Competitiveness of Indonesian Clove Exports in the International Market

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	Abstract
Keywords: Clove; Export; Gravity Model; RCA	Clove production in Indonesia is not only aimed at meeting domestic needs but also targeted to fulfill export demands in the international market. This study aimed to analyze the competitiveness of Indonesian clove exports and examine the factors influencing the volume of Indonesian clove exports to ten main destination countries. The research method utilized was Secondary Data Analysis. The data employed in this study consist of secondary data in the form of time series and cross-sectional data from the top ten destination countries for Indonesian clove exports during the period 2001 – 2022. The data analysis techniques included Revealed Comparative Advantages analysis and panel data regression (gravity model) using the Random Effect Model with Cross-Section Seemingly Unrelated Regression weighting. The research findings indicate that, in general, Indonesian clove commodities in the top ten destination countries exhibit strong competitiveness, as evidenced by the average Revealed Comparative Advantage (RCA) of Indonesian cloves in these countries being greater than one (>1). Additionally, the panel data regression results demonstrate that the real Gross Domestic Product per capita of Indonesia, the real Gross Domestic Product per capita of the destination countries, the population of the destination countries, and the real exchange rate have a positive and significant impact on the volume of Indonesian clove exports. Conversely, the economic distance variable has a negative and significant impact on the volume of Indonesian clove exports.

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INTRODUCTION

Cloves are among the 15 leading national plantation commodities prioritized for development in the plantation sector, particularly for domestic consumption and export in the international market. These 15 commodities include rubber, coconut, oil palm, coffee, cocoa, tea, cashew nuts, cloves, pepper, castor, sugar cane, tobacco, cotton, patchouli, and candlenuts. Plantation commodities are the mainstay sector and play a crucial role in national development. Their roles include being a source of foreign exchange through exports, food sources, job providers, raw materials for industries, and increasing community income (Hidayah et al., 2021). Cloves are one of the main export commodities in the plantation subsector contributing to the country's foreign exchange earnings through its export activities. This indicates that cloves play a significant role in the Indonesian economy (Haryana et al., 2021). The volume of Indonesian clove exports in the international market fluctuates with an average annual growth rate of 14%. According to Statistics Indonesia (2021), Indonesia's highest export volume occurred in 2020 with a value of 47,357 tons. Based on its export trend, the volume of Indonesian clove exports remains stagnant at 20,000 – 40,000 tons per year and shows an increasing trend albeit fluctuating. This means Indonesia has the opportunity to enhance its competitiveness as the largest clove exporter in the international market. Indonesia's export opportunities allow for specialization in producing competitive commodities efficiently to compete with other exporters in the international market (Pratiwi, 2021). Indonesian clove exports in the international market are concentrated in its top ten destination countries: India, the United Arab Emirates, Singapore, China, Pakistan, Saudi Arabia, the United States, Vietnam, the Netherlands, and Malaysia. Indonesia consistently exports cloves to these ten countries from 2001 to 2022. Indonesian clove exports to its top ten destination countries must maintain stability to preserve Indonesia's position in the clove export competition in the international market. A decrease in Indonesian clove exports can impact Indonesia's market share. The impact of declining Indonesian clove export performance is market share instability, which will subsequently affect the competitiveness of Indonesian cloves (Hidayati & Ekaria, 2023).

Alongside the development of international market demands, the demand for cloves from Indonesia continues to experience significant growth. This is evidenced by the average export volume from various major clove-producing countries in the world over the past decade, where Indonesia ranks second, showing the highest difference from other competing countries such as Madagascar and Tanzania

(Pratama & Darwanto, 2019). The fluctuating performance of clove exports is partly due to conflicts of interest regarding the limited quantity of clove commodities. On one hand, the use of cloves to meet domestic demand can be seen as an effort to fulfill the needs of Indonesian society for essential raw materials in the cigarette and pharmaceutical industries. The essential oil contained in clove roots, stems, leaves, and flowers contain several active ingredients such as eugenol, tannins, saponins, flavonoids, and alkaloids (Panuluh, 2019). Cloves are typically used as additives in cooking, beverages, the kretek cigarette industry, dental care products, perfumes, and medications. Clove commodities are extensively used as raw materials in the food and beverage industry, cigarettes, traditional herbal medicine *(jamu),* pharmaceuticals, and cosmetics (Rukmana & Yudirachman, 2016). Meanwhile, on the other hand, exporting cloves to the international market can provide significant financial benefits to exporters and serve as a source of foreign exchange for the country.

The high focus on clove production to meet domestic demand and export needs in the global market presents a major challenge for Indonesia. Cloves play a crucial role in creating employment opportunities, generating foreign exchange earnings, providing raw materials for industries, increasing farmers' income, and supporting environmental preservation (Rukmana & Yudirachman, 2016). The demand for Indonesian cloves from export destination countries over the past 20 years has been unstable due to fluctuating volume and value. Therefore, research on the "Competitiveness and Factors Influencing the Volume of Indonesian Clove Exports in the International Market" is highly important, analyzing the effects of Gross Domestic Product, the population of the main destination countries, economic distance, real exchange rate on the volume of Indonesian clove exports to the main export destination countries. Research on competitiveness and factors influencing the volume of clove exports is crucial because Indonesia heavily relies on exports for economic growth. The increasing trends in export volume and value should have drawn more attention from the government and stakeholders (Nursodik et al., 2022). By considering these factors, the government can take strategic steps to enhance the competitiveness of Indonesian cloves in the international market.

The study by Zuhdi et al. (2021) traced the development of Indonesian clove exporters and four main exporting countries as well as the competitiveness of Indonesian cloves and four main clove-exporting countries in the international market from 2001 to 2019. The research findings indicate that the level of export competitiveness and comparative advantage of cloves held by Indonesia tend to

increase. The study conducted by Zuhdi et al. (2021) aimed to analyze the competitiveness of Indonesian cloves with comparative advantage using RCA and competitive advantage using ECI. The research conducted has novelty compared to previous studies. This research focused on analyzing the competitiveness of clove exports and four main exporting countries in the international market from 2001 to 2019, while this study has novelty by analyzing the competitiveness of Indonesian clove exports to ten export destination countries in the international market from 2001 to 2022. Additionally, the novelty of this research lies in delving deeper into factors that can influence the volume of Indonesian clove exports in the international market using the Gravity Model approach. The objectives of this research are 1) to analyze the competitiveness of Indonesian clove exports in the international market, and 2) to analyze the factors influencing the volume of Indonesian clove exports in the international market.

RESEARCH METHODS

The research location is Indonesia. The research location was chosen considering that Indonesia is the world's second-largest exporter of cloves (Trade Map, 2023). The research was conducted over two months, specifically in October - November 2023. The period used in this study spans from 2001 to 2022.

The type of data used in this research was secondary data in the form of time series and cross-sectional data from the top ten destination countries for Indonesian clove exports, such as India, the United Arab Emirates, Singapore, China, Pakistan, Saudi Arabia, the United States, Vietnam, the Netherlands, and Malaysia. The data used includes the value and volume of Indonesian clove exports with HS code 0907 cloves (whole, flower, and stem) to the ten destination countries mentioned, real Gross Domestic Product per capita for Indonesia from 2001 to 2022, real Gross Domestic Product per capita for the main destination countries from 2001 to 2022, population of the destination countries from 2001 to 2022, real exchange rate of the destination countries from 2001 to 2022, and economic distance from 2001 to 2022. Secondary data was obtained from various sources including Statistics Indonesia (BPS), the Center for Agricultural Data and Information Systems of the Ministry of Agriculture, Trade Map, United Nations Commodity Trade Statistics Database (UN Comtrade), FAOSTAT, World Bank, as well as other information from various literature sources.

This study employed a quantitative descriptive method. The quantitative descriptive method was conducted using the approach of Secondary Data Analysis (SDA). The data analysis method was based on the research objectives:

1. The first objective was analyzed using the Revealed Comparative Advantage (RCA) analysis method. The concept of Revealed Comparative Advantages (RCA) analysis is a method whereby each country can determine the optimal direction of investment and which trading markets should be targeted based on their comparative advantage analysis (Aurelia et al., 2022). RCA calculation was performed using the following formula:

$$RCA = \frac{Xik/Xit}{Xwk/Xwt}$$

Where:

Xik   : Value of clove commodity exports from Indonesia (USD)

Xit   : Total export value from Indonesia (USD)

Xwk   : Value of world clove commodity exports (USD)

Xwt   : Total world export value (USD)

An RCA value > 1 indicates that a country has a comparative advantage for a specific commodity. A value < 1 indicates that a country is not a competitive producer and exporter of a commodity (Rossato et al., 2018).

2. The second objective was analyzed using the panel data analysis method (Gravity Model). The gravity model regression equation was then transformed into a log-linear form as follows:

$$LnEKS_{ijt} = \alpha_0 + \beta_1 \ln GDPRPI_t + \beta_2 \ln GDPRPN_{jt} + \beta_3 \ln POP_{jt} + \beta_4 \ln NTR_{jt} + \beta_5 \ln JE_{jt} + \varepsilon_{it}$$

Where:

$LnEKS_{ijt}$: Volume of Indonesian clove product exports to the destination country (tons)

$LnGDPRPI_{it}$: Real Gross Domestic Product per capita of Indonesia in the years 2001-2022 (USD)

$LnGDPRPN_{jt}$: Real Gross Domestic Product per capita of the destination country in the years 2001-2022 (USD)

$LnPOP_{jt}$: Population of the destination country in the years 2001-2022 (people)

$LnNTR_{jt}$	: The real exchange rate of Indonesia against the destination country (IDR/LCU)
$LnJE_{ijt}$	: Economic distance between Indonesia and the destination country (km)
$α_0$	: Constant
$β_{1,2,3,4,5,6}$	: Suspected parameters
$ε_{it}$	: Random error

The estimation approach in panel data consists of three approaches, including: (1) Common Effect Model (CEM); (2) Fixed Effect Model (FEM); and (3) Random Effect Model (REM) (Gujarati and Porter, 2015).

In determining the suitable model for use in panel data regression, several tests must be conducted, including:

a. Chow Test

    The Chow Test is used to determine whether the Fixed Effect Model (FEM) is better than the Common Effect Model (CEM).

b. Hausman Test

    The Hausman Test is used to determine whether the Fixed Effect Model (FEM) is better than the Random Effect Model (REM).

c. Lagrange Multiplier Test (LM)

    The Lagrange Multiplier Test is used to determine whether the Common Effect Model (CEM) is better than the Random Effect Model (REM).

After determining the best model, the model must pass the Gauss-Markov Assumptions Test. The Gauss-Markov assumption test is used to detect normality, multicollinearity, heteroscedasticity, and autocorrelation in the data (Gujarati and Porter, 2015).

a. Normality Test

    Testing the assumption of normality can be done by conducting a Jarque-Bera test (Gujarati and Porter, 2015).

b. Multicollinearity Test

    If the correlation coefficient between variables does not exceed 0.80, it can be concluded that the model used does not detect multicollinearity issues (Gujarati and Porter, 2015).

c. Heteroscedasticity Test

    If the probability value is higher than the critical value of 0.05, the null hypothesis is accepted. However, if the probability value is lower than the

critical value of 0.05, the null hypothesis is rejected (Gujarati and Porter, 2015).

d. Autocorrelation Test

Autocorrelation can be tested by examining the Durbin-Watson statistic.

The next step is to conduct significance tests to see the magnitude of the influence between variables. The significance tests used in this study are: the partial significance test (t-test), simultaneous significance test (F-test), and coefficient of determination test (R^2).

a. Partial Significance Test (t-test)

This test is conducted using a significance level of 0.05 or α = 5%. If the probability value is less than the predetermined α, the independent variable partially affects the dependent variable significantly (Gujarati and Porter, 2015).

b. Simultaneous Significance Test (F test)

If the probability value (F-statistic) is below the significant level, it can be concluded that all independent variables affect the dependent variable simultaneously (Gujarati and Porter, 2015).

c. Coefficient of Determination Test (R^2)

An R^2 value approaching one means that the independent variables provide almost all the information needed to predict the dependent variables (Gujarati and Porter, 2015).

RESULTS AND DISCUSSION

Comparative Advantage Analysis

The comparative advantage analysis is employed to analyze the export competitiveness of Indonesian cloves in the top ten destination countries from 2001 to 2022. Comparative advantage can be calculated using the Revealed Comparative Advantages (RCA) method. If RCA is greater than 1, it indicates that the share of the product in the total exports of a country is greater than the share of that product in the international market as a whole. Conversely, if RCA is less than 1, it indicates that the share of the product in the total exports of a country is relatively smaller (Nalurita et al., 2014). The values of Revealed Comparative Advantages (RCA) for Indonesian cloves in the top destination countries are presented in the following Table.

Table 1. Results of Comparative Advantage Analysis in Asia Continent

		Revealed Comparative Advantage Value							
Indonesian Clove Export Destinations		Asia							
No	Year	Arab Saudi	China	India	Malaysia	Pakistan	Singapura	Uni Emirat Arab	Vietnam
1	2001	7.38	3.10	4.36	15.70	0.00	1.18	0.10	0.00
2	2002	17.59	15.00	3.11	15.05	0.00	8.13	4.75	81.30
3	2003	130.09	20.70	11.57	4.56	12.99	4.69	10.98	2920.22
4	2004	123.65	11.15	10.61	0.97	3.69	2.14	9.83	52.31
5	2005	138.92	87.59	4.68	1.52	10.66	2.78	6.78	414.89
6	2006	149.20	1117.68	12.41	6.64	8.09	5.40	9.93	121.29
7	2007	209.03	39.52	12.66	9.61	12.47	7.35	10.64	206.59
8	2008	93.14	113.18	0.86	14.07	0.42	0.33	1.91	19.58
9	2009	46.17	45.80	0.99	2.40	2.49	0.06	2.20	185.33
10	2010	107.22	43.44	0.71	2.68	6.72	1.18	2.66	392.92
11	2011	82.98	3.28	3.06	0.68	7.98	0.16	0.20	101.83
12	2012	65.85	6.42	1.04	2.94	8.23	0.92	2.89	115.55
13	2013	62.72	6.04	0.27	5.69	10.39	1.70	0.11	107.81
14	2014	48.63	35.51	1.22	0.63	8.66	3.24	0.97	73.75
15	2015	59.39	28.34	1.46	5.72	16.47	5.71	9.07	244.97
16	2016	110.23	1135.75	1.41	2.08	14.19	0.98	19.12	228.42
17	2017	44.98	182.31	0.93	1.66	7.21	0.72	11.15	54.42
18	2018	88.69	392.16	6.47	1.83	23.13	3.74	46.69	766.28
19	2019	82.07	75.47	12.66	7.36	25.35	12.57	86.92	269.99
20	2020	77.85	79.07	10.28	2.10	20.41	15.80	117.04	949.56
21	2021	47.04	13.38	8.81	4.63	12.54	7.41	88.20	45.80
22	2022	60.98	16.95	0.97	1.76	8.86	0.61	24.03	17.96
Average		84.26	158.72	5.02	5.01	11.04	3.94	21.18	350.98

Source: Processed from Trade Map data (2023)

Table 2. Results of Comparative Advantage Analysis in America Continent

	Revealed Comparative Advantage Value	
Indonesian Clove Export Destinations		Amerika Continent
No	Year	United States
1	2001	6.93
2	2002	8.37
3	2003	19.02
4	2004	23.55
5	2005	22.62
6	2006	14.38
7	2007	25.40
8	2008	34.11
9	2009	14.57
10	2010	21.02
11	2011	17.83
12	2012	30.43

13	2013	44.21
14	2014	48.75
15	2015	42.98
16	2016	29.17
17	2017	31.56
18	2018	61.22
19	2019	57.25
20	2020	66.83
21	2021	25.18
22	2022	24.42
	Average	21.18

Source: Processed from Trade Map data (2023)

Table 3. Results of Comparative Advantage Analysis in Europe Continent

Revealed Comparative Advantage Value		
Indonesian Clove Export Destinations		**Europe Continent**
No	**Year**	**Netherlands**
1	2001	19.82
2	2002	12.29
3	2003	21.53
4	2004	20.71
5	2005	6.58
6	2006	10.45
7	2007	14.61
8	2008	2.61
9	2009	5.32
10	2010	3.84
11	2011	2.60
12	2012	9.59
13	2013	7.08
14	2014	17.15
15	2015	9.45
16	2016	1.73
17	2017	4.57
18	2018	8.47
19	2019	22.29
20	2020	58.00
21	2021	17.78
22	2022	9.95
	Average	**13.01**

Source: Processed from Trade Map Data (2023)

From the data provided in Tables 1, 2, and 3, it is evident that the RCA (Revealed Comparative Advantage) value of Indonesian cloves in the top ten destination countries for export, spanning across three different continents namely Asia, America, and Europe from 2001 to 2022, demonstrates comparative advantage and strong competitiveness in each market as it exhibits values greater than one (>1), except in India in the years 2008, 2009, 2010, 2013, 2017, and 2022, Malaysia in 2004, 2011, and 2014, Pakistan in 2008, Singapore in 2008, 2009, 2011, 2012, 2016, 2017, and 2022, as well as the United Arab Emirates in 2001, 2011, 2013, and 2014. According to Aji et al. (2017), the concept of Revealed Comparative Advantages (RCA) analysis is a method whereby each country can determine optimal investment directions and which trading markets should be targeted based on the comparative evaluation of their relative advantages. If a commodity possesses strong competitiveness, it can be well-received in international markets. This aligns with the assertion of Samah (2018), stating that good competitiveness in terms of quality and price can facilitate the acceptance of commodities in international markets, subsequently leading to an increase in export value and volume. This is in line with the opinion of Irfanda & Yuliawati (2019), who suggest that fundamentally, a region has the capability to produce a commodity or product that possesses uniqueness or distinctiveness, thus making it competitive, consequently resulting in higher selling prices.

Vietnam represents the highest market opportunity for Indonesian cloves. The stable RCA (Revealed Comparative Advantage) value of Vietnam, which ranks the highest, is attributed to the limited entry of other clove-exporting competitors into the Vietnamese market. According to Trade Map (2023), for three consecutive years, Indonesian clove exports to Vietnam have experienced a decline. This decline is attributed to the decrease in clove prices and issues related to clove production in Indonesia. Supported by data from the Ministry of Agriculture (2022), which indicates that in 2020, both domestic and international clove prices experienced a decrease of 14.81% due to the government's recommendation for people to reduce outdoor activities during the pandemic season, leading to a decrease in demand and consequently prices of cloves. China ranks second, showing fluctuating RCA values. According to Trade Map (2023), Indonesia is no longer the primary exporter of cloves to China. Throughout the period from 2018 to 2022, China imported more cloves from Madagascar. This triggered the decrease in Indonesia's RCA value for cloves in the Chinese market during that period. The third position is held by Saudi Arabia with an average RCA value of 84.26. The stable RCA value of Saudi Arabia,

consistently exceeding 1, is due to the limited entry of other competitors into the Saudi Arabian market. According to Trade Map (2023), countries exporting cloves to Saudi Arabia include Indonesia, Madagascar, and Sri Lanka.

The fourth position is held by the United States. The stable RCA (Revealed Comparative Advantage) value of Indonesian cloves in the United States, consistently exceeding 1, is due to the limited entry of other competitors into the US market. Indonesia remains the primary exporter with higher export values compared to other competitors. According to Trade Map (2023), the United States imports cloves from Indonesia, Madagascar, India, and Sri Lanka, but these three competitors have lower export values compared to Indonesian clove exports. The fifth position is followed by the United Arab Emirates. The RCA value of Indonesian cloves in the United Arab Emirates has declined for two consecutive years from 2021 to 2022. According to Trade Map (2023), this is because Indonesia is no longer the largest exporter of clove commodities to the United Arab Emirates. The sixth position is held by the Netherlands. According to Trade Map (2023), the RCA value of Indonesian cloves to the Netherlands in 2016 was affected by the Netherlands importing more cloves from countries such as Comoros, Madagascar, France, Tanzania, Sri Lanka, Vietnam, and Germany. The seventh position is Pakistan. The RCA value of Indonesian cloves in Pakistan has experienced a four-year consecutive decline, starting from 2019 to 2022. According to Trade Map (2023), this decline occurred because Pakistan reduced its demand for Indonesian clove exports, although Indonesia still remains the main clove exporter to Pakistan.

The eighth position is India. The continuous decrease in the RCA value of Indonesian cloves to India from 2019 to 2022 is due to India reducing its demand for Indonesian clove exports. Cloves imported from Indonesia will be used as inventory for re-export to countries such as the United States, Singapore, Canada, the United Arab Emirates, and others that have demand for cloves. India, as the world's second-largest importer, imports cloves from various countries to then re-export as a means of increasing domestic foreign exchange. The ninth position is Malaysia. The RCA value of Indonesian cloves to Malaysia is relatively low because Malaysia imports more cloves from other competitors. According to Trade Map (2023), starting from 2009, there has been a shift in the composition of Indonesian clove exports to Malaysia, with clove imports in the Malaysian market shifting to Singapore. Lastly, Singapore ranks last, with the smallest RCA value of Indonesian cloves. According to Trade Map (2023), the relatively low RCA value of Indonesian cloves in Singapore is due to Singapore importing more cloves from other competing countries such as

Madagascar, Tanzania, and Comoros. Singapore does not produce cloves domestically due to land limitations. This aligns with Zenti et al. (2021), stating that Singapore does not produce cloves domestically but imports cloves for re-export in both raw and derivative forms in the international market. To meet this demand, Singapore imports cloves from several countries such as Madagascar, Indonesia, and Tanzania.

The RCA (Revealed Comparative Advantage) value of Indonesian cloves in these ten destination countries can provide an indication of how competitive a country is in international trade in a particular sector. RCA measures the proportion of a country's exports in a specific sector compared to the total world exports of the same sector. RCA indicates the advantage a country has in producing goods compared to its trading partners. RCA indicates the extent to which a country has a comparative advantage in the production of a sector and is able to compete in the global market. According to Laursen (2015), the RCA ratio is applied in analyzing international trade to assess how strong a country's exports of a product are compared to the same product from other countries.

Analysis of Factors Influencing the Export Volume of Indonesian Cloves

The factors influencing the export volume of Indonesian cloves in the international market from 2001 to 2022 are the real Gross Domestic Product per capita of Indonesia (LnGDPRPI), the real Gross Domestic Product per capita of the main destination countries for Indonesian clove exports (LnGDPRPN), the population of the destination countries for Indonesian clove exports (LnPOP), the real exchange rate of the destination countries for Indonesian clove exports (LnNTR), and the economic distance of the destination countries for Indonesian clove exports (LnJE). These factors are included in the estimation model.

The estimation model is used to obtain regression results of panel data using the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The three-panel data regression models will be selected through tests to determine the best model to be used. In determining the suitable model to be used in panel data regression, several tests must be passed, namely the Chow Test, Hausman Test, and Lagrange Multiplier Test.

The determination of the best model to be used must pass three tests, namely the Chow Test, Hausman Test, and Lagrange Multiplier Test. After conducting the three tests for model determination, namely the Chow Test, Hausman Test, and Lagrange Multiplier Test, the best model to be used is the Random Effect Model. The

Chow Test is the first test conducted to determine the best model between the Common Effect Model and the Fixed Effect Model. The Chow Test result shows a probability value of 0.000. This means rejecting H_0 and accepting H_1, indicating that the Fixed Effect Model is selected.

The second test conducted is the Hausman Test, to determine the best model between the Fixed Effect Model and Random Effect Model. The Hausman Test result shows a probability value of 0.2489. This means rejecting H_1 and accepting H_0, indicating that the Random Effect Model is selected. The final test that must be conducted is the Lagrange Multiplier Test, to determine the best model between the Random Effect Model and Common Effect Model. The Lagrange Multiplier Test result shows a probability value of 0.000. This means rejecting H_0 and accepting H_1, indicating that the Random Effect Model is selected. Thus, after conducting three model determination tests, namely the Chow Test, Hausman Test, and Lagrange Multiplier Test, the best model to be used is the Random Effect Model.

The next step is to conduct the Gauss-Markov Test, which includes tests for normality, multicollinearity, heteroskedasticity, and autocorrelation. The results of the normality test are presented in Figure 1.

Figure 1. Results of the Normality Test
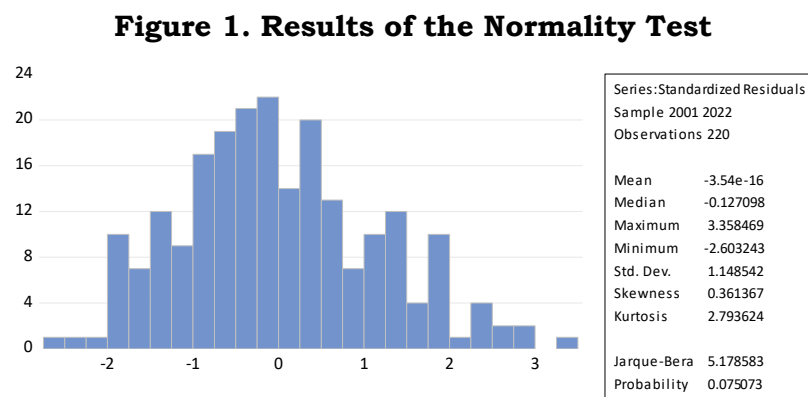
Source: Processed using Eviews 12

The Jarque-Bera value is greater than the α value, which means accepting H_0 and rejecting H_1. According to Gujarati and Porter (2015), testing the assumption of normality can be done by examining the value of Jarque-Bera; if the *p*-value of Jarque-Bera is greater than the significance level, then it is stated that the residual data are normally distributed. This result indicates that in this study, there are no issues with normality or normally distributed residuals. The results of the multicollinearity test are presented in Table 4.

Table 4. Results of the Multicollinearity Test

Independent Variables	LnGDPRPI	LnGDPRPN	LnPOP	LnNTR	LnJE
LnGDPRPI	1.000000	0.356775	0.740558	0.520800	0.468006
LnGDPRPN	0.356775	1.000000	0.194575	0.628008	0.352547
LnPOP	0.740558	0.194575	1.000000	0.388411	0.539146
LnNTR	0.520800	0.628008	0.388411	1.000000	0.799671
LnJE	0.468006	0.352547	0.539146	0.799671	1.000000

Source: Processed using Eviews 12

Based on Table 4, it is observed that the results of the multicollinearity test show that the correlation between independent variables is not greater than 0.80. This means that there are no multicollinearity issues in the regression model in this study. This is consistent with the view of Gujarati and Porter (2015), who state that if the correlation coefficient between different regressors does not exceed the value of 0.80 (rule of thumb), then it can be ensured that the model does not have multicollinearity issues. The results of the heteroskedasticity test are presented in Table 5.

Table 5. Results of the Heteroskedasticity Test

Independent Variables	Probability Value
LnGDPRPI	0.3758
LnGDPRPN	0.0000
LnPOP	0.0916
LnNTR	0.0280
LnJE	0.0243

Source: Processed using Eviews 12

Based on Table 5, it can be seen that there are independent variables with probabilities smaller than the significance level of 0.05, namely the real GDP per capita of the destination export country (GDPRPN), real exchange rate (NTR), and economic distance. This means that H0 is accepted, indicating the presence of heteroskedasticity issues. According to Widarjono (2013), heteroskedasticity issues can be addressed using Generalized Least Squares (GLS). This study employs the Random Effect Model, which already incorporates GLS weighting. This aligns with Greene's (2002) assertion that issues of autocorrelation and heteroskedasticity can be addressed using the Generalized Least Squares method with cross-section Seemingly Unrelated Regression (cross-section SUR) weighting.

Autocorrelation testing is conducted by examining the Durbin-Watson statistic. The estimation results indicate a Durbin-Watson value of 1.112494. Based on this result, it is inferred that there is positive autocorrelation in the regression model. According to Widarjono (2013), autocorrelation issues can be addressed because the Random Effect Model already utilizes Generalized Least Squares (GLS) weighting. The results of the Random Effect Model regression with cross-section SUR weighting are presented in Table 6.

Table 6. Results of Random Effect Model Regression with cross-section SUR weighting

Dependent Variable: LNEKS

Method: Panel EGLS (Cross-section random effects)

Date: 12/23/23   Time: 18:38

Sample: 2001 2022

Periods included: 22

Cross-sections included: 10

Total panel (balanced) observations: 220

Swamy and Arora estimator of component variances

Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.562819	0.692106	-0.813198	0.4170
LNGDPRPI	0.262652	0.060388	4.349389	0.0000
LNGDPRPN	0.119324	0.046708	2.554686	0.0113
LNPOP	0.228542	0.032942	6.937656	0.0000
LNNTR	0.245876	0.100216	2.453457	0.0149
LNJE	-0.279209	0.084732	-3.295213	0.0012

	Effects Specification		S.D.	Rho
Cross-section random			0.858477	0.5158
Idiosyncratic random			0.831717	0.4842

Weighted Statistics				
Root MSE	0.823433	R-squared		0.715810
Mean dependent var	1.175591	Adjusted R-squared		0.709170
S.D. dependent var	1.548150	S.E. of regression		0.834896
Sum squared resid	149.1692	F-statistic		107.8035
Durbin-Watson stat	1.112494	Prob(F-statistic)		0.000000

Unweighted Statistics				
R-squared	0.608205	Mean dependent var		5.811567
Sum squared resid	288.8936	Durbin-Watson stat		0.574432

Source : Processed using Eviews 12

Based on the results of the Random Effect Model regression with Cross-Section SUR weighting conducted, the regression equation obtained is as follows:

$$\text{LnEKSijt} = -0.562819 + 0.262652\text{LnGDPRPI}_t + 0.119324\text{LnGDPRPN}_{jt} + 0.228542\text{LnPOP}_{jt} + 0.245876\text{LnNTR}_{jt} - 0.279209\text{LnJE}_{jt} + \varepsilon_{it}$$

The results of the regression equation were then tested for significance using significance tests. The significance tests in this study include partial significance test (t-test), simultaneous significance test (F-test), and coefficient of determination test (R^2). Based on the results of the partial significance test (t-test), it was found that five independent variables have significant effects, namely the real Gross Domestic Product per capita of Indonesia, the real Gross Domestic Product per capita of the main destination countries for clove exports, the population of the main destination countries, the real exchange rate, and the economic distance of the main destination countries for clove exports from Indonesia.

Based on the results of the simultaneous significance test (F-test), it was found that the Prob(F-statistic) value is 0.0000, which is less than the significance level of 5% (0.0000 < 0.5). This means that the independent variables collectively have a significant impact on the dependent variable. This is consistent with the view of Gujarati and Porter (2015), stating that if the probability value (F-statistic) is below the significance level, then all independent variables have a simultaneous effect on the dependent variable.

Based on the results of the coefficient of determination test, it can be seen that the estimated value of the coefficient of determination (R^2) is 0.715810 (Table 7). This means that the independent variables used in this study (real Gross Domestic Product of Indonesia, real Gross Domestic Product of the main destination countries for clove exports from Indonesia, population of the destination countries, real exchange rate, and economic distance) can explain 71% of the dependent variable (volume of clove exports from Indonesia), while the rest is explained by other variables outside the scope of this study.

Interpretation of Factors Influencing the Volume of Clove Exports from Indonesia in the International Market

Real Gross Domestic Product Per Capita of Indonesia (GDPRPI)

The estimation results indicate a probability value of 0.0000 for the Real Gross Domestic Product (GDP) per capita of Indonesia, with a coefficient value of 0.262652. The probability value being smaller than the significance level indicates that the real GDP per capita of Indonesia has a significant influence on the volume of clove exports

from Indonesia. The coefficient value of 0.262652 suggests that for every 1% increase in the real GDP per capita of Indonesia, the volume of clove exports from Indonesia will increase by 0.26% (ceteris paribus). A high Gross Domestic Product per capita can indicate that the income per individual in a country is relatively high. This aligns with the view of Nugraheni et al. (2021), stating that countries with high per capita income can become attractive markets for imported products from other countries. The positive and significant influence of the Real Gross Domestic Product (GDP) per capita of Indonesia on the volume of clove exports from Indonesia is consistent with previous research by Humaira and Rochdiani (2021), who found that Indonesia's real GDP positively and significantly affects Indonesian cinnamon exports. The GDP of exporting countries reflects the production capacity of those countries; the higher the GDP, the greater the country's ability to produce various commodities, which in turn drives an increase in export volume.

Real Gross Domestic Product Per Capita of Destination Countries (GDPRPN)

The estimation results indicate a probability value of 0.0113 for the Real Gross Domestic Product (GDP) per capita of destination countries, with a coefficient value of 0.119324. The probability value being smaller than the significance level indicates that the real GDP per capita of the main destination countries for clove exports from Indonesia has a significant influence on the volume of clove exports from Indonesia. The positive coefficient value implies that the real GDP per capita of the main destination countries for clove exports from Indonesia has a direct relationship with the volume of clove exports from Indonesia. The coefficient value of 0.119324 suggests that for every 1% increase in the real GDP per capita of the destination countries, the volume of clove exports from Indonesia will increase by 0.12% (ceteris paribus).

The positive and significant influence of the Real Gross Domestic Product (GDP) per capita of the main destination countries for clove exports from Indonesia on the volume of clove exports from Indonesia is consistent with previous research by Rambe and Malau (2023), who found that the Real Gross Domestic Product (GDP) per capita of destination countries has a positive and significant effect on Indonesian cinnamon exports. An increase in real GDP per capita indicates an increase in demand for goods in a country, leading the country to import commodities that cannot be produced domestically to meet these needs. This finding aligns with the gravity model theory, which states that the increased economic size or GDP of a country leads to increased trade interaction (exports and imports) between two

countries. A high GDP per capita can indicate that the income per individual in a country is relatively high. According to Mankiw (2018), real GDP is a metric used in the gravity model because it measures the economic prosperity of a country by considering the value of the output of goods and services without being influenced by price fluctuations. In terms of exports, countries with high per capita income can become attractive markets for imported products from other countries. This is because consumers in countries with high per capita income tend to be able to afford high-quality imported products.

Population of Destination Countries (POP)

The estimation results indicate a probability value of 0.0000 for the population of the main destination countries for clove exports from Indonesia, with a coefficient value of 0.228542. The probability value is smaller than the significance level indicating that the population of the main destination countries for clove exports from Indonesia has a significant influence on the volume of clove exports from Indonesia. The positive coefficient value implies that the population of the main destination countries for clove exports from Indonesia has a direct relationship with the volume of clove exports from Indonesia. The coefficient value of 0.228542 suggests that for every 1% increase in the population of the main destination countries for clove exports from Indonesia, the volume of clove exports from Indonesia will increase by 0.23% (ceteris paribus).

The positive and significant influence of the population of the main destination countries for clove exports from Indonesia on the volume of clove exports from Indonesia is consistent with previous research by Maulana and Kartiasih (2017), who found that the population of destination countries has a positive and significant effect on Indonesian processed cocoa exports to nine destination countries from 2000 to 2014. This is also consistent with previous research by Bintoro and Khoirudin (2021), stating that a high population indicates high productivity in exporting countries, and from the demand side, a high population in importing countries can create a proportional increase in consumer consumption demand. If the domestic production of a commodity in the main destination country for exports cannot meet the increased consumption demand in that country, then the country is likely to increase its import volume to meet the needs of its population.

Exchange Rate (NTR)

The estimation results indicate a probability value of 0.0149 for the real exchange rate of the main destination countries for clove exports from Indonesia, with a coefficient value of 0.245876. The probability value is smaller than the significance level indicating that the real exchange rate of the main destination countries for clove exports from Indonesia has a significant influence on the volume of clove exports from Indonesia. The positive coefficient value implies that the real exchange rate of the main destination countries for clove exports from Indonesia has a direct relationship with the volume of clove exports from Indonesia. The coefficient value of 0.245876 suggests that for every 1% increase in the real exchange rate of the main destination countries for clove exports from Indonesia, the volume of clove exports from Indonesia will increase by 0.25% (ceteris paribus).

The positive and significant influence of the real exchange rate of the main destination countries for clove exports from Indonesia on the volume of clove exports from Indonesia is consistent with previous research by Karlina et al. (2022), which found that the real exchange rate has a positive and significant effect on the volume of Indonesian crude palm oil (CPO) exports. An increase in the exchange rate of the destination country's currency will cause domestic prices in the destination country to become expensive, thus causing the destination country to tend to buy cheaper goods from abroad. Depreciation of the Rupiah exchange rate causes the price of exported goods to decrease. Decreased export prices lead to an increase in demand for exported goods.

Economic Distance (JE)

The estimation results indicate a probability value of 0.0012 for the economic distance, with a coefficient value of -0.279209. The probability value being smaller than the significance level indicates that economic distance has a significant influence on the volume of clove exports from Indonesia. The negative coefficient value implies that economic distance has an inverse relationship with the volume of clove exports from Indonesia. The coefficient value of -0.279209 suggests that for every 1% increase in economic distance, the volume of clove exports from Indonesia will decrease by 0.28% (ceteris paribus).

The negative and significant influence of economic distance on the volume of clove exports from Indonesia is consistent with previous research by Nurhayati et al. (2019), which showed that economic distance has a negative and significant effect on the exports of nutmeg, mace, and cardamom from Indonesia. This is because

economic distance reflects the transportation costs borne by the export recipient, as well as communication costs and delivery time to the recipient country. This finding is in line with the gravity model theory, which suggests that greater distance weakens the interaction between two countries, while shorter distances strengthen the interaction between them.

CONCLUSION

Based on the research findings, it can be concluded that the first and second objectives of the study have been achieved. The conclusion drawn from the study is that the export competitiveness of Indonesian cloves from 2001 to 2022 in the top ten destination countries, namely the United States, Saudi Arabia, the Netherlands, China, India, Malaysia, Pakistan, Singapore, the United Arab Emirates, and Vietnam, is comparatively strong because the average RCA of Indonesian cloves in these top ten destination countries is greater than one (>1). The Gross Domestic Product per capita of Indonesia, the Gross Domestic Product per capita of the destination countries, the population of the destination countries, and the real exchange rate have a positive and significant impact on the volume of clove exports from Indonesia. Meanwhile, economic distance has a negative and significant effect on the volume of clove exports from Indonesia.

RECOMMENDATIONS

Indonesia is expected to maintain its main markets that regularly import cloves from Indonesia and to expand and explore new markets that do not yet regularly import cloves from Indonesia, beyond the top ten destination countries for Indonesian clove exports that have been studied, such as Bangladesh, Peru, and France. The government and clove exporters are expected to synergize in creating the development of clove cultivation through mutually beneficial and sustainable economic efforts such as improving the quality of cloves through the implementation of sustainable agricultural practices, facilitating information on clove market opportunities, providing technical guidance and assistance to clove exporters by the government, assisting in promotion and marketing, collaborating on the development of derivative clove products, developing infrastructure supporting the clove supply chain, as well as providing assistance in export financing and insurance. This study is still very limited and only focuses on the competitiveness and factors influencing Indonesian clove exports in the main destination countries. Therefore, further research is needed that is more detailed by adding other variables to refine this study,

such as international prices and international clove export tariffs, to provide more comprehensive and accurate information.

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