HIJM
HORIZON: Indonesian Journal of Multidisciplinary

p-ISSN: 2987-7776
e-ISSN: 2987-7180
Vol. 4, No. 4, 2026

THE EFFECT OF DOWNSTREAM POLICIES, EXCHANGE RATES, PRODUCTION AND INTERNATIONAL PRICES ON INDONESIA'S NICKEL EXPORT VOLUME WITH GLOBAL DEMAND AS A MEDIATOR VARIABLE FOR THE 2015-2024 PERIOD

Dewi Ayu Safitri[1], Denny Saputera[2]
[1, 2]Widyatama University, Cikutra No. 204A, Bandung, Jawa Barat, Indonesia
Email: ayudeww0312@gmail.com

Article History

Received: 10-06-2026

Revision: 02-07-2026

Accepted: 06-07-2026

Published: 10-07-2026

Abstract. The increase in world nickel demand has prompted the Indonesian government to implement downstream policies to increase the added value of mineral commodities before they are exported to the international market. This study aims to analyze the influence of downstream policies, exchange rates, production levels, and international prices on Indonesia's nickel export volume with global demand as a mediating variable. The research uses a quantitative approach with secondary data for the period 2015–2024 obtained from various official institutions such as the Central Statistics Agency, Bank Indonesia, TradeMap, and the World Trade Organization. The analysis was carried out based on international trade theory, comparative advantage theory, Heckscher-Ohlin theory, value-added theory, and derived demand theory. The results of the study show that the downstream policy contributes to increasing the competitiveness of Indonesia's nickel exports through increasing the added value of products. Production levels have an important influence in maintaining the sustainability of export supply, while exchange rates and international prices affect the competitiveness of Indonesian products in the global market. Global demand has proven to be a mechanism that strengthens the relationship between these variables and export volumes. The findings of the study show that the success of Indonesia's nickel exports is not only determined by production and price factors, but also influenced by government policies and international market dynamics.

Keywords: Downstreaming, Nickel, Exports, Global Demand, Exchange Rate.

Abstrak. Peningkatan permintaan nikel dunia telah mendorong pemerintah Indonesia untuk menerapkan kebijakan hilir guna meningkatkan nilai tambah komoditas mineral sebelum diekspor ke pasar internasional. Studi ini bertujuan untuk menganalisis pengaruh kebijakan hilir, nilai tukar, tingkat produksi, dan harga internasional terhadap volume ekspor nikel Indonesia dengan permintaan global sebagai variabel mediasi. Penelitian ini menggunakan pendekatan kuantitatif dengan data sekunder untuk periode 2015–2024 yang diperoleh dari berbagai lembaga resmi seperti Badan Pusat Statistik, Bank Indonesia, TradeMap, dan Organisasi Perdagangan Dunia. Analisis dilakukan berdasarkan teori perdagangan internasional, teori keunggulan komparatif, teori Heckscher-Ohlin, teori nilai tambah, dan teori permintaan turunan. Hasil penelitian menunjukkan bahwa kebijakan hilir berkontribusi pada peningkatan daya saing ekspor nikel Indonesia melalui peningkatan nilai tambah produk. Tingkat produksi memiliki pengaruh penting dalam menjaga keberlanjutan pasokan ekspor, sementara nilai tukar dan harga internasional memengaruhi daya saing produk Indonesia di pasar global. Permintaan global telah terbukti menjadi mekanisme yang memperkuat hubungan antara variabel-variabel ini dan volume ekspor. Temuan penelitian menunjukkan bahwa keberhasilan ekspor nikel Indonesia tidak hanya ditentukan oleh faktor produksi dan harga, tetapi juga dipengaruhi oleh kebijakan pemerintah dan dinamika pasar internasional.

Kata Kunci: Hilir, Nikel, Ekspor, Permintaan Global, Nilai Tukar.

How to Cite: Safitri, D. A & Saputera, D. (2026). The Effect of Downstream Policies, Exchange Rates, Production and International Prices on Indonesia's Nickel Export Volume with Global Demand as a Mediator Variable for the 2015-2024 Period. *HORIZON: Indonesian Journal of Multidisciplinary*, 4 (4), 3782-3800. http://doi.org/10.54373/hijm.v4i4.6650

INTRODUCTION

International trade is a crucial instrument for driving a country's economic growth. Through export and import activities, countries can expand markets, increase foreign exchange earnings, and strengthen global competitiveness. For developing countries, exports play a strategic role as a source of development financing and a pillar of national economic stability. In the Indonesian context, the mining sector is a major contributor to exports, particularly nickel, which has seen increasing global significance in recent years (Prawoto, 2024). Indonesia holds a highly strategic position in the global nickel industry. According to a 2025 report by the United States Geological Survey, Indonesia's nickel ore reserves reached approximately 55 million tons, equivalent to more than 40 percent of global nickel reserves. This provides Indonesia with a comparative advantage in international trade. In line with the Heckscher–Ohlin theory, countries with an abundance of a particular factor of production tend to export commodities that intensively utilize that factor. Therefore, the availability of substantial nickel resources theoretically opens up opportunities for increasing the volume and value of Indonesian exports in the global market.

Nickel's importance is growing with the development of the electric vehicle industry as part of the global energy transition agenda. Nickel is a key raw material in electric vehicle battery production, so the surge in demand for electric vehicles directly drives global nickel demand. Several studies indicate that the growth of the global electric vehicle industry is a major driver of increased nickel demand and is changing the structure of international trade in this commodity (Anwar et al., 2026; Lazuardi, 2024). This situation presents a significant opportunity for Indonesia to expand its nickel export market share, not only in the form of raw materials but also processed products.

However, the utilization of nickel resources in Indonesia is no longer solely focused on increasing the volume of raw material exports. In recent years, the Indonesian government has implemented a downstreaming policy by banning the export of raw nickel ore and encouraging the development of a domestic processing industry. This policy aims to increase the added value of commodities and strengthen the national industrial structure. From the perspective of Porter's theory of competitive advantage, the economic value of a commodity increases through processing, so exporting semi-finished or finished products provides greater economic benefits than exporting raw materials (Porter, 1990).

Several national studies have shown that downstreaming policies have an impact on Indonesia's nickel export performance, although the impact is not always direct and consistent across periods. Anwar et al. (2026) found that downstreaming increased the value of processed

nickel exports, while other studies showed a short-term decline in export volume due to restrictions on raw ore exports (Prawoto, 2024). These differing findings indicate that the influence of downstreaming policies needs to be analyzed in conjunction with other economic factors influencing exports. In addition to downstreaming policies, the exchange rate is a macroeconomic factor that plays a crucial role in international trade. Depreciation of the domestic exchange rate tends to increase export price competitiveness, while appreciation can decrease it. However, previous research on the effect of the exchange rate on Indonesia's nickel exports has yielded mixed results. Some studies found a significant effect of the exchange rate on exports, while others found its effect insignificant when combined with production and international price variables (Lazuardi, 2024).

Another equally important factor is the level of nickel production and international prices. Production levels reflect Indonesia's capacity to meet global market demand, while international prices influence production and export decisions. Interestingly, the development of Indonesian nickel exports demonstrates a phenomenon where increases in production and global demand are not always accompanied by increases in international prices, indicating that the nickel market mechanism does not fully follow the simple laws of supply and demand (Febrianto, 2018; Tangkudung & Kaseger, 2024).

The inconsistency of previous research findings regarding the influence of downstreaming policies, exchange rates, production, and international prices on nickel exports indicates a research gap that requires further exploration. Furthermore, most previous studies have not explicitly included global demand as a mediating variable that can explain the relationship between these factors and export volume. Therefore, this study aims to analyze the influence of downstreaming policies, exchange rates, production levels, and international prices on Indonesian nickel export volume, with global demand as a mediating variable. This is expected to provide empirical and novel contributions to the study of Indonesian nickel commodity trade.

METHOD

This research uses a quantitative approach with a causal associative approach. This approach was chosen because it aims to examine the relationships and influences between variables based on numerical data analyzed using statistical methods. According to Sugiyono (2019), quantitative research is a positivistic approach that uses numerical data to test formulated hypotheses. Meanwhile, Ghozali (2018) explains that a quantitative approach uses specific statistical procedures to objectively analyze relationships between variables.

Causal associative research is used to analyze the cause-and-effect relationships between research variables. In this context, the study aims to examine the influence of downstreaming policies, exchange rates, production levels, and international prices on Indonesian nickel export volume, both directly and indirectly through global demand as a mediating variable (Sugiyono, 2020). The data used in this study is secondary data in the form of annual quantitative time series data for the period 2016–2024. Secondary data were obtained from official publications and relevant institutions without directly involving respondents. Data sources included the Central Statistics Agency (BPS), Bank Indonesia, the World Bank, and Trade Map. The research object consists of six variables: downstreaming policy (X1), exchange rate (X2), nickel production (X3), international nickel price (X4), global demand (Z), and Indonesian nickel export volume (Y).

Data collection was conducted through documentation studies, collecting and recording data from official reports, statistical publications, and online databases of relevant institutions. Data on downstreaming policies were obtained from official government documents, which served as the basis for creating dummy variables. Data on exchange rates, production, international prices, global demand, and export volumes were obtained from national and international statistical sources. The research instrument consisted of secondary data tables compiled based on the operational definitions of each variable. Downstreaming policies were measured using dummy variables, with a value of 0 for the period before policy implementation and a value of 1 for the period after policy implementation. The exchange rate variable was measured using the rupiah exchange rate against the US dollar, production was measured based on national nickel production, international prices were measured using the world nickel price in US$/MT, global demand was measured by total global nickel imports, and export volume was measured by total Indonesian nickel exports.

The population in this study includes all annual data related to downstreaming policies, exchange rates, production, international prices, global demand, and Indonesian nickel export volume. The sampling technique used saturation sampling, where all members of the population were included in the research sample (Sugiyono, 2017). Therefore, the research sample consists of annual time series data for the period 2016–2024. Although the sample size is relatively limited, the use of this data remains methodologically sound. Ghozali (2018) emphasized that the validity of a regression model is determined not only by the sample size but also by the fulfillment of classical assumptions, such as normality, multicollinearity, heteroscedasticity, and autocorrelation.

Data analysis was performed using SPSS version 25.0 software. The analysis steps included descriptive statistics, classical assumption tests, and linear regression analysis to examine the effect of the independent variables on the dependent variable. Furthermore, path analysis was used to examine the role of global demand as a mediating variable in the relationship between the independent variables and Indonesian nickel export volume. Data analysis in this study was conducted using SPSS version 25.0. Prior to hypothesis testing, a classical assumption test was conducted to ensure the feasibility of the regression model. The normality test was used to determine whether the residuals were normally distributed, with a significance value greater than 0.05 (Ghozali, 2018). A multicollinearity test was conducted to ensure there was no high correlation between the independent variables, as indicated by a tolerance value > 0.10 and a VIF < 10. Furthermore, a heteroscedasticity test was conducted using a scatterplot graph between the predicted values (ZPRED) and standardized residuals (SRESID) to determine whether there was a specific pattern in the residual distribution. The autocorrelation test was conducted using a Run Test, with a 2-tailed Asymp. Sig. value > 0.05, indicating no autocorrelation in the residuals (Ghozali, 2006).

Causal relationship testing between variables was conducted using path analysis to determine the direct and indirect influence of independent variables on nickel export volume through global demand as a mediating variable (Sugiyono, 2017). Hypothesis testing was conducted using a t-test to determine the partial influence of each independent variable and an F-test to test the influence of independent variables simultaneously on the dependent variable, with a significance level of 5%.

RESULTS

Descriptive Statistical Analysis

According to Basuki and Nazaruddin (2015), descriptive statistics are data analysis that aims to provide an overview through measurements of the mean value, maximum value, minimum value and standard deviation.

Table 1. Descriptive statistics table

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
Kebijakan Hilirisasi (X1)	10	0	1	0.50	0.527
Nilai Tukar (X2)	10	-1.8	12.7	3.000	4.2541
Produksi (X3)	10	-28.2	83.5	42.970	35.3570
Harga Internasional (X4)	10	-29.8	33.9	2.000	23.7019
Permintaan Global (Z)	10	-26.5	365.4	43.880	115.4943
Volume Ekspor Nikel (Y)	10	-4.8	367.7	55.460	114.1511
Valid N (listwise)	**10**				

Based on the results of the descriptive statistical analysis listed in the table above, it can be seen that the amount of data (N) used to analyze each variable has the same number of samples, namely 10 samples, namely from 2015 to 2024. Descriptive statistical analysis includes the analysis of mean values, maximum values, minimum values, and standard deviations. The average value represents the result of dividing the total value of a variable by the number of samples, this value describes the tendency of the data center. The maximum value reflects the largest range of values on each variable, while the minimum value shows the smallest range of values on each variable. In addition, the standard deviation shows the amount of variation in the data derived from the average value. The following is an analysis of the average value, maximum value, minimum value and standard deviation of each variable.

- The downstream policy has a minimum value of 0, a maximum value of 1, an average value of 0.50, and a standard deviation of 0.527.
- The exchange rate has a minimum value of -1.8, a maximum value of 12.7, an average value of 3,000, and a standard deviation of 4.2541.
- Production has a minimum value of -28.2, a maximum value of 83.5, an average value of 42.970, and a standard deviation of 35.3570
- The International Price has a minimum value of -29.8, a maximum value of 33.9, an average value of 2,000 and a standard deviation of 23.7019.
- Global Demand has a minimum value of -26.1, a maximum value of 365.4, an average value of 43.880 and a standard deviation of 115.4943.
- The Nickel Export Volume has a minimum value of -4.8, a maximum value of 368.6, an average value of 55,220 and a standard deviation of 114,1511

Classic Assumption Test

Normality Test

Table 2. Model 1 normality test table

		Unstandardized Residual
N		10
Normal Parameters, b	Red	0.0000000
	Std. Deviation	72.51361675
Most Extreme Differences	Absolute	0.167
	Positive	0.167
	Negative	-0.131
Test Statistic		0.167
Asymp. Sig. (2-tailed)		.200c,d

Based on the normality test on model 1 listed in the table above, it is known that the Asymp value. A sig of 0.200 is greater than a significance level of 0.05. This means that model 1 has met the assumption of normality, so it can be concluded that the data used in model 1 is normally distributed.

Table 3. Model 2 normality test table

Keterangan	Unstandardized Residual
N	10
Mean	0.000000
Std. Deviation	10.60827092
Most Extreme Differences (Absolute)	0.147
Most Extreme Differences (Positive)	0.147
Most Extreme Differences (Negative)	-0.088
Test Statistic	0.147
Asymp. Sig. (2-tailed)	0.200

Based on the normality test on model 2 listed in the table above, it is known that the value of Asymp. A sig of 0.200 is greater than a significance level of 0.05. It can be concluded that the data used in Model 2 is distributed normally because Model 2 has met the assumption of normality.

Multicollinearity Test

Table 4. Model 1 multicollinearity test

Variabel	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	-103.103	99.593	–	-1.035	0.348	–	–
Kebijakan Hilirisasi	120.972	76.099	0.552	1.590	0.173	0.654	1.530
Nilai Tukar	11.200	9.114	0.413	1.229	0.274	0.700	1.430
Produksi	1.101	1.208	0.337	0.911	0.404	0.576	1.736
Harga Internasional	2.789	1.512	0.572	1.844	0.124	0.819	1.221

Based on the results of the statistical test in the multicollinearity test model 1 listed in the table above, all independent variables have a VIF value of < 10 and a tolerance value of > 0.1. This shows that the correlation between independent variables does not have too high a correlation.

Table 5. Model 2 multicollinearity test table

Variabel	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	-8.631	17.951	–	-0.481	0.656	–	–
Kebijakan Hilirisasi	29.895	15.272	0.138	1.958	0.122	0.434	2.303
Nilai Tukar	0.043	1.701	0.002	0.025	0.981	0.537	1.861
Produksi	0.153	0.213	0.047	0.718	0.512	0.494	2.024
Harga Internasional	-0.778	0.321	-0.162	-2.428	0.072	0.487	2.052
Permintaan Global	1.002	0.073	1.014	13.704	0.000	0.394	2.537

Based on the results of the statistical test in the multicollinearity test model 2 listed in the table above, all independent variables have a VIF value of < 10 and a tolerance value of > 0.1. This shows that the correlation between independent variables does not have too high a correlation.

Heterokedasticity Test

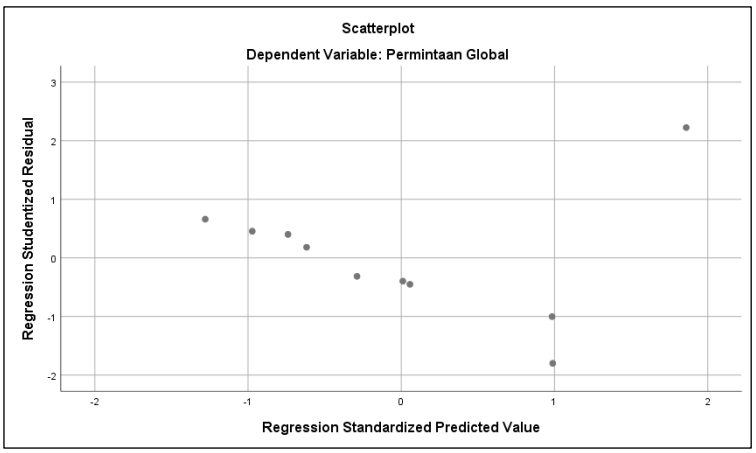

Figure 1. Model 1 heterokedasticity test drawings

Based on the chart *Scatterplot* in the model 1 heterokedasticity test listed in the graph above. The graph shows that the dots are randomly spread above and below the number 0 on the Y axis and do not form a specific pattern. Thus, it can be concluded that the regression model in model 1 does not experience symptoms of heterokedasticity, so it can be concluded that the heterokedasticity test successfully meets the classical assumption test in regression.

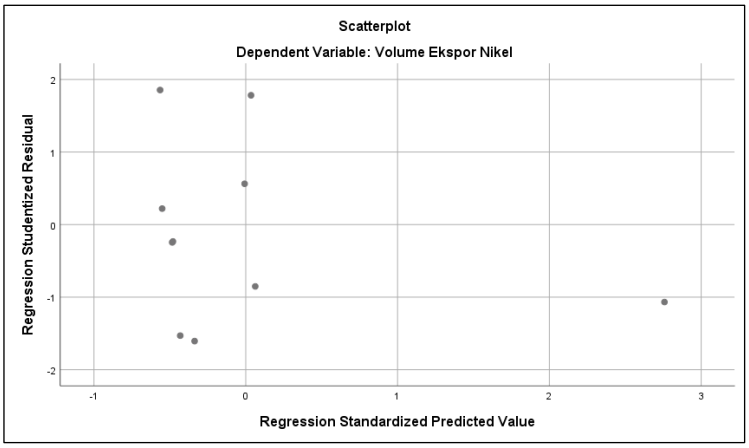

Figure 2. Model 2 heterokedasticity test drawings

Based on the chart *Scatterplot* in the model 2 heterokedasticity test listed in the graph above. The graph shows that it is seen that the dots are randomly spread above and below the number 0 on the Y axis and do not form a specific pattern. Thus, it can be concluded that the

regression model in model 1 does not experience symptoms of heterokedasticity, so it can be concluded that the heterokedasticity test successfully meets the classical assumption test in regression.

Autocorrelation Test

Model 1. Autocorrelation Test Table

Runs Test

	Unstandardized Residual
Test Value[a]	-3.98741
Cases < Test Value	5
Cases >= Test Value	5
Total Cases	10
Number of Runs	6
Z	0.000
Asymp. Sig. (2-tailed)	1.000

a. Median

The statistical results of the model 1 autocorrelation test are shown in the table above. It is known that the significance value of (1,000) is greater than the specified significance value, which is 0.05. Therefore, it can be said that the data used in this study is free of autocorrelations.

Model 2. Autocorrelation Test Table

Runs Test

	Unstandardized Residual
Test Value[a]	-2.15375
Cases < Test Value	5
Cases >= Test Value	5
Total Cases	10
Number of Runs	4
Z	-1.006
Asymp. Sig. (2-tailed)	0.314

a. Median

The statistical results of the model 2 autocorrelation test are listed in the table above. It is known that the significance value of (0.314) is greater than the specified significance value, which is 0.05. Therefore, it can be said that the data used in this study is free of autocorrelations.

Path Analysis

Model 1 Multiple Linear Regression Analysis

Based on the results of model 1 analysis using the SPSS program, regression results were obtained between the variables of Downstream Policy (X1), exchange rate (X2), production (X3), and international prices (X4) to the global demand variable (Z) as follows:

Table 6. Model 1 regression results

Variabel	B	t	Sig	Hasil
Constant	-103.103	-1.035	0.348	
Kebijakan Hilirisasi (X1)	120.972	1.590	.173	H_0 diterima
Nilai Tukar (X2)	11.200	1.229	.274	H_0 diterima
Produksi (X3)	1.101	0.911	.404	H_0 diterima
Harga Internasional (X4)	2.789	1.844	.124	H_0 diterima
R Square	0.290			
F Hitung	1.921		.245	

From the regression results obtained in the table above, the following equations can be made:

$$Z = -101.103 + 120.972\,X_1 + 11.200\,X_2 + 1.101\,X_3 + 2.789\,X_4$$

The regression equation has the following meanings:

- The value of the constant is -101.103 which means that if all independent variables are considered constant, then the value of global demand (Z) is -101.103
- The regression coefficient in the Downstream Policy variable (X1) is 120,972, so every increase of one unit of the downstream policy variable will increase the value of Global Demand (Z) by 120,972 units, assuming the other variables are constant.
- The regression coefficient of the Exchange Rate variable (X2) is 11,200, so every increase of one unit of the exchange rate variable will increase the value of Global Demand (Z) by 11,200 units, assuming the other variables are constant.
- The regression coefficient of the Production variable (X3) is 1,101, so every increase in one unit of the production variable will increase the value of Global Demand (Z) by 1,101 units, assuming the other variable is constant.
- The regression coefficient of the International Price variable (X4) is 2,789, so every increase of one unit of the international price variable will increase the value of Global Demand (Z) by 3,051 units, assuming the other variables are constant.

Model 2 Multiple Linear Regression Analysis

Table 7. Model 2 Regression Results

Variable	B	t	Sig	Results
Constant	-8.631	-0.481	0.656	
Downstream Policy (X1)	29.895	1.958	.122	H_0 Accepted
Exchange Rate (X2)	0.043	0.025	.981	H_0 Accepted
Production (X3)	0.153	0.718	.512	H_0 Accepted

International Pricing (X4)	-0.778	-2.428	-0.072		H_0 Accepted
Global Demand (Z)	1.002	13.704	.000		H_0 Rejected
R Square	0.981				
F Calculate	91.832		.000		

From the regression results obtained in the table above, the following equations can be made:

$$Z = -8.631 + 29.895\,X_1 + 0.043X_2 + 0.153\,X_3 - 0.778\,X_4 + 1.002\,Z$$

The regression equation has the following meanings:

- The value of the constant is -8,631 which means that if all independent variables are considered constant, the value of the Nickel Export Volume (Y) is -8,631.
- The regression coefficient in the Downstream Policy variable (X1) is 29,895, so every increase in one unit of the downstream policy variable will increase the value of the Nickel Export Volume (Y) by 29,895, assuming that other variables are constant.
- The regression coefficient on the Exchange Rate variable (X2) is 0.043, so every increase in one unit of the exchange rate variable will increase the value of the Nickel Export Volume (Y) by 0.043, assuming the other variables are constant.
- The regression coefficient on the Production variable (X3) is 0.153, so every increase in one unit of production variable will increase the value of Nickel Export Volume (Y) by 0.153, assuming the other variables are constant.
- The regression coefficient in the International Price variable (X4) is -0.778, so every increase in one unit of the international price variable will decrease the value of the Nickel Export Volume (Y) by 0.778, assuming that the other variables are constant.
- The regression coefficient on the Global Demand (Z) variable is 1,002, so every increase of one unit of the global demand variable will increase the value of the Nickel Export Volume (Y) by 1,002, assuming the other variables are constant.

Model Testing

Coefficient of Determination

Sugiyono (2017) explained that the determination coefficient (R^2) is used to measure the extent to which the model is able to explain the influence of independent variables on dependent variables. The value of R^2 is in the range between 0 and 1.

Coefficient of Determination Model 1

Table 8. Model determination coefficient

Models	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.778a	0.606	0.290	97.2872

The results of the determination coefficient between the downstream policy variables (X1), exchange rate (X2), production (X3) and international prices (X4) against global demand (Z) can be seen in table 4.10 above. The value of the adjusted R square is 0.290. this means that the policies of downstream (X1), exchange rate (X2), production (X3) and international prices (X4) are able to explain the global demand variable (Z) by 29%, with other factors not discussed in this study explaining the remaining 71%.

Coefficient of Determination Model 2

Table 9. Model 2 determination coefficient

Models	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.996a	0.991	0.981	15.9124

The results of the determination coefficient between the variables of downstream policy (X1), exchange rate (X2), production (X3) and international prices (X4) against global demand (Z) can be seen in table 4.11 above. The adjusted R square value is 0.994. this means that the policies of downstream (X1), exchange rate (X2), production (X3) and international prices (X4) are able to explain the global demand variable (Z) by 98.1%, with other factors not discussed in this study explaining the remaining 1.9%.

Hypothesis Testing (Test – t)

According to Sugiyono (2017), the t-test is used to illustrate the influence of each independent variable on the dependent variable partially. The t-test can be shown through the t-value of the calculation and the t-table. The t-value of the calculation can be seen from the regression results and the t-value of the table is obtained through the degree of freedom $df = n - k - 1$.

Model 1 t test

Table 10. Model 1 regression results table

Variabel	B	t	Sig	Hasil
Constant	-103.103	-1.035	0.348	
Kebijakan Hilirisasi (X1)	120.972	1.590	.173	H_0 diterima
Nilai Tukar (X2)	11.200	1.229	.274	H_0 diterima
Produksi (X3)	1.101	0.911	.404	H_0 diterima
Harga Internasional (X4)	2.789	1.844	.124	H_0 diterima
R Square	0.290			
F Hitung	1.921		.245	

The results of the t-test between the variables of downstream policy (X1), exchange rate (X2), production (X3) and international prices (X4) against global demand (Z) can be seen through the table above. The table has the following meanings:

- The downstream policy variable (X1) has a calculated t value of 1,590 and a table t value of 2,571. Because t counts are smaller than table t (1,590 < 2,571), the downstream policy does not have a significant influence on the dependent variables. Therefore, H_0 it is accepted.
- The exchange rate variable (X2) has a calculated t value of 1.229 and a table t value of 2.571. Because t counts are smaller than table t (1.229 < 2.571), the exchange rate does not have a significant influence on the dependent variable. Therefore, H_0 it is accepted.
- The production variable (X3) has a calculated t value of 0.911 and a table t value of 2.571. Because the calculated t is smaller than the table t (0.911 < 2.571), production does not have a significant influence on the dependent variable. Therefore, H_0 it is accepted.
- The International Price variable (X4) has a calculated t value of 1.844 and a table t value of 2.571. Because t is calculated less than the t table (1.844 > 2.571), the international price does not have a significant influence on the dependent variable. Therefore, H_0 it is accepted.

Model 2 t test

Model 2. Regression Results Table

Variable	B	t	Sig	Results
Constant	-8.631	-0.481	0.656	
Downstream Policy (X1)	29.895	1.958	.122	H_0 Accepted
Exchange Rate (X2)	0.043	0.025	.981	H_0 Accepted
Production (X3)	0.153	0.718	.512	H_0 Accepted
International Pricing (X4)	-0.778	-2.480	.072	H_0 Accepted
Global Demand (Z)	1.002	13.704	.000	H_0 Rejected
R Square	0.981			
F Calculate	91.832		.000	

The results of the t-test between the variables of downstream policy (X1), exchange rate (X2), production (X3), international price (X4), and global demand (Z) for nickel export volume (Y) can be seen through the table above. The table has the following meanings:

- The Downstream Policy variable (X4) has a calculated t value of 1,958 and a table t-value of 2,776. Because the t calculation is smaller than the t table (1,958 < 2,776), the downstream policy does not have a significant influence on the dependent variable. Therefore, H_0 it is accepted.
- The Exchange Rate variable (X2) has a calculated t value of 0.025 and a table t value of 2.776. Because t is calculated smaller than t of table (0.025 < 2.776), the exchange rate does not have a significant influence on the dependent variable. Therefore, H_0 it is accepted.
- The Production variable (X3) has a calculated t value of 0.718 and a table t-value of 2.776. Because t is calculated smaller than t table (0.718 < 2.776), the exchange rate has no significant influence on the dependent variable. Therefore, H_0 it is accepted.
- The International Price Variable (X4) has a calculated t-value of -2,480 and a table t-value of 2,776. Since t is smaller than t table (2,480 < 2,776), international prices have a significant influence on dependent variables. Therefore, H_0 it is accepted.
- The Global Demand variable (X5) has a calculated t-value of 13,704 and a table t-value of 2,776. Because t is smaller than t table (13,704 > 2,776), global demand has a significant influence on dependent variables. Therefore, H_0 it was rejected.

Test F

F Model 1 Test

The results of the regression model model 1 in table 4.12 show the results of the F test between the downstream policy variables (X1), exchange rate (X2), production (X3), and international prices (X4) against global demand (Z). The table shows that H_0 it is accepted because of the significance value > 0.05. Thus the downstream policy variables (X1), exchange rate (X2), production (X3), and international prices (X4) do not have a simultaneous significant influence on global demand (Z) because the calculated F-value (1.921) is smaller than the table F-value (5.19).

Test F Model 2

The results of the model 2 regression model in table 4.13 show the results of the F test between downstream policies (X1), exchange rates (X2), production (X3), international prices

(X4) and global demand (Z) on nickel export volumes (Y). The table shows that H_1 it is accepted because of the significance value < 0.05. Thus, the downstream policy variables (X1), exchange rate (X2), production (X3), international prices (X4), and global demand (Z) were declared to have a simultaneous significant effect on the export volume of nickel (Y) because the value of F calculated (91,832) was greater than the F of the table (6.26).

DISCUSSION

Model 1 Discussion

The Influence of Downstream Policy on Global Demand

The study results show that the downstreaming policy has not had a significant impact on increasing global demand for Indonesian nickel during the observation period. This finding indicates that increased added value through processing has not automatically translated into increased competitiveness in the international market. In other words, downstreaming still plays a greater role in the domestic industrial structure than as a direct driver of global demand. This conclusion aligns with the view that added value needs to be accompanied by strengthening product quality, efficiency, and strategic positioning within the global supply chain to significantly influence demand.

The Effect of Exchange Rates on Global Demand

This study concludes that exchange rate fluctuations have not yet become a determining factor in global demand for Indonesian nickel. This suggests that international demand for nickel is driven more by the structural needs of consumer industries, particularly the battery and electric vehicle sectors, rather than price considerations resulting from exchange rate fluctuations. Therefore, exchange rate stability or depreciation does not directly increase the attractiveness of Indonesian nickel in the global market as long as industrial needs remain the primary decision-making factor.

The Effect of Production on Global Demand

Although Indonesian nickel production continues to increase, the study concludes that this increase has not been accompanied by a commensurate increase in global demand. This finding confirms that large production capacity does not automatically generate demand unless accompanied by a strong competitive advantage. Global demand appears to be more selective,

considering aspects of quality, sustainability, and product conformity to end-user industry specifications.

The Influence of International Prices on Global Demand

This study also concluded that changes in international nickel prices have not significantly influenced global demand. This indicates that nickel is a strategic commodity with relatively price-inelastic demand due to its ongoing need by certain industries. Therefore, purchasing decisions are driven more by long-term production needs than short-term price fluctuations.

Model 2 Discussion

The Effect of Downstream Policy on Nickel Export Volume

Downstream policy variables do not have a significant effect on nickel export volume. This is evidenced by the value of T calculated which is smaller than the T table (1,958 < 2,776). These findings are in line with the theory *value added* proposed by Porter (1985). In his theory, Porter stated that the process of processing a product can increase the added value of a product which has an impact on increasing competitiveness. This is due to the fact that the government's main goal in implementing downstream policies is to increase the added value of a product, not just to increase the quantity of Indonesia's nickel exports. HThis is also in line with a study conducted by Octaviani et al. (2024) with the result that downstream policies do not have a significant effect on the export volume of a commodity.

The Effect of Exchange Rates on Nickel Export Volume

Exchange rate variables do not have a significant effect on nickel export volume. This is evidenced by the value of T calculated which is smaller than the T table (0.025 < 2.776). These results show that changes in the exchange rate do not affect Indonesia's nickel export volume. The results of this study are different from the theory of Salvatore (2013) which states that exchange rate depreciation makes the price of a product tend to be cheaper and has an impact on increasing nickel export demand as the cause of an increase in nickel export volume. This is in line with studies Ratana et al., (2021) which states that the exchange rate does not affect the export volume of a commodity, but rather the export volume of a commodity is more influenced by the level of a country's demand for the commodity.

The Effect of Production on Nickel Export Volume

Production variables do not have a significant effect on nickel export volume. This is evidenced by the t-value of the calculation that is smaller than the t table (0.718 < 2.776). These results show that the change in the amount of nickel production does not affect Indonesia's nickel export volume. The results of this study are different from the supply theory which states that increasing production will increase a country's ability to meet the needs of the international market. The results of this study are in line with Indayati et al. (2017) research which states that production does not have a significant effect on export volume, because export volume is not only determined by the amount of production, but also influenced by market conditions and applicable trade policies.

The Effect of International Prices on Nickel Export Volume

International price variables have a significant effect on the volume of nickel exports. This is evidenced by the t-value of the calculation that is smaller than the t-table (2,480 < 2,776). These results show that changes in nickel prices in the international market cannot affect Indonesia's nickel export volume. The results of this study are in line with the research of Wijaya et al., (2024) which states that international prices do not affect the export volume of a commodity, so that export volume is more influenced by other factors than international prices. This is in line with the economic theory put forward by Krugman & Obstfeld., (2009), with the statement that the high level of demand is influenced by the level of industry or importing country demand for the commodity. So that changes in price levels have no effect on global demand levels.

The Effect of Global Demand on Nickel Export Volume

Global demand variables have a significant effect on nickel export volume. This is evidenced by a calculated t value that is greater than the t table (13,704 > 2,776). These results show that the increase in global demand will encourage an increase in Indonesia's nickel export volume. The results of this study are in line with the theory of international demand put forward by Marshal (1860) which states that the higher the demand of importing countries for a commodity, the greater the export volume that can be carried out by the exporting country. In nickel commodities, the increasing global demand for raw materials for the electric vehicle battery industry and the stainless steel industry has caused demand for Indonesian nickel to increase. Thus, global demand is one of the main factors that determine the change in Indonesia's nickel export volume.

CONCLUSION

This study shows that Indonesia's nickel export volume is influenced by various internal and external factors. Downstream policies play an important role in increasing the added value and competitiveness of Indonesian nickel products in the global market. The exchange rate affects the competitiveness of export product prices, while the level of production determines Indonesia's ability to meet the needs of the international market. International prices also contribute to changes in export volumes through their influence on production and trade decisions. In addition to direct influence, global demand has proven to have a strategic role as a mediating variable that connects downstream policies, exchange rates, production levels, and international prices with Indonesia's nickel export volume. These findings show that the success of Indonesia's nickel exports is highly dependent on the ability of governments and industry players to respond to global market dynamics and take advantage of Indonesia's resource advantages

REFERENCES

Anwar, R., Santoso, B., & Putri, A. (2026). *Analysis of the Downstreaming Policy and Factors Affecting Indonesia's Nickel Export Performance (HS 75) 2010–2023*. Journal of International Economics and Commodity Markets. Diakses dari https://www.researchgate.net/publication/399924755_Analysis_of_the_Downstreaming_Policy_and_Factors_Affecting_Indonesia%27s_Nickel_Export_Performance_HS_75_2010-2023

Basuki, A. T., & Nazaruddin, I. (2015). *Analisis Statistik Dengan SPSS*. Danisa Media. https://ekonometrikblog.wordpress.com/wp-content/uploads/2019/05/analsisi-statistik-spss.pdf

Febrianto, D. (2018). *Proses pembentukan nikel di endapan sulfida primer dan implikasinya terhadap eksplorasi mineral*. Jurnal Geologi dan Sumber Daya Mineral, 10(2), 145–156.

Ghozali, I. (2018). *Aplikasi Analisis Multivariate Dengan Program IBM SPSS 25* (9th Ed.). Badan Penerbit Universitas Diponegoro.

Indayati, D., Pudjiastuti, A. Q., & Sa'diyah, A. A. (2017). Pengaruh Produksi CPO Domestik, Harga CPO Internasional, Dan Nilai Tukar Terhadap Volume Ekspor CPO Indonesia. *Jurnal Fakultas Pertanian Universitas Tribhuwana Tunggadewi*, *5*(2), 183–194.

Joehastanti (2012). *Wisata alam sebagai alternatif pengembangan pariwisata berkelanjutan*. Jurnal Kepariwisataan Indonesia, 7(2), 89–98.

Krugman, P. R., & Obstfeld, M. (2009). *International Economics: Theory And Policy*. Pearson Education.

Lazuardi, S. D. (2024). *The Impact on Downstream Policy Implementation for Mineral Export*. Proceeding of ITS Scholar, Institut Teknologi Sepuluh Nopember. Diakses dari https://scholar.its.ac.id/en/publications/the-impact-on-downstream-policy-implementation-for-mineral-export/

Marshall, A. (1890). *Principles of economics*. London: Macmillan and Co.

Porter, M. E. (1985). *Competitive Advantage: Creating And Sustaining Superior Performance*. Free Press; Collier Macmillan. https://books.google.co.id/books?id=h9reaijck8cc&utm

Porter, M. E. (1990). *The competitive advantage of nations*. Free Press.

Prawoto, N. (2024). *Analysis of Determinants of Indonesian Nickel Exports*. Jurnal Ekonomi dan Perdagangan, 9(1), 45–60. Diakses dari https://ejournal.seaninstitute.or.id/index.php/Ekonomi/article/download/4381/3539

Rahmawati, N., Sari, D. P., & Nugroho, A. (2024). *Kualitas amenitas dan kepuasan wisatawan pada destinasi wisata alam*. Jurnal Pariwisata Terapan, 8(1), 15–27.

Ridwan, M., Yulianti, E., & Hidayat, R. (2022). *Loyalitas wisatawan ditinjau dari kualitas fasilitas dan pelayanan destinasi*. Jurnal Ilmu Pariwisata, 7(3), 201–212.

Sugiyono. (2008). *Metode Penelitian Bisnis*. Alfabeta.

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*. Alfabeta.

Sugiyono. (2020). *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*. Alfabeta.

Tangkudung, D., & Kaseger, J. (2024). *Geological process and economic implications of nickel mineralization in Indonesia*. Jurnal Mineral, 15(1), 78–92.

United States Geological Survey. (2025). *Mineral commodity summaries: Nickel*. Diakses dari https://www.usgs.gov/centers/nmic/mineral-commodity-summaries-nickel

Wijaya, I., Hamrullah, & Fitrianti, R. (2024). *Tinjauan Faktor Yang Berdampak Pada Ekspor Di Provinsi Pusat Produksi Nikel*. Jurnal Ekonomika Dan Dinamika Sosial, 3(2). https://journal.unhas.ac.id/index.php/jeds/article/view/22203