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COMPETITIVENESS ANALYSIS OF COPPER EXPORTS TO CHINA: CASE STUDY OF ASEAN COUNTRIES

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Abstract

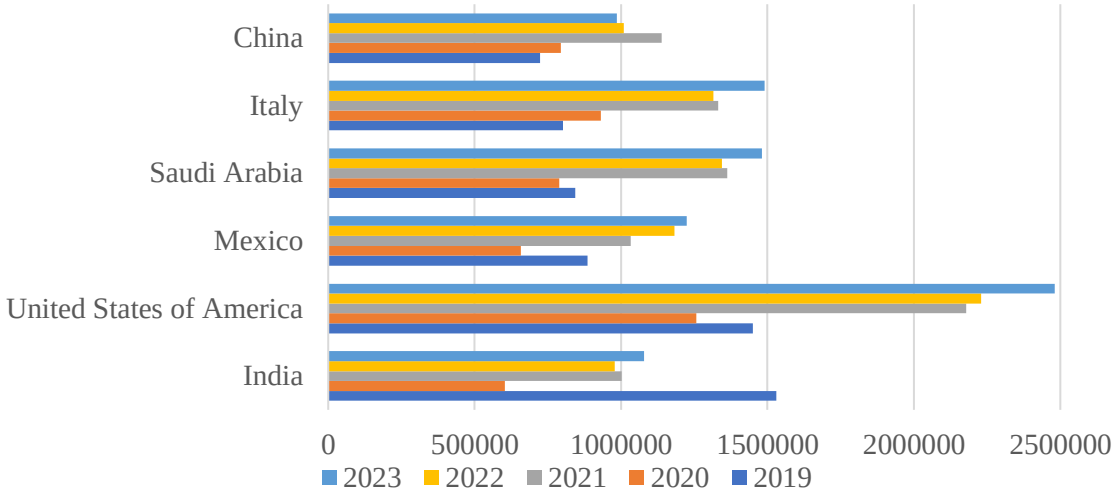
This study analyzes the competitiveness of ASEAN copper exports (HS 7408) to the Chinese market over the period 2019–2023. China is one of the world's largest copper importers, and ASEAN has emerged as a major supplier with substantial export value growth in recent years. Using secondary data from Trademap and World Integrate Trade Solution, the research applies quantitative descriptive methods supported by Revealed Comparative Advantage (RCA), Revealed Symmetric Comparative Advantage (RSCA), and Export Product Dynamics (EPD) to assess the comparative position and market dynamics of copper exports from six ASEAN countries—Indonesia, Malaysia, Thailand, Philippines, Singapore, and Vietnam. The findings indicate varying levels of comparative advantage among ASEAN exporters, reflecting differences in productivity, export structure, and market integration. The analysis also highlights shifts in China's import demand that influence ASEAN's export performance and long-term prospects. Overall, the study provides insights into policy implications for strengthening ASEAN's competitiveness in the Chinese copper market, particularly through enhancing productivity, export diversification, and value-added development.

Keyword: Competitiveness, Export, Copper, ASEAN, China

INTRODUCTION

International trade is the activity of exporting and importing that goods or services. International trade offers most benefits from an export perspective, including increased income, increased foreign exchange, capital transfers, and expanded employment opportunities. And benefits from an import perspective, it provides a wider range of consumer goods and fulfills the needs of goods that cannot be produced domestically. Each country's leading commodities serve as a benchmark for supporting the economy. These leading commodities will continue to be developed to compete in the international market. The mining sector is a non-oil and gas sector with the potential to benefit a country through export commodities. The copper sector is one of the mining sectors most needed by the automotive industry, combat vehicle manufacturing, combat weapons manufacturing, telecommunications and electronics, and the construction and transportation industries. Figure 1 shows the six major copper importing countries in the world based on export value from 2019 to 2023. Based on the figure, we show that in 2019, India takes the top position as the world's copper importer with an export value of US$1,529,509. From 2020 to 2023, the United States takes the top position as the world's largest importer. In 2023, the United States had copper export values of US$2,480,898. Mexico, Saudi Arabia, and Italy ranked third, fourth, and fifth in 2019. $.

Figure 1. Copper importers from 2019 to 2023



Source: Trademap,2025

China is one of the world's largest copper importers. In 2019, China ranked sixth with an export value of US$723,038. In 2020, China entered the top three with copper exports worth US$794,173. In the next two years, 2021 and 2022, China achieved exports worth more than US$1 million, making it one of the major importers and giving it a significant market share for copper. According to data published by Trademap (2025), ASEAN is one of the regions with the highest copper exports in the world. The value of ASEAN copper exports to the world in 2022 was US$3,021,086 and in 2023 it was US$2,858,182 (Trademap 2024). Based on the above explanation, the purpose of this paper is to analyze the potential development and comparative competitiveness of ASEAN copper exports in China. By analyzing the competitive position of ASEAN copper commodities in the Chinese market, we can see the implications of the ASEAN countries' policies on copper exports to the Chinese market.

LITERATURE REVIEW

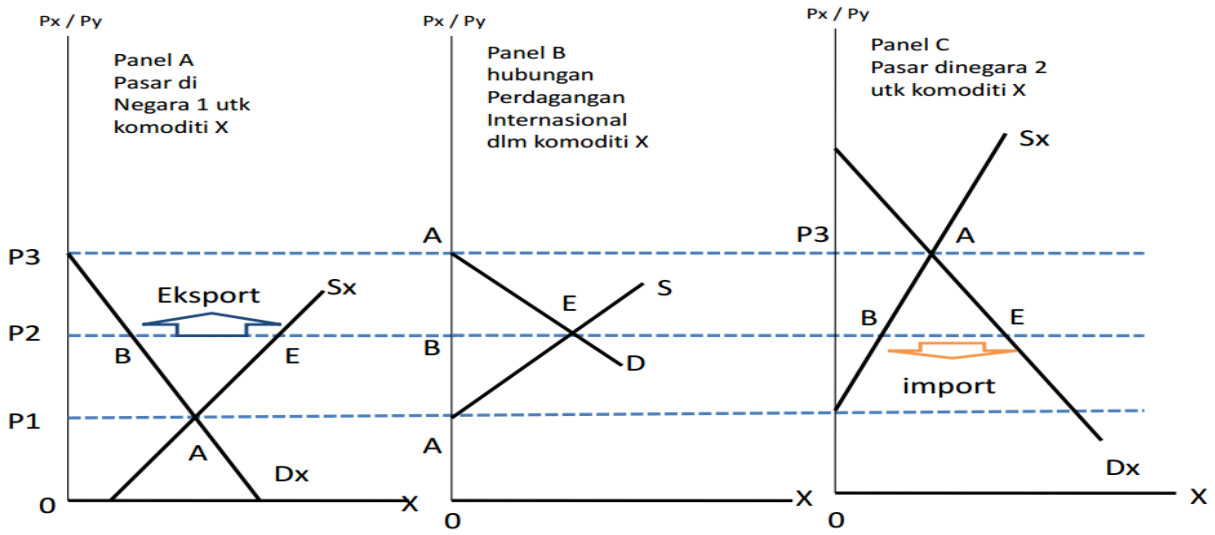
International Trade

International trade theory focuses on analyzing the fundamentals of international trade and the benefits it generates, which are the goals of trade, according to Salvator (2019). The availability of a country's natural and human resources is a factor that significantly influences trade choices. International trade creates bonds between trading countries and requires governments to play a role in regulating a country's economic activities by increasing exports and regulating imports. International trade is trade conducted between countries. Every country that engages in international trade aims to profit from it. Krugman (2009) stated that the main reasons for international trade are as follows:

1. Countries trade because they are different from one another.
2. Countries trade to achieve economies of scale.

International trade is characterized by exports and imports, or the exchange of commodities between two or more countries. This activity occurs due to differences in supply and demand, as well as differences in price levels between countries. Graphically, international trade activities can be explained in the following figure:

Figure 2. Partial equilibrium of international trade



Source: Salvatore, 2019
Description:
Panel A: Acting as an exporting country
Panel B: International Trade Equilibrium
Panel C: Acting as an importing country
P1: Equilibrium price in country A's market
P2: Equilibrium price in the international market
P3: Equilibrium price in country C's market

Figure 1 shows the process of international trade. When the price is at P1, equilibrium occurs in country A, namely at point A (in panel A). At that time, there is no supply in the international market, this is indicated by the supply curve (curve S) which is at point A, namely when X (commodity) is zero (in panel B). When the price is at P3, equilibrium occurs in country C, namely at point A (in panel C). At that time, there is no demand in the international market, this is indicated by the demand curve (curve D) which is at point A, namely when X (commodity) is zero (in panel B). When the price is at P3, there is excess supply in country A because supply is at point E and demand is at point B, indicating that commodity X produced is greater than commodity X consumed (in panel A). This encourages country A to export. At the same time, excess demand occurs in country C because supply is at point B and demand is at point E, indicating that commodity X consumed is greater than commodity X produced (in panel C). This encourages country C to import. Exports made by country A and imports made by country C cause international trade to occur so that equilibrium is formed in the international market at point P3, namely at point E (in panel B).

Theory of Absolute Advantage

Adam Smith first proposed the theory of absolute advantage. This theory explains that each country can benefit from international trade by specializing in production and exporting goods in which it has an absolute advantage. Absolute advantage, in other words, means an advantage gained because the country in question can produce goods or services more cheaply or more efficiently than other countries, due to the country's higher labor productivity compared to other countries (Mankiw 2006).

Theory of Comparative Advantage

David Ricardo explained that comparative advantage can be considered a natural factor and emphasizes the price ratios between countries that differ compared to the absence of trade (Oktaviani and Novianti 2014). Comparative advantage can be seen from several perspectives, such as land use and productivity levels. Meanwhile, the competitive advantage of a commodity can be seen from the price and infrastructure conditions. While a commodity has a comparative advantage in a region, it does not necessarily mean that the commodity also has a competitive advantage.

Competitiveness

Porter (1990) explains that competitiveness is the ability of a commodity to enter and maintain foreign markets. A country's competitiveness is closely related to productivity. Higher levels of productivity, as reflected in exports, indicate a country's high competitiveness. Competitiveness, in general, is the capacity to produce goods and services that meet foreign market criteria and offer long-term improvements in quality of life (Bernardini et al., 2014). A commodity's competitive advantage is something that can be developed; therefore, it must be created to be attained (Tambunan, 2001).

METHOD

This research uses secondary data from 2019-2023. The data used includes the value and volume of copper exports in ASEAN, consisting of six major exporting countries: Indonesia, Malaysia, Thailand, Philippines, Singapore, and Vietnam. The data was obtained from various sources, including Trademap and the World Integrated Trade Solution (WITS). This research used Harmonized System (HS) is a global product classification system, the HS for copper used is HS 7408. The method used in this research is quantitative descriptive. Quantitative descriptive is a type of research used to analyze data by describing and providing an overview of the phenomena and results of a study, which are then processed for analysis and drawing conclusions (Aji et al., 2019). The data analysis technique in this study uses quantitative descriptive analysis using Revealed Comparative Advantage (RCA), Revealed Symmetric Comparative Advantage (RSCA), and Export Dynamic Product (EPD).

Revealed Comparative Advantage (RCA) and Revealed Symmetric Comparative Advantage (RSCA)

The concept of Revealed Comparative Advantages (RCA) was first introduced by Ballasa (1965), who argued that a country's comparative advantage is reflected in its exports. RCA analysis compares a country's export market share in a particular sector to that sector's market share in the international market and in the destination country. In this study, the commodity is copper (HS 7408). The RCA calculation is as follows:

$$\text{RCA}=\frac{Xi/Xt}{Wi/Wt}$$

Description:
Xi: Value of commodity i exports to China
Xt: Total export value the country to China
Wi: export value of commodity i in World
Wt: Total exports value in the world

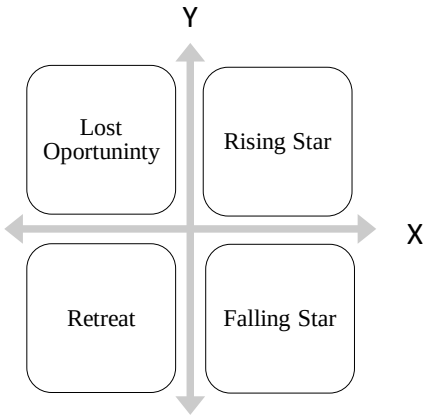
If the RCA value is less than one (RCA < 1), the commodity does not have a comparative advantage. If the RCA value is greater than one (RCA > 1), the country has strong competitiveness and a comparative advantage compared to countries exporting similar commodities (Aji et al., 2019; Aprilia R. et al., 2015; Stellian & Danna-Buitrago, 2022). The use of RCA has a weakness, namely the asymmetry of the RCA index. Therefore, the Revealed Symmetric Comparative Advantage (RSCA) index is used to address this issue. RSCA is a simple modification of RCA or the Balassa index, with values ranging from -1 to 1 (Laursen, 1998). RSCA is formulated as follows:

$$\text{RSCA}=\frac{RCA+1}{RCA-1}$$

If the result RSCA >0 = a country is said to have a comparative advantage and than RSCA <0 = a country is said to have no comparative advantage.

Export Product Dynamics (EPD)

Expect RCA, this research used Export Product Dynamics (EPD) analysis. The EPD method consists of quadrants that place the analyzed products into four categories as shown in Figure 2.



The estimated competitive position will be in one of the quadrant positions based on the market share of the commodity, (Esterhuizen, 2006) formulates the EPD as follows:

$$\text{Axis X} = \frac{\sum_{t=1}^{T}\left(\frac{Xia}{Xta}\right)t \times 100\% - \sum_{t-1}^{T}\left(\frac{Xia}{Xta}\right)t\text{-}1 \times 100\%}{T}$$

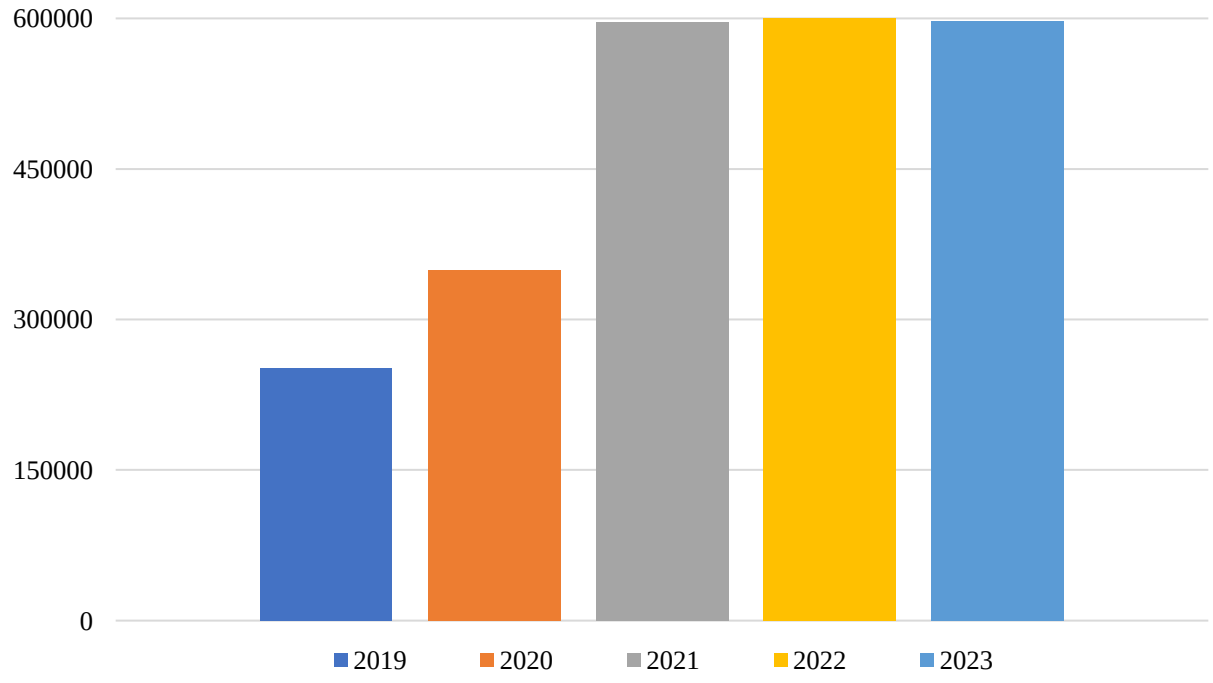
$$\text{Axis Y} = \frac{\sum_{t=1}^{T}\left(\left(\frac{Wi}{Wt}\right)t \times 100\% - \sum_{t-1}^{T}\left(\frac{Wi}{Wt}\right)t\text{-}1 \times 100\%\right.}{T}$$

RESULT AND DISCUSSION

The Trend of ASEAN Copper Exports to China

Copper is one of ASEAN's top export commodities to China period from 2019-2023. Trademap data (2025) ASEAN contributed 61 percent of copper in 2022 and 67.5 percent of copper in 2023 to China. Figure 2 shows that the value of ASEAN's copper exports to China fluctuates and has a trend of increasing every year.

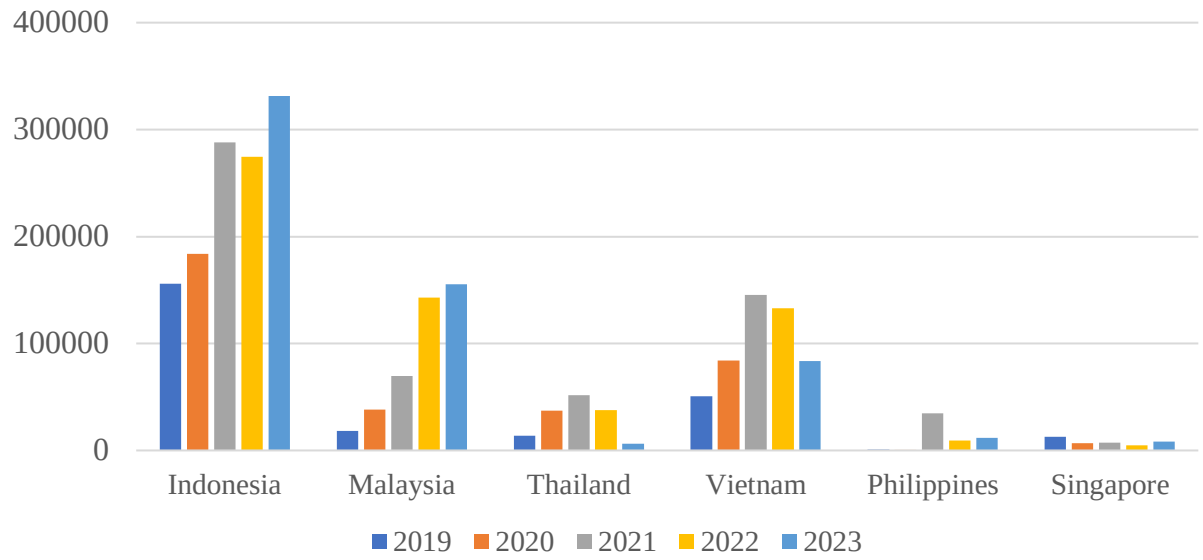
Figure 3. ASEAN-China Copper Export Value Growth



Source: WITS, 2025

In 2020, there was an increase in the value of ASEAN copper exports by US$ 97,919 to US$ 349,479. The largest increase in the value of ASEAN copper exports occurred in 2021, which was US$ 246,912 from the previous year. In 2023, there was a decrease of US$ 3,893 to US$ 596,831. The increase in the value of copper exports over the last five years occurred because China is the export destination for ASEAN countries. Figure 3 shows a comparison of copper export values among ASEAN countries period 2019-2023. There are six countries that export copper to China, including Indonesia, Malaysia, Thailand, Vietnam, Philippines, and Singapore. Indonesia's copper export value ranked first with an export value of US$155,820.24 in 2019. In 2020, it increased to US$183,648.88. Indonesia's highest export value to China occurred in 2023, reaching US$331,648.26.

Figure 4. Comparison of Copper Export Values from ASEAN country to China from 2019-2023



Source: WITS, 2025

Vietnam and Malaysia placed second and third with export values of US$50,546.73 and US$18,181.98 in 2019. Malaysia has increased its copper export value over the past five years, achieving its highest point in 2023 with an export value of US$155,500.60. Vietnam, which fluctuates in its copper export value to China, In 2023 copper export value has decreased to US$83,377.14. Thailand, Philippines, and Singapore are three other ASEAN countries that export copper to China. In 2019, Thailand's copper exports were valued at US$13,556.85. Thailand experienced an increase until 2022 with an export value of US$37,600.96, but in 2023 it experienced a decline to an export value of US$6,436.89. The value of Philippine copper exports in 2019 was US$715.9, then dropped in 2020 to US$4.48. In 2021, it is the biggest with an export value of US$34,619.34. In 2022 and 2023, the export value of Philippine copper is US$9,407.41 and US$11,684.05. Singapore received US$12,860.59 in exports in 2019. Singapore experienced fluctuations in value each year until 2023, achieving an export value of US$8,043.06.

Revealed Comparative Advantage (RCA) and Revealed Symmetric Comparative Advantage (RSCA) Copper ASEAN-China

The export value of copper commodities from ASEAN countries to China is high and tends to fluctuate each year. Therefore, a study or research is needed to determine the comparative competitiveness of copper commodities from ASEAN countries using RCA. The results of the comparative competitiveness analysis of ASEAN copper commodities are shown in Table 1.

Table 1. Results of ASEAN copper RCA to China

Country	RCA				
	2019	2020	2021	2022	2023
Indonesia	15.16	14.23	11.93	10.72	12.73
Malaysia	1.45	2.48	3.34	7.70	9.20
Thailand	1.26	3.09	3.08	2.81	0.47
Vietnam	3.32	4.23	5.80	5.93	3.43
Philipines	0.20	0.00	6.69	2.21	2.74
Singapore	0.68	0.32	0.24	0.19	0.31

Source: WITS, 2025

The RCA result from the six exporting countries in the period 2019 to 2023 mostly had RCA values greater than one. Table 1 shows that the highest average RCA value was reached by Indonesia at 12.95. During the research period, Indonesia had the highest RCA compared to other exporting countries. Malaysia had the second highest RCA value. Malaysia had an average RCA of 4.83 and experienced an increase in RCA every year. In 2023, Malaysia had an RCA value of 9.20. Vietnam was in third position with an average RCA of 4.54. Vietnam decreased its RCA in 2023 with a result of 3.43. Thailand and Philippines had average RCA values of 2.14 and 2.36, Thailand recorded a significant reduction in 2023, with an RCA value of less than one. With this result, Thailand has weak comparative competitiveness. Philippines had an RCA<1 in 2019 and 2020, which means it has no comparative advantage in China, but in the next year it increased to 6.69 in 2021. Singapore as a whole still has an RCA<1 value, which means it is not competitively advantageous in the China market. Table 2 shows the RSCA results for six ASEAN copper exporting countries to China. Three countries, including Indonesia, Malaysia, and Vietnam, show that value of RSCA>0, that means the copper commodities of these three countries have a strong comparative advantage in the Chinese market. Table 2 shows the RSCA values, where Indonesia's average RSCA is 0.85. Indonesia's RSCA value fluctuates each year. Vietnam is in second place with an average RSCA value of 0.62, which falls to 0.55 in 2023. Malaysia is in third position with an average RSCA value of 0.54. Malaysia's RSCA is rising each year, reaching a value of 0.80 in 2023.

Table 2. Results of ASEAN copper RSCA to China

Country	RSCA				
	2019	2020	2021	2022	2023
Indonesia	0.88	0.87	0.85	0.83	0.85
Malaysia	0.18	0.42	0.54	0.77	0.80
Thailand	0.12	0.51	0.51	0.48	-0.36
Vietnam	0.54	0.62	0.71	0.71	0.55
Philipines	-0.67	-1.00	0.74	0.38	0.46
Singapore	-0.19	-0.51	-0.61	-0.68	-0.53

Source: WITS, 2025

Thailand ranks number four with an average RSCA coefficient of 0.25. Thailand's RSCA coefficient has decreased from 2020 to 2023. In 2023, Thailand's RSCA coefficient was less than zero, which explains that Thailand did not have a comparative advantage. Philippines and Singapore have an average RSCA<0. Philippines' average RSCA is -0.02, but Philippines' RSCA score increased from 2021 to 2023 and obtained an RSCA>0. From these results, it can be explained that Philippines has a comparative advantage in copper exports to China. Singapore's RSCA is less than zero each year, which means that Singapore does not have a comparative advantage in copper exports to the Chinese market.

Export Product Dynamic (EPD) Copper ASEAN-China

In this case, the EPD analysis is used to examine the competitive advantage of ASEAN copper commodities in China. The EPD results of the six ASEAN countries that export copper to China are shown in Table 3.

Table 3. Results of ASEAN copper EPD to China

Country	Axis X	Axis Y	Market Position
Indonesia	-0.0080	0.0271	Lost Opportunity
Malaysia	0.6499	0.0271	Rising Star
Thailand	0.1915	0.0271	Rising Star
Vietnam	0.1015	0.0271	Rising Star
Philipines	1645.5965	0.0271	Rising Star
Singapore	-0.0773	0.0271	Lost Opportunity

Source: WITS, 2025

Based on Table 3, Malaysia, Thailand, Vietnam, and Philippines are in the highest group, namely rising stars. Philippines has the largest percentage among other countries in terms of export market share growth (X-axis), which is 1645.596 percent. Positive values on the X-axis for Malaysia, Thailand, Vietnam, and Philippines illustrate good export market share growth in the Chinese market. These values are much higher when compared to Indonesia and Singapore, which have values of -0.008 and -0.077, respectively. This data shows that the share of Indonesia and Singapore copper exports in the Chinese market has been declining every year. The Export Product Dynamic (EPD) method shows the position of ASEAN countries' copper in the Chinese market. From 2019 to 2023, ASEAN copper in the Chinese market is in position rising star and lost opportunity. The rising star position of copper commodities is in Malaysia, Thailand, Vietnam, and Philippines. This shows that these countries' copper commodities have a competitive advantage in the Chinese market, marked by increasing export demand and market share showing positive growth for copper commodities. The lost opportunity position is seen in Indonesia and Singapore, indicating that the copper commodities of these countries have experienced a reduction in market share growth, but have seen an increase in copper export demand in the Chinese market.

CONCLUSION

China is a country with a potential market share for ASEAN in terms of exports. Indonesia has an average RCA value of 12.954 and an average RSCA value of 0.85. Malaysia has an average RCA value of 4.83 and an average RSCA value of 0.54. Vietnam has an average RCA value of 4.54 and an average RSCA value of 0.62. These results show that Indonesia, Malaysia, and Vietnam are competitively positioned in the Chinese market. Thailand and Philippines have average RCA values of 2.14 and 2.36, according to the data. Thailand's average RSCA value is 0.25, while Philippines has an average RSCA value of -0.02. This explains that Thailand is already competitive in the Chinese market, but Philippines is not yet competitive in copper exports. Singapore has an RCA value of <1 and an RSCA value of <0, which explains that Singapore's copper export market is not yet competitive in China. The results of the EPD analysis estimate explain the dynamics of ASEAN copper commodities in the Chinese market. Malaysia, Thailand, Vietnam, and Philippines take the position of rising stars. Indonesia and Singapore are in the position of lost opportunity.

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