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"The Impact Of Downstream Policies On The Growth Of Indonesia's Net Exports Of Iron And Steel (HS 72)"

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ABSTRACT

This study examines the impact of downstream policies on Indonesia's net exports of iron and steel (HS 72) during 2000–2023. The downstream policy, aimed at enhancing value-added and reducing raw material exports, is crucial for improving trade balances and boosting economic growth. Using paired t-tests and Export Product Dynamics (EPD), the study reveals significant increases in total exports (5%, 0.041) and total imports (1%, 0.001), while net export improvements were marginally significant (10%, 0.08). Despite the positive impacts, challenges such as high dependency on imported raw materials and the need for substantial infrastructure investments persist.

INTRODUCTION

International trade has become a key component of the economy as it influences economic growth. Ideally, a country will experience a surplus when exports exceed imports and a deficit when imports exceed exports. The goal is to improve the living standards of a country, stimulate economic growth, and expect profits (Suryanto & Kurniati, 2022). One of Indonesia's key export commodities from the mineral and coal sector is iron and steel (HS 72). Iron and steel are essential raw materials for infrastructure development and manufacturing in the country, including Indonesia. This has driven growing domestic demand year after year (IISIA, 2024).

Faced with limited supply availability, the government has banned the export of raw materials and implemented downstream policies. Downstreaming (value-adding) is an effort to reduce raw material exports by processing them into semi-finished or finished goods, with the aim of increasing their value and promoting the domestic industry. Downstreaming is regulated under Law No. 3 of 2020, amending Law No. 4 of 2009 on Mineral and Coal Mining.

The downstream policy for iron and steel has reversed the situation. Initially, Indonesia was a net importer of iron and steel, but by 2020, the situation changed, making Indonesia a net

exporter of iron and steel. This change also brought positive results for the trade balance, which shifted from a deficit to a surplus. Furthermore, this increase indicates an improvement in the production capacity of iron and steel in Indonesia. This reflects better product quality and the industry's ability to meet international standards, as well as a response to the increasing global demand, particularly from infrastructure development in developing countries and changes in global supply chains. Unfortunately, research on the impact of downstream policies on iron and steel is still limited, even though iron and steel have the same great potential to be optimized through downstream policies.

LITERATURE REVIEW

International Trade

International trade theory encompasses mercantilism, classical theories developed by Adam Smith and David Ricardo, and the modern theory introduced by Heckscher-Ohlin.

1. Mercantilism Theory
   This theory posits that a country becomes wealthier and more powerful if it can produce more exports than imports (Purba et al., 2023). It assumes that surpluses in gold and silver act as assets to boost exports and reduce imports. Abundant assets and capital can contribute to national prosperity. Mercantilism led to policies of import restrictions and increased export quotas to stimulate economic growth (Nissa et al., 2024).
2. Classical Theory
   a. Absolute Advantage by Adam Smith
   This theory suggests that a country gains more from specializing in producing commodities that are more efficient to produce within its borders. According to Adam Smith, absolute advantage refers to a country's ability to produce goods and services using fewer resources than other countries. Exports produced at a lower cost can yield higher profits and make production more efficient (Devitasari et al., 2023).
   b. Comparative Advantage by David Ricardo
   This theory states that the value or price of a product is determined by the amount of labor or hours needed to produce one unit of goods (MC = Px). It argues that a country gains from international trade if it specializes in production. This implies that if a country can export goods in large quantities, it does so because it can produce them relatively more efficiently than other countries. Conversely, if a country imports goods, its domestic production is relatively lower or less efficient than other countries (Setiawati, 2021).
3. Modern Theory – Heckscher-Ohlin (H-O)
   This theory assumes that countries tend to export goods produced with abundant, relatively inexpensive factors of production, and import goods that require resources that are relatively scarce and costly in their own country. The core of this theory is that international trade raises wages and lowers real interest rates for countries with abundant labor and limited capital. This brings advantages to countries pursuing this strategy (Ibrahim & Halkam, 2021).

Exports and Imports

Hutabarat, as cited in Fordatkosu et al. (2021), defines exports as the trade of goods sent from within to outside Indonesia's customs territory in compliance with applicable regulations. Imports are the trade of goods brought into Indonesia from abroad, also adhering to applicable regulations. Net exports are the result of subtracting imports from exports. Net export value will be positive, and the trade balance will be in surplus when exports exceed imports. The higher the net export value, the more positively it affects economic growth. Conversely, if the net export value is negative and the trade balance is in deficit, it negatively impacts economic growth (Asrinda, 2022).

Downstreaming

Downstreaming, also known as value-adding, refers to the process of converting raw materials into semi-finished or finished goods to increase their value and create new jobs (Deddy et al., 2023). Mineral downstreaming is divided into three stages: mining, smelting, and refining. The goal of mineral downstreaming is to add value by processing raw materials into products via domestic smelters (Agung & Adi, 2022). Mineral downstreaming is a fiscal tool used to create added value, increase state revenue, promote economic growth, create jobs, and improve the welfare of the Indonesian people. According to Panturu in Deddy et al. (2023), downstreaming aims to reduce raw material exports and instead encourage domestic industries to process these materials, thereby enhancing domestic value-added (while creating job opportunities). If exports are necessary, the export should consist of finished goods, products processed from raw materials.

Production

According to Assauri in Prananda et al. (2023), production is the process of utilizing various production factors to add value to goods or services through specific techniques. This process involves labor, materials, technology, and capital. Meanwhile, Ruminta (2023) defines production as the process of proper management aimed at achieving efficiency and producing high-quality products. The main goal of the production process is to enhance the utility value of a good.

Price

According to Suharno and Sutarso in Nurfauzi et al. (2023), price is the amount of money paid to acquire goods or services. International price is the price prevailing in the international market, which has been determined through international agreements for specific types of goods (Wati et al., 2023).

METHODS

This study adopts a quantitative approach. The data used are secondary data sourced from various official sources such as the Central Bureau of Statistics (BPS), Trade Map, International Trade Center (ITC), and UN Comtrade (United Nations Commodity Trade Statistics Database). The main variable of this study is Indonesia's net exports of iron and steel from 2000-2023 (before and after the implementation of downstream policies). The testing tools used in this study are the paired sample t-test and Export Product Dynamic (EPD).

Normality Test

The normality test is a prerequisite test conducted to determine whether the data is valid and normally distributed. Based on the Kolmogorov-Smirnov test, the data is considered to be normally distributed if the generated asymp.sig (2-tailed) value is greater than 0.05. Conversely, if the generated asymp.sig (2-tailed) value is smaller than 0.05, the data is considered not to be normally distributed and alternative methods must be applied to normalize the data.

Paired t-Test

The paired sample t-test is a data analysis tool used for comparing two paired samples to measure the same subjects under different treatments. In this study, the test is used to assess the impact of the downstream policy on the net exports of iron and steel in Indonesia and to measure whether there is a significant difference in the average net exports of iron and steel before and after the downstream policy was implemented. The paired t-test formula used in this research is as follows:

$$t = \frac{\bar{D}}{\left(\frac{SD}{\sqrt{N}}\right)}$$

Where:
t = t-value
$\bar{D}$ = Mean of sample 1 and 2 measurements
SD = Standard deviation of sample 1 and 2 measurements
N = Sample size

The decision rule for the paired t-test is: if the asymp.sig (2-tailed) value is greater than 0.05, then Ho is accepted or Ha is rejected (indicating the downstream policy has no effect on net export growth). Conversely, if the asymp.sig (2-tailed) value is less than 0.05, then Ho is rejected or Ha is accepted (indicating the downstream policy affects net exports). The decision-making assumption between t-value and t-table is: if the t-table value is greater than the t-value, then Ho is accepted or Ha is rejected. If the t-table value is smaller than the t-value, then Ho is rejected or Ha is accepted.

EPD (Export Product Dynamic)

Export Product Dynamic (EPD) analysis is a tool used to measure the dynamics or growth rate of exports of a particular product. The EPD analysis in this study is used to assess the development of Indonesia's iron and steel exports in the global market after the downstream policy was implemented.
The EPD formula used in this study is as follows:
X: Growth in Indonesia's export market share

$$\frac{\sum_{t=1}^{t}\left(\frac{Xij}{Wij}\right)t \times 100\% - \sum_{t=1}^{t}\left(\frac{Xij}{Wij}\right)t-1 \times 100\%}{T}$$

Y: Growth in the market share of Indonesia's products or commodities

$$\frac{\sum_{t=1}^{t}\left(\frac{Xt}{Wt}\right)t \times 100\% - \sum_{t=1}^{t}\left(\frac{Xt}{Wt}\right)t-1 \times 100\%}{T}$$

Where:
Xij = Value of Indonesia's iron and steel exports to the world
Xt = Value of total exports from Indonesia to the world
Wij = Value of world iron and steel exports
Wt = Value of total world exports
T = Number of years analyzed

The results from these calculations form the basis for decision-making in the Export Product Dynamic analysis, which is divided into four quadrants:

1. Rising Star: The highest position, indicating the market is in a strong position with rapidly growing demand.
2. Lost Opportunity: An undesirable position due to a declining market condition where the product has no opportunity to reach international markets.
3. Falling Star: A similar condition to "Lost Opportunity," but the market is improving, even though the product is not dynamic.
4. Retreat: The lowest position, indicating both the market and product are declining, and their presence is no longer needed or desired.

RESULTS

Normality Test

Table 1 Normality Test Results

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Export before downstreaming	.179	11	.200*
Export after downstreaming	.271	11	.024

Source: SPSS data processed

Based on the *Kolmogorov-Smirnov* normality test, the results indicate that the data is not normally distributed, specifically the net export data after downstreaming, with an Asymp.sig value below 0.05 (0.024). One solution to address the issue of non-normal data is through data regression.

Tabel 2 Results of the Normality Test Regression

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Export before downstreaming	.179	11	.200*
(New) Export after downstreaming	.231	11	.105

Source: SPSS data processed

After data regression, the Asymp.sig value for net exports after downstreaming became greater than 0.05 (0.105), indicating that the data is now normally distributed and can be subjected to the Paired t-Test.

Paired t-Test

The results of the Paired Sample Statistics test are as follows:

Table 3 Results of Paired Sample Statistics

Pairedl Samplesl Statistics					
		Mean	N	Std.l Deviation	Std.l Errorl Mean
Pair 1	Export before downstreaming	-2567037.09	11	1927772.991	581245.427
	(New) Export before downstreaming	.00	11	3914042.837	1180128.319

Source: SPSS data processed

Based on the Paired Sample Statistics test, the average net exports increased after the implementation of the downstream policy. Indonesia's average net exports of iron and steel before downstreaming were -2,567,037.09, which increased to 0.00 after downstreaming. This indicates that the downstream policy contributed to an increase in Indonesia's net exports of iron and steel.

Table 4 Results of Paired Sample Correlations

Pairedl Samplesl Correlations				
		N	Correlation	Sig.
Pair 1	Export before downstreaming & (New) Export after downstreaming	11	.000	1.000

Source: SPSS data processed

The correlations value of 0.000 and an Asymp.sig (2-tailed) value of 1.000 indicate no significant linear relationship between Indonesia's net exports of iron and steel before and after the downstream policy was implemented. This suggests that the observed increase in net exports of iron and steel may also be influenced by factors other than the implemented policy.

Table 5 Results of Paired Sample Test

Pairedl Samplesl Test									
		Pairedl Differences					t	df	Sig.l (2-tailed)
		Mean	Std.l Deviation	Std.l Errorl Mean	95%l Confidencel Intervall ofl thel Difference				
					Lower	Upper			
Pair 1	Export before downstreaming - (New) Export after downstreaming	-2567037.091	4363031.061	1315503.361	-5498161.241	364087.059	-1.951	10	.080

Source: SPSS data processed

The Paired Sample Test results indicate that the Asymp.sig (2-tailed) value obtained is 0.080, and the calculated T-value is 1.951. Based on these results, the Asymp.sig (2-tailed) value and the T-value are significant at a 10% significance level. The Asymp.sig (2-tailed) value of 0.080 is less than 0.1 (0.080 < 0.1), and the T-table value for df = 10 at a 10% significance level is 1.812 (1.951 > 1.812). These findings indicate that the downstream policy has an impact on Indonesia's net exports of iron and steel. The 10% significance level suggests that the effect is relatively small.

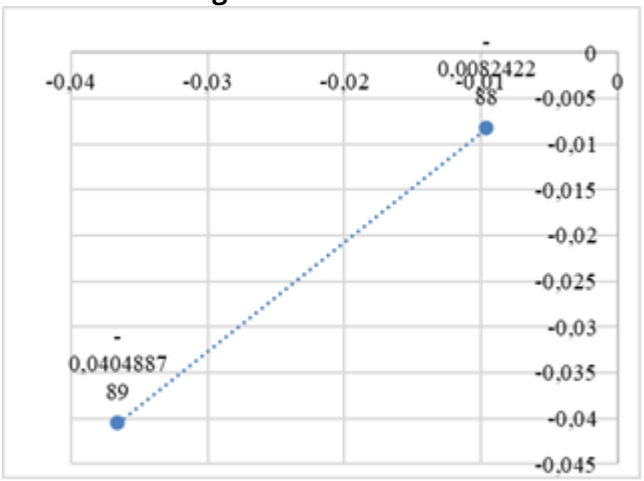
Export Product Dynamic (EPD)

The Export Product Dynamic (EPD) analysis in this study is used to determine the position of Indonesia's iron and steel in the international market after the implementation of the downstream policy. The following are the EPD calculation results for Indonesia's iron and steel (HS 72) before and after the implementation of the downstream policy:

Tabel 6 Results of Export Product Dynamic (EPD)

Yearl	Growthl inl Indonesia'sl Exportl Marketl Sharel (%)	Growthl inl Ironl andl Steell Marketl Sharel (%)	Position
2000-2010	-0,036575	-0,040489	*Retreat*
2011-2023	-0,009584	-0,008242	*Retreat*

Figure 1 Result Data



Source: UN Comtrade (2024), data processed

Based on the EPD results, Indonesia's export market share growth increased from -0.036575% in 2000–2010 to -0.009584% in 2011–2023. Similarly, the market share growth for iron and steel improved from -0.040489% in 2000–2010 to -0.008242% in 2011–2023. Both remained in the retreat position, indicating a decline in product dynamism in the international market. Although still in the same position, the increase in export market share growth indicates improvements in exports, and the growth in the market share of iron and steel reflects the positive impact of the implemented downstream policy.

DISCUSSION

The Impact of Downstream Policies on the Growth of Indonesia's Net Exports of Iron and Steel

The growth in Indonesia's net exports of iron and steel (HS 72) is inseparable from the factors that shape net exports, namely exports and imports. The increase in the average total exports of iron and steel demonstrates the success of downstreaming in adding value to Indonesia's iron and steel products. The prohibition on exporting raw materials has preserved domestic supplies for processing into semi-finished or finished goods. This aligns with research by Cahyani (2023) and Santoso et al. (2023), which states that export bans driving downstreaming help maintain domestic supply and increase export value. The increase, however, is not only seen in total exports but also in total imports. A significant increase in imports at the 1% level indicates Indonesia's continued reliance on imported iron and steel, as domestic supply remains insufficient to meet the higher production demand. A potential solution is to expand smelter facilities to optimize production (Cahyaningtyas et al., 2021). Unfortunately, smelter development faces various obstacles that hinder mining companies from maximizing downstreaming (Illahi, 2022).

The delay in smelter construction results from the shortcomings in the regulations governing this process. Law No. 4 of 2009 on Mineral and Coal Mining was deemed ineffective during its first 10 years of implementation. Although the law was enacted in 2009, the Ministry of Energy and Mineral Resources noted that the raw material export ban was only fully implemented in 2014. Smelter development outlined in Law No. 4 of 2009 requires significant capital and time, along with compliance requirements considered burdensome for mining companies (Illahi, 2022). Furthermore, the licensing mechanism has been criticized for lacking transparency and accountability, complicating governance in the mining sector (Nugroho, 2020).

In response to these challenges, the government amended the regulations through Law No. 3 of 2020, revising Law No. 4 of 2009 on Mineral and Coal Mining. The new law guarantees the

extension of mining permits (IUPK), ensuring that investors can continue their operations without the risk of losing land to state auctions after contracts expire (Amatullah et al., 2020). Additionally, Law No. 3 of 2020 shifted the authority over mining from local governments to the central government, improving clarity and specificity in mining regulations, thereby enhancing compliance and enforcement (Farisi, 2021).

These regulatory improvements positively impacted Indonesia's net exports of iron and steel. Net exports, which were consistently negative or in deficit, turned positive or surplus following the changes to Law No. 4 of 2009, which previously had limited impact. According to data from Trademap (2024), Indonesia's net exports of iron and steel (HS 72) surged dramatically beginning in 2020, reaching their peak in 2022. This explains why the downstreaming policy's impact on net exports appears small in the Paired t-Test results, as significant changes were only observed in the last three years, from 2020 to 2024.

The Impact of Downstream Policies on Indonesia's Iron and Steel Market Share

Based on the results of the Export Product Dynamic (EPD) analysis, Indonesia's iron and steel commodities remained in the retreat position both before and after the implementation of downstream policies, indicating a decline in product dynamism in the international market. However, there was an increase in market share growth for both overall exports and iron and steel commodities. This improvement, albeit small, suggests that downstream policies have begun to positively impact this industry. Nevertheless, the retreat position highlights that Indonesia's iron and steel sector still faces significant challenges in improving its competitiveness in the international market. Several key obstacles must be addressed. First, the capacity of the processing industry is still limited, so further investment in infrastructure and technology is needed. Second, tight global competition with countries that are superior in technology, production, and costs. Third, regulatory stability or policy changes that are too frequent can affect investor confidence and stop the downstreaming of projects. This aligns with research by Sari and Utami (2023), which states that Indonesia's iron and steel commodities (HS 72) still lack strong competitiveness in the global market.

CONCLUSION

The downstream policy has successfully increased Indonesia's net exports of iron and steel (HS 72), although the impact remains limited, with significance at the 10% level. The ban on raw material exports has driven domestic processing into higher-value products, as reflected in the increase in total exports. However, the heavy reliance on imported raw materials—which also increased significantly at the 1% level—remains a major challenge due to limited domestic supply. This issue is exacerbated by delays in smelter construction, previously hindered by regulations under Law No. 4 of 2009, which were only rectified through Law No. 3 of 2020. These improvements have resulted in net export surpluses since 2020, peaking in 2022, although the impact has only been evident in the past three years.

Despite the surplus, the sector's "retreat" position in the international market indicates low competitiveness. The small growth in export market share is an initial sign of the downstream policy's positive impact, but the sector requires substantial investments in infrastructure, technology, and regulatory stability. With consistent implementation of Law No. 3 of 2020, the iron and steel sector has the potential to become more competitive in the global market in the future.

LIMITATION

This study focuses on quantitative indicators without accounting for external factors such as global economic fluctuations, technological advancements, or policy implementations in

competing countries. Future research should incorporate these dimensions for a holistic evaluation.

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