Analysis of the Export Determinants of Indonesian Cocoa with Gravity Model Approach

Sry Adelina[1], Rulianda Purnomo Wibowo[2], Hasman Hasyim[2]

[1]Master of Agribusiness Study Program, Agriculture Department of University of Sumatera Utara
[2]Master of Agribusiness Study Program, Agriculture Department of University of Sumatera Utara

Corresponding Author: Sry Adelina

ABSTRACT

Cocoa is an important commodity exports because it can provide foreign exchange and significant to the Indonesian economy. There is a difference in the cocoa export value earned by Indonesia based on export destinations. Objective research in this study were to identify the main destination countries for Indonesian cocoa exports and analyze the determinant factors that affect the value of Indonesian cocoa exports to the main destination countries. The data used in this study were the panel data from 2009 to 2018 with the cross section of the main cocoa export destination countries which is nine countries that have the largest value of Indonesian cocoa. The analysis research used was a descriptive analysis and gravity model approach with fixed effect model technique using E-views 10 soft-ware program. The results of descriptive research showed that the main export cocoa Indonesia from the biggest to the smallest were Malaysia, United States of America, China, Singapore, Germany, the Netherlands, Australia, India and Brazil. The Results of the analysis showed that variable GDP shows had positive and significant influence, real exchange rate; distance and export tax of cocoa beans had negative and significant influence, while the variable of the world oil price and population of export destination countries did not show any significant influence.

Keywords: Indonesia's Cocoa Export, Gravity Model, Distance, Gross Domestic Product, Real Exchange Rate, world oil price and export tax of cocoa beans

INTRODUCTION

Cocoa (Theobroma cacao L.) is one of the export commodities from the agricultural sub-sector which is a national superior commodity whose role is quite important for the national economy and provides the third largest foreign exchange contribution after palm oil and rubber. Cocoa is one of the plantation commodities which are very suitable for Indonesia's climate and soil type, so that Indonesia can produce and produce cocoa. In addition, cocoa is also a provider of employment because it is able to absorb a large number of workers. The Indonesian culture that does not consume large quantities of cocoa and the cocoa bean processing industry that is not supportive has made cocoa more exported than sold in the domestic market (Puspita, Hidayat et al, 2015). Indonesia is in the 2nd position as the world's largest cocoa producer in the 2008-2013 period with an average of 780,223 tones.

Based on data obtained from ITS (2019), the export and import value of Indonesian cocoa from 2009 to 2018 in general continues to fluctuate. There are fluctuations in the value of cocoa exports which can be caused by many factors, including the occurrence of a global crisis which can result in a decline in national income from the export side and disrupt Indonesia's export performance. However, as time went on, export growth continued to increase after a sharp decline in export growth in 2010 (Andelisa, 2011). Meanwhile, the import value of Indonesian

cocoa has continued to increase from 2009 to 2018. This indicates that the demand for domestic cocoa products has increased over the past 10 years, while the export value indicates that foreign demand for cocoa has fluctuated. An increase in Indonesia's demand for imports occurred due to an increase in domestic industrial processing as a result of increased purchasing power of the people and the large interest of small industries in the chocolate business. However, the export value of Indonesian cocoa is still higher than that of cocoa imports (Andelisa, 2011).
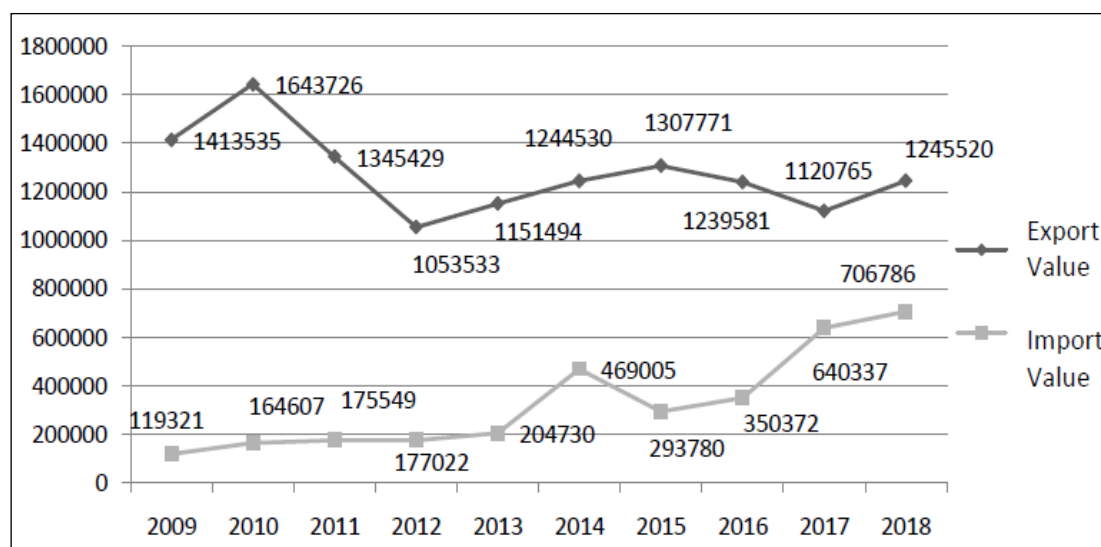

Figure 1: Export and Import Value of Indonesian Cocoa from 2009 to 2018 (Thousand USD).

The decline in exports was due to the introduction of export duties for cocoa beans by the government. The implementation of this export duty aims to stop the export of cocoa beans or at least experience a reduction. With this export duty, the selling price on the market will be more expensive than before but still of the same quality. This of course will hit the competitiveness of Indonesian cocoa beans. Industry circles will also be motivated to stop selling cocoa beans, but will focus on increasing the added value of the product so as not to lose. This can be seen in Figure 1.2, where slowly the export value of processed cocoa products such as cocoa paste, cocoa butter, and cocoa powder has begun to increase compared to before the export duty policy.

There are several ways that can be done to analyze the factors of trade between two countries, including the Gravity model approach. This model can be used to estimate the variables that affect trade in different regions, especially the variables of Gross Domestic Product (GDP), distance between countries, and populations in countries of origin and destination. The advantage of the gravity model compared to other trading models is because the model presented is more empirical. Unlike other models, the framework of this model predicts where countries will become full-fledged specialists rather than producing a variety of commodities (Sitorus, 2009).

Feenstra et al (1998) in Yuniarti (2007) state that the use of the Gravity model is based on Newton's law of gravity, which states that the gravitational force between two objects is directly affected proportionally by the masses of the two objects and vice versa is proportionally influenced by the square of the distance between them. In the context of trade, this model states that trade intensity between countries will be positively related to the national income of each country and inversely related to the distance between the two (Puspita, Hidayat et al, 2015).

The flow of Indonesian cocoa exports to partner countries depends on the Gross Domestic Product (GDP) of the

export destination country, the distance of Indonesia from various partner countries, and the population of the export destination countries. Besides that, it also lies in the exchange rate of the currency in effect at that time (Tarigan, 2005). The increase in Indonesian cocoa exports from year to year shows that the potential for the cocoa market is still high in the international market. This can be used by the Indonesian state to increase Indonesian cocoa exports so it is necessary to know the determinants that drive Indonesian cocoa exports in the international market.

Export Determinants

Export is the activity of removing goods from the region, while import is the activity of bringing goods into the region. International trade occurs when a country experiences excess supply, while other countries experience excess demand (Salvatore, 2013). Gross Domestic Product (GDP) is a measure of the capacity to produce the country's export commodities. GDP is the total national income in the output of goods and services. Lipsey stated that GDP is the value of the total production of goods and services in a country which is expressed as national production and the total value of this production is also the total income of the country concerned or in other words, the national product is equal to national income. This national product or income can also be measured in terms of gross national income, GNI or GDP. GDP is often seen as a reflection of economic performance and as the total economy of everyone in the economy (Mankiw. 2000).

The size of the exporting country will determine the amount of export commodity production (product capacity) and the size of the importing country determines the amount of export commodity production that can be sold by the exporting country (absortive capacity). The size of the economy is the country's potential ability to conduct foreign trade, namely the ability of the two countries to sell or buy export commodities. The larger the economic size

of the exporting country, the greater the ability to produce export commodities. Likewise, importing countries. the greater the size of the importing country's economy.

Export Duty Policy for Cocoa Beans

Export Duty is a duty imposed on goods transported by transportation out of a customs area. Determination of export goods subject to export goods is carried out by the Minister after obtaining considerations and / or recommendations from the minister in charge of trade and / or the minister / head of non-departmental government agencies / heads of related technical agencies. Based on Government Regulation (PP) No. 55 of 2008 concerning Imposition of Export Duty on Exported Goods, export duties are imposed with the aim of ensuring the fulfillment of domestic needs, protecting the preservation of natural resources, anticipating quite drastic price increases of certain export commodities on the international market and maintaining price stability certain commodities in the country.

Gravity Model

The gravity model (gravity model) according to Fitzsimons and Hogan (1991) is a model used to analyze the effects of economic integration on trade and is an analysis that can be used to estimate the value of goods entering and leaving an area. The model is then estimated for the many countries, time periods and levels of disaggregation. The trade-gravity model provides a more empirical analysis of trading patterns than other more theoretical models. The gravity model in its basic form, predicts trade based on the distance between countries and the interactions between countries in terms of their economy. This model mimics Newton's law of gravity which also takes into account the physical distance and size between two objects. This model has been shown to be robust empirically by econometric analysis. The gravity equation model has been used

extensively in various sectors such as migration.

Foreign Direct Investment and many others related to international trade as well as a reliable tool to analyze the phenomenon of free trade. The basic equation of the gravity model (Tij) is the product of A, Y_i ^ a and Y_j ^ b / D_ij ^ c where Tij is the trade value between country i and country j. Yi is the GDP of country i. Yj is the GDP of country j. Dij and is the distance between the two countries. This gravitational equation model is quoted from the theory of Krugman and Obstfeld (2002). They also argue that the background for naming gravity in this model is an analogy to Newton's theory of gravity: just as the gravitational attraction between two objects is proportional to mass and decreases with distance. Trade between two countries. Other things being equal, being proportional to GDP and decreasing with increasing distance.

Variables in a Gravity Model

Tarigan (2005) in Sitorus (2009) on the gravity model of bilateral trade flows is determined by three groups of variables, namely (1) the variable representing the total potential demand of the importing country (2) the indicator variable for the total potential supply of the exporting country (3) the supporting or inhibiting variables flow of trade between exporters and importers.

Tinbergen (1962) suggested that more or less the same functional form could be applied to international trade flows. The gravity model using the panel data approach is assumed to be influenced by predetermined variables such as GDP, exchange rate, population, economic distance, and the export price of each commodity (Telaumbanua, 2013).
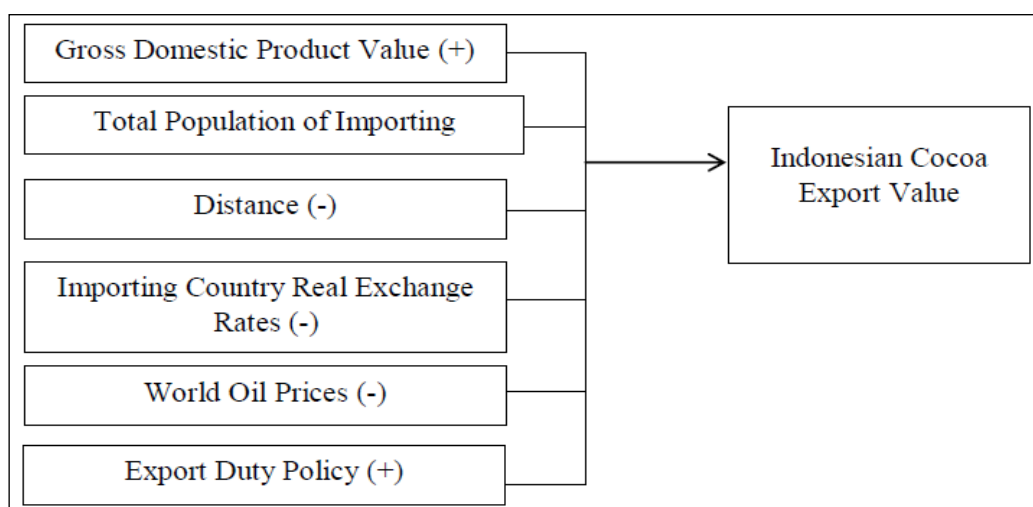
Conceptual Framework

Figure 2: Research conceptual framework

RESEARCH METHOD

The method of determining the sample in this study is purposive (deliberately). The sample is determined based on the largest Indonesian cocoa export value to the destination country from 2009 to 2018 and according to Sarwoko (2005) the panel data analysis method must meet the requirements, namely the number of cross sections must be greater than the number of research variables. This study uses panel data, which is a combination of time series data and cross section data from 2009-2018 which is processed using EViews 10 software. The trade data to be studied is cocoa commodity and its processed with 2-digit HS code, 18 is used for see the cocoa commodity and its processed products which are Indonesia's mainstay. To identify the main destination

countries for Indonesian cocoa exports in this study using descriptive analysis. Based on descriptive statistics, the value of Indonesian cocoa exports from the period 2009 to 2018 will be ranked so that the main destination countries for Indonesian cocoa exports are obtained.

This study will analyze the determinant factors that affect the value of Indonesian cocoa exports to the main destination country and analyze the value and significance of the influence of the independent variable Gross Domestic Product (GDP), population of the destination country for Indonesian cocoa exports, distance, the real exchange rate of the export destination country for Indonesian cocoa. , and export duty policies. Based on Supriana (2011) the models to be used in this study are:

$$\text{Ln EXPV}_i^t = \beta o + \beta 1 \text{In}(\text{PDB}_i^t \times \text{PDB}_j^t)$$
$$+ \beta 3 \ln \text{POP}_j^t + \beta 4 \ln \text{DIST}_j^t$$
$$+ \beta 5 \ln \text{PTO}^t + \beta 6 \ln \text{REER}_j^t$$
$$+ \beta 7 \, D1 + \mu \dots\dots\dots\dots (3.1)$$

$\beta 0$ = constant
$\beta 0, \dots, \beta 6$ = the parameters of each variable
t= (1,…,t); 2009-2018
j= (1,…,N); the main export destination country for Indonesian cocoa
I= Indonesia
EXPV_i^t = the value of Indonesian cocoa exports to j-country in t-year (US $)

PDB_i^t = the value of Indonesia's GDP in t-year (US $)
PDB_j^t = the GDP value of the importer j-country against t-year (US $)
POP_j^t = population of the importer j-country in t-year (inhabitants)
DIST_j^t = economic distance between the capital of Indonesia and the capital of the importer j-country in t-year (km)
PTO^t = World Oil Price in t-year (US$/bbl)
REER_j^t = the real exchange rate of the importer j-country in t-year
D1 = Dummy variable of cocoa trade policy, export duty policy
1 = Years after the implementation of export duty policy
0 = Years before the export duty policy was implemented
μ = error term

RESULT AND DISCUSSION

The export value of Indonesian cocoa to destination countries is different in each country. The destination countries for Indonesian cocoa exports in this study consist of Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil which are stated in US $ from 2009 to 2018.

Table 1: Descriptive Statistics of Indonesian Cocoa Export Value

Country	Export (US $)				
	Std Deviasi	**Mean**	**Median**	**Maximum**	**Minimum**
Malaysia	130.653.824	343.100.400	299.003.000	568.332.000	187.310.000
USA	81.626.497	265.187.600	260.675.500	372.475.000	145.578.000
China	22.573.408	69.797.200	69.840.500	111.400.000	25.962.000
Singapore	56.918.334	69.711.500	61.533.500	158.997.000	5.364.000
German	34.222.629	65.551.400	57.275.500	114.680.000	25.938.000
Netherland	28.546.931	41.853.500	35.046.500	107.271.000	10.383.000
Australia	12.383.732	41.122.000	41.674.500	63.444.000	24.685.000
India	17.292.898	35.505.200	35.561.500	67.462.000	8.022.000
Brazil	34.531.346	35.063.600	17.821.500	105.477.000	9.756.000

Based on these data, Malaysia is the export destination country for Indonesian cocoa with the highest average (mean) total export value and the country with the lowest average total export value, namely Brazil. Meanwhile, the United States is the export destination country for Indonesian cocoa

which has a relatively stable total export value.

Estimation of Determinant Analysis of Indonesian Cocoa Exports Using the Gravity Model

In this study, the Chow test was found to be the best model among the selected estimation results when the data was processed using the E-Views 10 program.

Table 2.Chow test using the E-views 10 software

Effects Test	Statistic	d.f.	Prob.
Cross-section F	18.335889	(8,75)	0.0000
Cross-section Chi-square	97.540099	8	0.0000

Based on the results of the Chow test estimation using the period-random method, it shows the chi-square value of 0.0000 and the probability of 0.0000 so that it can be seen from the probability value that is smaller than the 0.05 level. Thus, it can be concluded that this study uses a random Fixed Effect Model (FEM).

Testing Assumptions and Model Suitability

1. Normality Test

The gravity model of the Indonesian cocoa trade flow compiled in this study has met the normality assumption test. This is shown by the results of the Jarque Bera test. At the ten percent real level, the p-value is 0.560066. The value obtained is greater than the real level of ten percent or 0.1, so it can be concluded that the assumption of normality has been fulfilled.

2. Autocorrelation

The autocorrelation test on the estimated results of the cocoa trade analysis in this study was carried out using the Durbin-Watson statistical test, the statistical results in the Durbin-Watson test after the model improvement were 1.868 while the values of du and dl with n (number of observations) = 90, t (total cross section) = 9 and k (number of independent variables = 6, resulting in a value of du = 1.80, dl = 1.52 and 4 - dw = 2.13. So based on this it can be concluded that the criteria for the right decision area for calculation it is du (1.80) <dw (1,868) <4-dw (2.13) which means that accept H0 or there is no positive autocorrelation or negative autocorrelation at the five percent significance level.

3. Multicollinearity

Based on the Klein test, the model can be declared free from multicollinearity because none of the correlation coefficients between variables exceeds the coefficient of determination (R-square) 0.891255. This is also supported by the statistical test t, F, and p-value which are significant. Based on the t-statistic test with a five percent level, there are four independent variables in the model that are stated to have a significant effect, namely the GDP variable, Indonesia's distance to the destination country, the real exchange rate of the export destination country and policies. Thus, in general, all variables used in the regression model have met the multicollinearity assumption.

Statistical Testing

Table 3: Estimation Results of Indonesian Cocoa Export Determinants Using the Gravity Model Approach

No.	Variable	Coefficient	Significance
	Constanta (C)	240.5403	0.0143
1	GDP	0.247444	0.0033
2	Population of Export Destination Countries (POPJ)	10.53837	0.6737
3	Distance (DIST)	-0.947483	0.0136
4	World Oil Prices (PTO)	-0.636813	0.0009
5	Real Exchange Rates (REER)	-0.608357	0.6601
6	Policy (D1)	-0.495539	0.0584
R-squared		0.891255	
Adjusted R-squared		0.833622	
S.E. of regression		0.649050	
F-statistic		11.99418	
Prob(F-statistic)		0.000000	

Table 4: Individual Hypothesis Test Results (t-test)

Variable	Coefficient	t-Statistic	Prob.
GDP	0.247444	0.422791	0.0033*
Population of Export Destination Countries (POPJ)	10.53837	3.034010	0.6737
Distance (DIST)	-0.947483	-0.822126	0.0136*
World Trade Oil (PTO)	-0.636813	-0.441466	0.0009*
Real Exchange Rates (REER)	-0.608357	-3.472390	0.6601
Policy (D1)	-0.495539	-1.921708	0.0584*

T-table: 1.66342; * significant at the 5% confidence level

- Simultaneous Hypothesis Testing (Test F)

Based on Table 4.4. by using the F-test with a significance level of 95 percent ($\alpha = 5\%$) and degrees of freedom (df1 = k-1), df2 = nk, where n is the number of observations (90) while k is the number of independent variables (6), then by comparing the calculated F value and the F table or by comparing the calculated F with the P-value. It turns out that F-count is greater than F. Table (11.99> 2.32), whereas when compared between the probability F statistical with the real level of 0.05, the statistical probability F value is smaller than the significance level of 0.05 (0.000 <0, 05). Thus, it can be concluded that simultaneously the population variables of the country of destination for Indonesian cocoa exports (POPj), the real exchange rate of the importing country (REER), distance (DIST), GDP, world oil prices (PTO) and the export duty policy variable for cocoa beans (D1) has a significant effect on the export value of Indonesian cocoa.

- Individual Hypothesis Testing (t-test)

In the regression equation of the factors that influence the value of Indonesian cocoa exports, it is shown that the independent variables, namely policy, real exchange rate distance and GDP have a smaller probability value than the 0.05% real level, except for the world oil price variable and the population of the export destination countries. By using the t-test with a significance level of 95% ($\alpha = 5\%$), the table value is 1.66342. This shows that based on the comparison between the t-statistic and the t-table or by looking at the probability value. Based on Table 4, it can be seen that the GDP variable has a significant and positive effect on the

variable value of Indonesian cocoa exports. This shows that each increase in GDP will affect the increase in the value of Indonesian cocoa exports to export destination countries.

The population variable of the export destination country does not have a significant and negative effect on the variable value of Indonesian cocoa exports. This shows that the variable population of the destination country does not have a significant effect on the value of Indonesian cocoa exports to Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil. Furthermore, the variable distance between the country of Indonesia and the export destination countries (Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil) has a significant and negative effect on the variable value of Indonesian cocoa exports. This shows that the farther the distance, the lower the value of Indonesian cocoa exports to Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil.

Furthermore, the world oil price variable does not have a significant and negative effect on the variable value of Indonesian cocoa exports. This shows that world oil prices do not have a significant effect on the value of Indonesian cocoa exports to Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil. The real exchange rate variable of the importing country has a significant and negative effect on the variable value of Indonesian cocoa exports. This shows that any increase in the exchange rate tends to reduce the value of Indonesian cocoa

exports to Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil. Furthermore, the policy variable between the country of Indonesia and the export destination country has a significant effect on the variable value of Indonesian cocoa exports. This shows that the policy variable has a significant and negative effect on the value of Indonesian cocoa exports to Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil.

- Coefficient of Determination (R2)

In the regression equation for the variable value of Indonesian cocoa exports to Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil, the R-squared value is 0.891255. This value indicates that 89.12 percent change in the dependent variable (the variable value of Indonesian cocoa exports) can be explained by independent variables (population of export destination countries, real exchange rate, distance, GDP, PTO and policies) while the remaining 10.88 percent is explained by other factors outside the model.

CONCLUSION

The main export destinations for Indonesian cocoa are Malaysia, the United States, China, Singapore, Germany, the Netherlands, Australia, India and Brazil.

The determinants chosen in the research model are able to explain the flow of Indonesian cocoa export trade to its destination countries by 89.12 percent. The remaining 10.88 percent is explained by other factors not included in the model or error. Through the fixed effect model approach, it is known that Gross Domestic Product shows a positive and significant effect, the real exchange rate variable, distance and the export duty policy for cocoa beans show a negative and significant effect, while the world oil price variable and the population of the cocoa export destination countries do not show significant influence on the value of Indonesian cocoa exports in the period 2009-2018.

REFERENCES

1. Andelisa,N.,2011. *Analisis Daya Saing Aliran EksporProduk Crude Coconut Oil (CCO) Indonesia*. Skripsi. Departemen IlmuEkonomi.Fakultas Ilmu Ekonomi dan Manajemen. IPB. Bogor.
2. Bergstrand, J.H. 1985. *The Gravity Equation in International Trade. Some Microeconomic Foundation and Emprical Evidence*. The Review of Economic and Statistic. Vol 67. No.3 Center, I. T. (2015). *2001-2015*. International Trade Center.
3. Ekanayake, E.M, Amit Mukherjee, Bala Veeramacheneni. 2010. *Trade Blocks and Gravity Model: A Study of Economic Integration Among Asian Developing Countries.* Journal of Economic Integration. 25(4), December 2010; 627-643
4. Federal Reserve Economic Data of St. Louis. 2019. *Economic Research, Federal Reserve Bank of St. Louis: Real Broad Effective Exchange Rate*. Diakses Oktober 2019 dari https://fred.stlouisfed.org
5. Feenstra, Robert C. *et al*. (1998) *Understanding The Home Market Effect and The Gravity Equation: The role of Differentiating Goods*. http://www.nber.org/papers/w6804.
6. Fitzsimons, Emla, Vincent Hogan, J. Peter Neary (1991). *Explaining The Volume North-South Trade in Ireland: Gravity Model*. The Economica and Social Riview. Vol. 30. No. 4. Oktober.
7. Frankel JA, Stein E, Wei S-J. 1997. *Regional trading blocs in the world economic system*: Peterson Institute.
8. Gujarati, Damodar. 1997. *Ekonometrika Dasar*. Alih Bahasa Sumarno Zain. Erlangga : Jakarta.
9. Gujarati, Damodar. 2007. *Ekonometrika Dasar*. Alih Bahasa Sumarno Zain. Erlangga : Jakarta.
10. Hadi,I. 2009. *Analisis Faktor-Faktoryang Mempengaruhi Aliran Perdagangan Pisangdan ManggaIndonesiakeNegaraTujuan*.Departe menAgribisnis. Skripsi. Departemen Ilmu Ekonomi. Fakultas Ilmu Ekonomi dan Manajemen. IPB. Bogor.

11. Indonesia Jarak. 2019. *Jarak Antar Negara*. Diakses September 2019 dari http://indonesia.distanceworld.com/dc

12. International Trade Center (ITC). 2019. *International trade statistics*. Diakses Oktober 2019 dari http://www.intracen.org/itc/market-info-tools/trade-statistics/.

13. Khaliqi, M. 2017. *Dampak Kebijakan Non-Tariff Measures Terhadap Ekspor Udang Indonesia. Tesis. Sekolah Pascasarjana.* Institut Pertanian Bogor. Bogor.

14. Kien NT. 2009. *Gravity model by panel data approach: an empirical application with implications for the ASEAN free trade area*. ASEAN Economic Bulletin.

15. Krugman, P.R dan Obstfeld, M. 2002. *Ekonomi Internasional: Teori dan Kebijakan*. Jakarta: PT Raja Grafindo Persada.

16. Li,K.,Song,L.,&Zhao,X.2008.*ComponentTradeandChina'sGlobalEconomic Integration.* Unu-Wider, No.2008/10, 26 pages. *http://ovidsp.ovid.com/ovidweb.cgi?T=JS& CSC=Y&NEWS=N&PAGE=fulltext&D=econ&AN=1035295*

17. Lipsey RG, Steiner PO, Purvis D. 1995. *Pengantar Mikroekonomi*. Jilid kesatu. Edisi Kesepuluh. Jakarta: Binarupa Aksara.

18. Lubis, N.A.R.. 2017. *Analisis Faktor yang Mempengaruhi Ekspor Kakao Indonesia ke Singapura (Tahun 2001 – 2015).* Jurnal. Jurusan Ilmu Ekonomi. Fakultas Ekonomi. Universitas Islam Indonesia.

19. Mankiw, N.G. 2000. *Macroeconomics*. Worth Publisher. New York.

20. _____ 2007. Makroekonomi. Edisi Keenam. Liza, F dan Nurmawan, I [Penerjemah].Gelora Aksara Pratama: Jakarta.

21. Manurung,J.J, A.H.Manurung, dan F.D.Saragih,2005,*Ekonometrika:Teori dan Aplikasi.* Jakarta: Elex Media Komputindo.

22. Nizar, M.A., 2012. *Dampak Fluktuasi Harga Minyak Dunia Terhadap Perekonomian Indonesia*, Buletin Ilmiah Litbang Perdagangan, Vol.6 No.2, Desember.

23. Organization of the Petroleum Exporting Countries (OPEC). 2019. *Market Indicators 2009 - 2018*. Diakses Oktober 2019 dari https://www.opec.org/opec_web/en/data_graphs/1993.htm

24. Pusat Data dan Sistem Informasi Pertanian. 2016. *Outlook Kakao*. Kementerian Pertanian.

25. Puspita,R., Kadarisman Hidayat, Edy Yulianto.2015.*Pengaruh ProduksiKakao Domestik, HargaKakao Internasiona, DanNilaiTukar Terhadap Ekspor KakaoIndonesiaKe Amerika Serikat (Studipada Ekspor Kakao Periode Tahun2010-2013)*. Jurnal Administrasi Bisnis27.

26. Retnowati, J.D. 2007. *Analisis Faktor-Faktor Determinan Perdagangan Intra-Industri Komoditas Information and Communivcation Technology (ICT) Antar Negara-Negara ASEAN-5*. Skripsi Departemen Ilmu Ekonomi. Fakultas Ekonomi dan Manjemen. Institut Pertanian Bogor.

27. Salvatore, D. (2013). *International Economics, [11th Edition]*. New Jersey: Wiley.

28. Sarwoko, 2005. *Dasar-dasar Ekonometrika*. Yogyakarta: Penerbit ANDI.

29. Sitorus, M. 2009. *Peningkatan Ekspor CPO dan Kakao di bawah pengaruh liberalisasi Perdagangan (Suatu Pendekatan Model Gravitasi)*. Skripsi. Departemen Ilmu Ekonomi. Fakultas Ilmu Ekonomi dan Manajemen. IPB. Bogor.

30. Soraya, B. 2013. *Analisis Determinan Ekspor Karet Indonesia dengan Pendekatan Gravity Model.* Tesis. Program Studi Magister Agribisnis. Fakultas Pertanian. Universitas Sumatera Utara. Medan.

31. Supriana, T. 2011. *Indonesia Trade Under China Free Trade Area*. Economic Journal of Emerging Markets. August 3(2) 139-151.

32. Tambunan, T. (2001). *Perdagangan Internasional dan Neraca Pembayaran: Teori dan Temuan Empiris*. Jakarta: Pustaka LP3ES.

33. Tarigan, R. 2005. *Perencanaan Pengembangan Wilayah Edisi Revisi*. Bumi Aksara. Jakarta.

34. Telaumbanua E. 2013. *Analisis Determinan Ekspor Provinsi Sumatera Utara: Pendekatan Gravity Model* [DIsertasi]. Medan: UNIMED

35. The World Bank. 2019. *Data Bank, World Depelopment Indicators : GDP (Current US$)*. Diakses Oktober 2019 dari https://databank.worldbank.org/indicator/NY.GDP.MKTP.CD/1ff4a498/Popular-Indicators.

36. _____ 2019. *Data Bank, World Development Indicators: Population (Total)*. Diakses Oktober 2019 dari https://databank.worldbank.org/indicator/SP .POP.TOTL/1ff4a498/Popular-Indicators.
37. Tinbergen J. 1962. *Shaping the World Economy The Twentieth Century Fund*. New York.
38. Yuniarti, 2007. *Analisis Determinan Perdagangan Bilateral Indonesia Pendekatan Gravity Model*. Fakultas Ekonomi. Universitas Ahmad Dahlan. Jurnal Ekonomi Pembangunan.

******