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Trade Potential in the Bilateral Relationship Between Indonesia-South Korea (Perspective: SITC Agregat 1 Digit) 2013-2022

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Abstract

The Republic of Indonesia and South Korea have engaged in a bilateral cooperation spanning 50 years across diverse domains. Despite the success of this collaboration in augmenting the overall trade between the two nations in alignment with their initial economic objectives, the trajectory of trade development has not consistently followed a linear pattern. This study aims to elucidate the trading dynamics between Indonesia and South Korea from 2013 to 2022. This period was selected as it reflects significant dynamics in bilateral trade relations as well as global economic fluctuations that influenced the trade patterns of both countries. This is achieved through a comprehensive analysis utilizing methodologies such as the Grubel-Lloyd Index, Trade Balance Index (TBI), Trade Complementarity Index (TCI), and Revealed Symmetric Comparative Advantage Index (RSCA). The research outcomes reveal a high degree of industrial interrelatedness within 10 commodity groups, with 7 exhibiting robust integration and 3 displaying varying degrees of integration ranging from moderate to weak. Despite the sustained high level of compatibility in the trade structure, discernible fluctuations are observed in trade surpluses and deficits. The analysis of the Revealed Symmetric Comparative Advantage Index highlights the absence of significant comparative advantages for Indonesia across the majority of the analyzed commodities. Notwithstanding marginal alterations in the Product Mapping classification, statistical analyses of (IIT), TBI, TCI, and RSCA underscore bilateral trade's nuanced and dynamic nature, with annual fluctuations necessitating focused attention.

Keywords: Bilateral, IKCEPA, IIT, TBI, TCI, RSCA, Product Mapping.

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INTRODUCTION

In supporting domestic needs fulfillment and addressing the challenges of globalization, every country engages in cooperation with other countries in various fields. Humans, as social beings, need to collaborate in efforts to meet their living needs, and the same applies to these countries. Without this cooperation, a country may have to strive to produce everything on its own and face difficulties in accessing products that are difficult to produce locally (Li, 2017). The development of the global economy has driven countries to seek new ways to enhance international trade cooperation (Hesti, 2023). One form of international cooperation between countries is bilateral cooperation, which involves two countries in various fields. The Republic of Indonesia has engaged in bilateral cooperation with the Republic of South Korea for 50 years, which has implications in various fields including politics-security, economy, and socio-cultural aspects. Bilateral economic relations between Indonesia and South Korea were first started in 1973 and have continued to this day and have experienced various degrees of progress and impacts for the two countries (Salsa Bila & Wijayati, 2022).

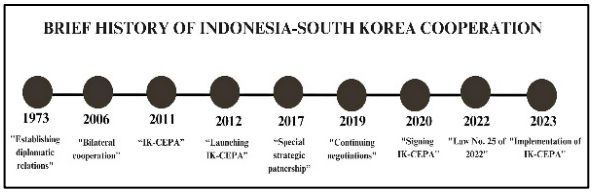

Figure 1. Brief history of Indonesia-South Korea Cooperation. Source: *Ministry of Foreign Affairs of Indonesia* (*Author's Summary*)

International trade is crucial for economic efficiency and fostering international relations. Indonesia and South Korea established diplomatic relations in September 1973, with consular relations dating back to August 1966 (Rompas, 2019). Initially, this cooperation was based on Indonesia's natural resources and labor, and South Korea's capital and technology. Over time, these relations expanded into various fields, including energy, environment, agriculture, economy, defense, tourism, and culture. In 2006, bilateral cooperation aimed at accelerating industrialization in Indonesia began. In 2011, the Indonesia-Korea Comprehensive Economic Partnership Agreement (IK-CEPA) was signed to strengthen trade relations.

In 2012, Indonesia and South Korea agreed to establish the Indonesia-South Korea Comprehensive Economic Partnership (IK-CEPA). IK-CEPA was signed on December 18, 2020, in Seoul, South Korea. With regulations on the Certificate of Origin (SKA) governed by Regulation of the

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Minister of Trade No. 57 of 2022 (Ministry of Trade of the Republic of Indonesia, 2022). The Indonesia-Korea Comprehensive Economic Partnership Agreement (IK-CEPA) has become one of the strategic economic collaborations that can provide new opportunities for economic growth, trade, and investment between Indonesia and South Korea (Santoso, 2022). Through IK-CEPA, Indonesia is poised to secure market access for 95.5% of South Korea's tariff lines, accounting for a market share of 97.33% (Ministry of Foreign Affairs of the Republic of Indonesia, 2018).

The Republic of South Korea is one of Indonesia's major trading partners. From 2013 to 2022, trade between Indonesia and South Korea fluctuated in line with both developments between the two nations and global economic trends. The trade between both countries experienced the largest decline in 2014 & 2020. According to data from the Indonesian Ministry of Trade, the trade volume between Indonesia and South Korea experienced a decline due to the weakening global economy, which was felt by many countries worldwide. (Pratiwi, 2019). During this period the COVID-19 pandemic in 2019–2020 further disrupted the global economy, leading to a worldwide recession. These global economic dynamics, alongside other factors, contributed to the fluctuations in trade between Indonesia and South Korea during this period (Arianto, 2020).

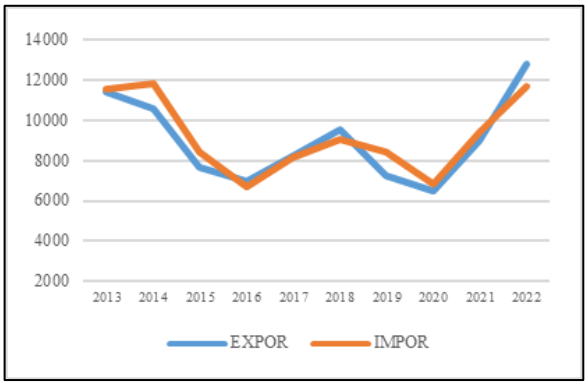

Figure 2. Indonesia-South Korea Trade Balance 2013-2022 (US$). Source: *UN COMTRADE*

In Figure 2, it is apparent that from 2013 to 2022, the trade balance between Indonesia and South Korea tended to exhibit a deficit for Indonesia, with the trade volume also showing fluctuations reflecting trade imbalance. Indonesia achieved a trade surplus only in 2017-2018 and 2022 during this period. Fluctuations reflecting trade imbalance occurred during this period, with Indonesia achieving a trade surplus only in 2017-2018 and 2022. From 2013 to 2017, the trade trend experienced a decline. However, following the agreement to elevate the bilateral relationship from a "strategic partnership" to a "special strategic partnership" in November 2017, the trade trend began to improve at the start of 2018. This shift in the partnership status likely contributed to renewed efforts to strengthen

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economic ties and trade relations, resulting in an upward trajectory in bilateral trade moving forward (Rompas, 2019). The combination of these factors provides a dynamic context that allows for an in-depth analysis of how both global economic shifts and bilateral trade agreements have impacted the trade balance between the two countries.

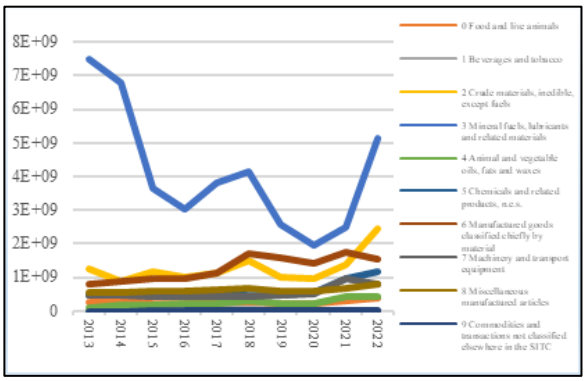

Figure 3. Indonesia's Export Volume to South Korea 2013-2022 SITC 0-9 (US$). Source: *UN COMTRADE*

In Figure 3, which shows Indonesia's Export Volume to South Korea from 2013 to 2022 classified by SITC [1] 0-9, the data reveals that Indonesia's exports are primarily dominated by SITC 3 (Mineral fuels, lubricants, and related materials), consistently representing the largest share of exports to South Korea throughout the period. This highlights the significant role of energy commodities in Indonesia's trade with South Korea. In contrast, SITC 9 (Commodities and transactions not classified elsewhere in the SITC) shows the lowest export volume, indicating the minimal contribution of this category to the overall trade flow.

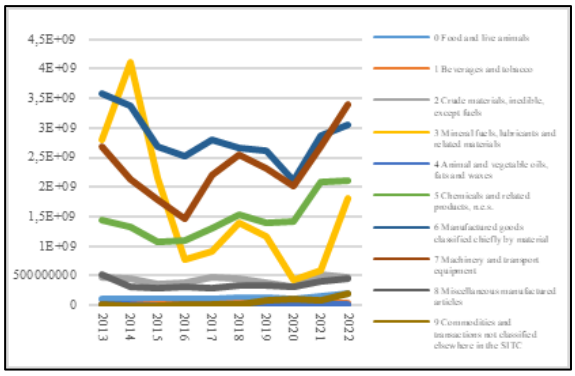

Figure 4. Indonesia's Import Volume to South Korea 2013-2022 SITC 0-9 (US$). Source: *UN COMTRADE*

In Figure 4, which shows Indonesia's Import Volume to South Korea from 2013 to 2022 classified by SITC 0-9, the data reveals that the commodity with the highest import volume is manufactured goods primarily classified based on materials (SITC 6), while the commodity with the lowest export volume is (SITC 9) Commodities and transactions not classified elsewhere in the SITC. The

[1] The Standard International Trade Classification (SITC) is a system for classifying products developed in 1962 by the United Nations (UN). SITC was created with the aim of classifying traded products not only based on the material and physical properties of the products but also according to their stage of processing and economic function. This classification system is designed to facilitate economic analysis by providing a structured framework for understanding trade patterns and product categories.

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conditions mentioned above are of interest because bilateral cooperation between Indonesia and South Korea has the potential to boost the total trade between both countries. However, trade developments do not always result in consistent improvements. Therefore, this research aims to delve into this matter by examining the position and potential of trade in the context of the international trade cooperation relationship between Indonesia and South Korea from 2013 to 2022.

The research focus includes the analysis of trends and performance in intra-industry trade, trade balance, product competitiveness, and the suitability of trade structures. In this study. The analysis is conducted using an aggregate SITC (Standard International Trade Classification) perspective that utilizes 1-digit codes (0-9). SITC is a system developed by the United Nations to categorize and classify traded products based on their material composition and economic function, rather than their physical characteristics. The SITC classification system allows for a systematic approach to analyzing trade data, facilitating comparisons across countries and time periods. By using the 1-digit classification, the analysis focuses on broad categories of goods, making it easier to examine general trade patterns and trends between Indonesia and South Korea during the specified period. This approach provides valuable insights into the overall structure of trade and the types of goods driving the bilateral trade flows. From the aforementioned background, the author attempts to formulate several research questions as follows:

1. What is the potential for intra-industry trade between Indonesia and South Korea during the period of 2013-2022?
2. How is the suitability of the trade structure between Indonesia and South Korea, as measured by the Trade Complementarity Index?
3. What is the historical development of the bilateral trade balance between Indonesia and South Korea, measured by the Trade Balance Index from 2013 to 2022?
4. What is the position and dynamics of Indonesia's leading commodities with comparative advantages in the South Korean market through the analysis of Revealed Symmetric Comparative Advantage (RSCA) during the period of 2013-2022?

How is the framework of trade positions and comparative advantages formed through the application of Product Mapping in identifying the trade positions of Indonesia and South Korea?

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THEORETICAL FRAMEWORK

Importance of International Trade and Theories

In analyzing Indonesia-Korea trade, relevant trade theories such as Adam Smith's theory of absolute advantage, David Ricardo's theory of comparative advantage, and the Heckscher-Ohlin (H-O) theory provide a robust framework for understanding the dynamics of trade relations between the two countries. Each of these theories focuses on differences in production factors and efficiency in producing goods, which forms the foundation for analyzing the flow of international trade. A country may not be able to meet its needs solely by relying on its resources due to the diverse human needs, which is one of the reasons a country engages in trade with others (gains from trade). Almost no country remains isolated without relations with others, as stated by Dumairy in 1997 (as cited in Kemendag, 2010).

Krugman's theory (1991) suggests the main reasons for international trade are differences among countries and the pursuit of economies of scale. International trade theory and policy fall under the microeconomic aspects of international economics as they relate to individual countries treated as single units and the relative prices of commodities. On the other hand, because the balance of payments concerns total receipts and payments and adjustment policies affect national income levels and general price indices, these illustrate the macroeconomic aspects of international economics (Salvatore, 1997:6). According to Adam Smith's classical economic theory, a nation's wealth is not measured by precious metals but by GDP and the contribution of foreign trade to GDP formation. To increase GDP and foreign trade, the government needs to establish free trade, which fosters intense competition and encourages countries to specialize based on absolute advantage, occurring when a country produces goods or services that other countries cannot.

The Heckscher-Ohlin (H-O) theory states that a country will export commodities produced by cheap and abundant factors of production and import commodities whose factors are relatively scarce and expensive domestically. Meanwhile, David Ricardo's comparative advantage theory explains that in trade, comparative advantage occurs when a country produces goods or services at a relatively lower cost than other countries. Lancaster (1980) shows that intra-industry trade occurs even when economies are identical in every aspect and can persist under comparative advantage conditions. According to Helpman and Krugman (1999),

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as cited in Hoang's 2019 research, comparative advantage drives inter-industry trade by encouraging trade specialization, while economies of scale spur intra-industry trade.

Classical theory was pioneered and developed by Adam Smith and subsequently enhanced by other scholars, including Adam Smith, David Ricardo, and John Stuart Mill. The classical theory of comparative advantage explains that international trade is possible due to differences in labor productivity (explicitly stated as a factor of production) among countries (Salvatore, 2004). Adam Smith criticized the mercantilist view of international trade, which he saw as excessive government intervention. Smith argued that if a country adopts the laissez-faire principle domestically and engages in free trade with other nations, its wealth will increase. This is similarly true for other countries when there is an international division of labor (specialization). This will expand the market for produced goods and lead to international specialization. With specialization, the consumption of goods and services will increase as each country focuses on producing specific goods according to its advantages. A country will have an absolute advantage if it chooses to specialize in production and export goods which it has an absolute advantage, and import goods which it has an absolute disadvantage.

David Ricardo's theory of international trade states that in a situation of free trade, even if a country is less efficient than another in producing both goods, both countries can still engage in mutually beneficial trade. The first country should specialize in producing the commodity in which its absolute disadvantage is smaller, which is known as comparative advantage. Conversely, it should import the commodity in which its absolute disadvantage is larger, referred to as comparative disadvantage (Salvatore, 2013). When a commodity has a greater comparative advantage, the country has the opportunity to produce and export it. Conversely, commodities with smaller comparative advantages should be imported (Salvatore, 1997). Comparative advantage can be achieved by increasing the productivity of a commodity or product. Cost comparative advantage is a component of comparative advantage. A country achieves high productivity by combining factors of production efficiently, resulting in the ability to produce better and relatively cheaper products, thereby gaining a cost comparative advantage.

According to the Heckscher-Ohlin (H-O) Model, international trade occurs due to differences in the ownership of production

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factors among countries, even if their technology levels are the same. A country with an abundance of capital will focus on producing and exporting capital-intensive goods. Conversely, a country with an abundance of labor will specialize in producing and exporting labor-intensive goods. Thus, international trade arises from these differences in the ownership of production factors, despite comparable technology levels. Several concepts have been developed within this theory. International trade is not fundamentally different from inter-regional trade, with distance being the primary distinction. The traded goods are based on the proportions and intensities of the production factors used to produce them. The theory posits that a country should produce goods that utilize its relatively abundant or cheap production factors. As a result, the production costs of these goods will be relatively low. By extensively using these relatively abundant production factors, their prices will increase. The H-O theory uses the isocost curve, representing equal total production costs, and the isoquant curve, representing equal total production. Equilibrium occurs when the isocost curve intersects with the isoquant curve, indicating optimal production at a certain cost.

In this context, a country's production is not only based on comparative advantage but also involves participation in trade within similar industrial sectors, leading to the emergence of the New Trade Theory (NTT) as a response to some limitations of the Heckscher-Ohlin (H-O) model. Criticisms of the H-O theory include its questionable empirical validation and the foundational assumptions that fail to reflect reality. One major criticism that NTT addresses is related to the homogeneity of traded goods. According to New Trade Theory, almost all modern economies no longer produce homogeneous goods but instead manufacture a variety of products with significant differences. Even within a single product category, there can be substantial variation. Consequently, international trade involves the exchange of diverse products, both within the same industry and across different industries. This differentiated product exchange is referred to as intra-industry trade (IIT). IIT is a key aspect of the New Trade Theory (Usman et al., 2010).

The main difference between intra-industry trade and inter-industry trade is that the latter involves entirely different products, while intra-industry trade involves products that are essentially similar but differ in certain aspects. Grubel and Lloyd's (1975) theory conceptualizes two-way trade within the

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same industry, explaining the phenomenon of intra-industry trade among countries engaged in exporting and importing similar goods. This concept was further developed by Greenaway and Milner (1994), who classified intra-industry trade into two types: horizontal intra-industry trade (between countries with similar products) and vertical intra-industry trade (between countries with products differing in quality and technological advantages). According to the Ministry of Trade (2010), IIT originates from the theory of comparative advantage, where a country with a comparative advantage in a specific commodity exports that commodity and imports goods in which it does not have a comparative advantage. Intra-industry trade plays a significant role, especially in the trade of manufactured goods among advanced industrial nations, which dominate global trade. Intra-industry trade tends to occur between countries with similar labor modal ratios and skill levels (Amalia et al., 2018). In other words, intra-industry trade becomes stronger when countries are at similar levels of economic development.

RESEARCH METHOD

The object of this research is the bilateral trade between Indonesia and South Korea during the period of 2013-2022. Within this framework, the research will analyze the flow of trade in goods between the two countries using the 1-digit aggregate SITC perspective. The objects of the research are the Intra-Industry Trade Index (IIT), Trade Balance Index (TBI), Trade Complementarity Index (TCI), and Revealed Symmetric Comparative Advantage (RSCA). Furthermore, the analysis will be conducted using a product mapping scheme by classifying based on TBI and RSCA. Additionally, descriptive statistical analysis will be employed to depict the data in formations that are easier to interpret. The subject of this study is the trade balance between Indonesia and South Korea from 2013 to 2022. Thus, the object of this research will provide valuable insights into the trade relationship between Indonesia and South Korea during the examined period.

Intra-Industry Trade Index (IIT)

In depicting the trade interdependence between the two countries, an analysis of Intra-Industry Trade (IIT) is conducted. To assess the level of integration occurring between the involved countries, the IIT index is derived through the calculation of the Grubel-Lloyd index from trade data obtained from UN Comtrade (*United Nations Commodity Trade*) with SITC aggregate 1-digit codes. The calculation of IIT follows the method developed by Grubel-Lloyd (1971; 1975) and Greenaway & Milner (1983). The process is as follows:

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$$Bj = 1 - \frac{(Xj - Mj)}{(Xj + Mj)}$$

Explanation:

Xj = Export value of a specific commodity or industrial sector
Mj = Import value of a specific commodity or industrial sector

Table 1. Classification of the Grubel-Lloyd index

GLI	Classification
*	Not- Reported
0,00	One way trade
0,00-0,249	Weak integration
0,250-0,499	Mild integration
0,500-0,749	Moderately strong integration
0,750-0,999	Strong integration

Source: Setyawati, 2018

Trade Balance Index (TBI)

The Trade Balance Index is used to depict and analyze whether a country specializes in exporting or importing specific commodities with its trading partners (Lafay, 1992). Simply put, the Trade Balance Index has the following formula:

$$TBI_{ij} = (X_{ij} - Min) / ((X_{ij}$$

Explanation:

Xij = Export of commodity j to the world by country i
Min = Import of commodity j from the world by country i

The trade balance index (TBIij) represents the trade balance of country I for a group of products (SITC) j, where xij and mij denote the exports and imports of a group of products j by country i, respectively. The index values range from -1 to +1. Specifically, the TBI equals -1 if a country only imports, while it equals +1 if a country only exports. However, the index is not defined when a country neither exports nor imports. In such cases, we assign a value of zero, indicating that the group of products has potential for either export or import. Any value between -1 and +1 indicates that the country simultaneously exports and imports a commodity. A country is termed a "net importer" in a specific group of products when the TBI value is negative, and a "net exporter" when the TBI value is positive (Widodo, 2009).

Trade Complementarity Index (TCI)

The Trade Complementarity Index can provide insight into the prospects of intra-regional trade and indicate the compatibility of a country's import structure with its trading partners' exports. This index indicates whether two trading countries have complementary export and import structures or the opposite (Drysdale, 1967). To measure the level of trade complementarity between two countries, the Trade Complementarity Index can be utilized (Khadan & Hosein, 2016). The formulation used is:

$$TCI = 100 \left[1 - \sum_q \frac{(m_q^A - x_q^b)}{2}\right]$$

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Explanation:

m_q^A = Total import share of country A for commodity q divided by the total import of all commodities of country A

x_q^b = Total export share of country B for commodity q divided by the total export of all commodities of country B

This index has values ranging from 0 to 100. A value of 0 indicates that a country does not export any goods or that another country does not import anything. Conversely, a value of 100 indicates that the export and import market shares are equal or proportional, signifying perfect complementarity (Alhayat, 2011).

Revealed Symmetric Comparative Advantage (RSCA)

This study utilizes the Revealed Symmetric Comparative Advantage (RSCA) trade index developed by Laursen (2015) to determine the potential or competitiveness of products. RSCA is a modified version of the Revealed Comparative Advantage (RCA) index introduced by Balassa (1965), which is used to analyze the comparative advantage of a commodity in a country. In this study, a modified version of the research by (Adzimatinur, 2018) will be used. The formulation is as follows:

$$RCA = \frac{Xpj/Xj}{Wpj/Wj}$$

$$RSCA = \frac{(RCA - 1)}{(RCA + 1)}$$

Explanation:

Xpj = The export value of commodity p from Indonesia to South Korea

Xj = Total export value from Indonesia to South Korea

Wpq = The export value of commodity p from the world to South Korea

Wj = Total export value from the world to South Korea

RSCAij index varies from -1 to +1 (or - 1≤RSCAij≤1). The interpretation of RSCA is similar to that of RCA. RSCAij greater than 0 implies that country i has a comparative advantage in good j. In contrast, RSCAij less than 0 implies that country i has a comparative disadvantage in product j (Saleh, 2010).

Product Mapping

Widodo (2009) developed a tool called "Product mapping" to examine the dynamic changes in the comparative advantage of East Asian countries from the perspective of industrial competitiveness in the region. According to Widodo (2009), two indicators are needed to represent these perspectives: domestic trade balance and international

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competitiveness. Widodo (2009) designed a product mapping scheme that categorizes each exported product into four groups: Groups A, B, C, and D. Group A consists of products with comparative advantage and specialization in exports. Group B consists of products with comparative advantage but no specialization in exports. Group C consists of products with specialization in exports but no comparative advantage, and Group D consists of products with neither comparative advantage nor specialization in exports. This can be seen in Figure 5, which is a matrix for the distribution of all product mapping sets exported.

RSCA > 0	**Group B**: Comparative Advantage Net-importer (RSCA > 0 and TBI < 0)	**Group A**: Comparative Advantage Net-exporter (RSCA > 0 and TBI > 0)
RSCA < 0	**Group D**: Comparative disadvantage Net-importer (RSCA < 0 and TBI < 0)	**Group C**: Comparative disadvantage Net-exporter (RSCA < 0 and TBI > 0)
	TBI < 0	**TBI > 0**

Figure 5. Product Mapping Classification.
Source: Widodo (2009)

Statistical Analysis

According to Pangestu Subagyo (2003:1), descriptive statistics refers to a branch of statistics that deals with the processes of data collection, data presentation, statistical calculations, and the creation of diagrams or graphs. According to Suryoatmono (2004:18), descriptive statistics is a statistical method that utilizes data from a dataset to describe or infer the characteristics of that dataset. In this study, various descriptive statistical tests will be utilized, including mean, median, mode, and standard deviation, as well as skewness tests, to illustrate the trading patterns trend over the years. This descriptive statistical analysis will facilitate the summarization of trading data, identification of average trade values, median values, mode (most frequently occurring value), as well as the level of data dispersion or variation (standard deviation).

RESULT AND DISCUSSION

The economic overview of a country is generally measured using the Gross Domestic Product (GDP) indicator. (Wibowo, 2003). Gross Domestic Product represents the total value of all goods and services produced within a country's borders in a specific period, usually within one year. GDP includes consumption, investment, government spending, and net exports. It is an important indicator for measuring the size and growth of a country's economy and is used as a basis for comparing economies between countries.

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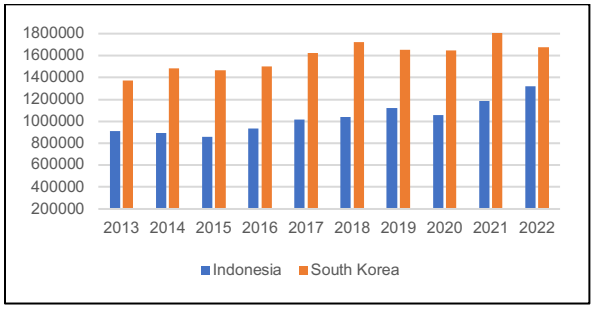

Figure 5. Indonesia-South Korea GDP (Million US$). Source: Worldbank

The IMF measures the economies of countries based on projected Gross Domestic Product (GDP) values. In 2022, Indonesia's GDP reached US$1.3 trillion. This figure places Indonesia at 17th in the world. Meanwhile, South Korea's GDP reached US$1.6 trillion, positioning Indonesia at 13th in the world. Despite Indonesia having a larger population and abundant natural resources, the difference in economic rankings indicates that South Korea has a comparative advantage in terms of innovation, technology, and economic diversification, which may play a role in its economic growth.

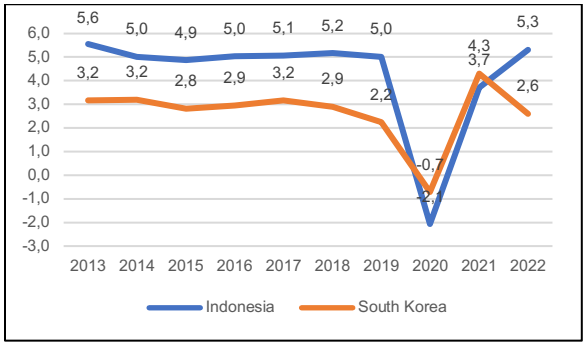

Figure 6. Indonesia-South Korea GDP Growth (%) 2013-2022. Source: *Worldbank.*

The significant difference in economic growth between Indonesia and South Korea becomes more pronounced when looking at the average economic growth data for the period 2013-2022. Indonesia achieved an economic growth rate of 4.3 percent per year. On the other hand, South Korea recorded an economic growth rate of 2.7 percent per year during the same period. This di Additionally, both nations were significantly impacted by the COVID-19 pandemic, which resulted in widespread disruptions to global economies. In 2020, both countries experienced negative GDP growth as a consequence of the severe economic repercussions of the pandemic.fference reflects differing economic development strategies between the two countries.

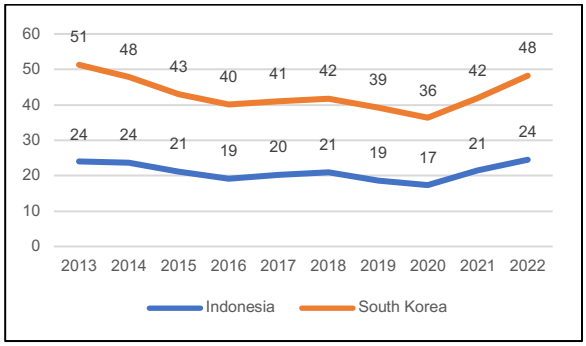

Figure 7. Indonesia-South Korea exports of goods and services (% of GDP) 2013-2022. Source: *Worldbank*

Indonesia's export share of Gross Domestic Product (GDP) recorded a share of 21.1 percent of GDP during the period 2013-2022, while South Korea had a higher export

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share, amounting to 43.1 percent. This difference reflects the extent to which both countries rely on international trade as the primary driver of economic growth.

Intra-Industry Trade (IIT)

In addition to fluctuating economic growth, the changing dynamics of trade relations, particularly in terms of intra-industry trade (IIT), are noteworthy. IIT refers to the exchange of similar goods between countries and is influenced by various economic factors, including production specialization and market integration.

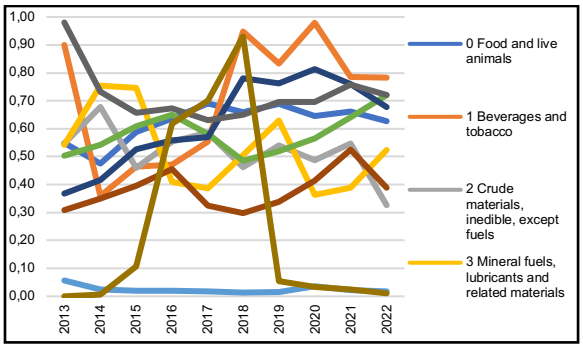

Figure 8. Results of Grubel Liyod Index (2013-2022)

The degree of Intra-Industry Trade (IIT) integration per period of 2013-2022 experienced significant fluctuations in each commodity. The recorded Grubel-Lloyd index values during this period show consistent variations, depicting unstable intra-industry trade dynamics between Indonesia and South Korea.

Table 2. Classification of Grubel-Lloyd index values based on the average (Period 2013-2022)

Commodity	Average Value (2013-2022)	Classification
SITC 1 Food and live animals	0,62	Moderately strong integration
SITC 2 Beverages and tobacco	0,71	Moderately strong integration
SITC 3 Crude materials, inedible, except fuels	0,52	Moderately strong integration
SITC 4 Animal and vegetable oils, fats and waxes	0,52	Moderately strong integration
SITC 5 Chemicals and related products, n.e.s.	0,02	Weak integration
SITC 6 Manufactured goods classified chiefly by material	0,58	Moderately strong integration
SITC 7 Machinery and transport equipment	0,62	Moderately strong integration
SITC 8 Machinery and transport equipment	0,38	Mild integration
SITC 9 Commodities and transactions not classified elsewhere in the SITC	0,72	Moderately strong integration

The Intra-Industry Trade (IIT) index values for each commodity group averaged over the years 2013-2022 indicate that Indonesia has a high level of industrial linkage with South Korea in the commodity group (SITC 8) of other manufactured articles. Furthermore, out of 10 commodities, 7 have IIT values exceeding 50 percent, indicating a fairly strong integration, while 3 commodities have IIT values below 50 percent, with 1 commodity classified as having weak integration and 2 commodities classified as having moderate integration.The figure 9 below illustrates the Intra-Industry Trade (IIT) index between South Korea and Indonesia from 2013 to 2022. The statistical analysis, using measures such as mean, median, standard

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deviation, and skewness, provides a comprehensive overview of the data.

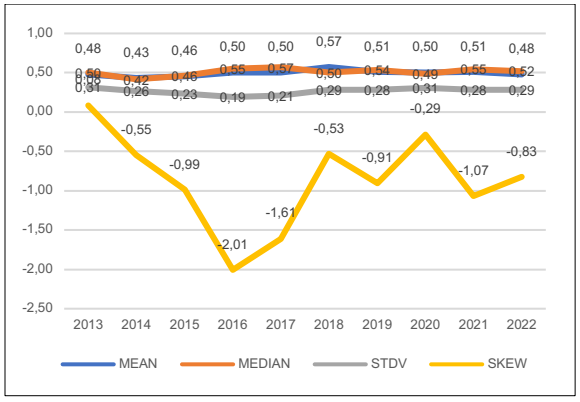

Figure 9. The statistical test results for IIT (Intra-Industry Trade) include measures such as mean, median, standard deviation, and skewness.

The relatively stable average IIT ranging from 0.43 to 0.57 reflects a consistent level of trade integration within the same commodity sector. However, the annual fluctuations observed in 2016 and 2017 indicate significant trade dynamics. The relatively low standard deviation (0.19 to 0.31) indicates that most IIT values are clustered around the mean, showing consistency in the level of trade integration.The negative skewness (-2.01 to -0.29) suggests that the data distribution is skewed to the right, with most IIT values concentrated at the upper end of the distribution. In this context, the negative skewness indicates that extreme positive values in the distribution (very high IIT values) occur less frequently than extreme negative values (very low IIT values). This may suggest that despite annual fluctuations, there is a tendency to achieve high levels of trade integration most of the time, with few cases of very low trade integration.

Trade Balance Index (TBI)

To further understand the dynamics of trade between Indonesia and South Korea, the Trade Balance Index (TBI) offers insight into the trade performance of specific commodities. The TBI helps assess the balance of trade in individual products, indicating whether a country has a trade surplus or deficit in a particular commodity.

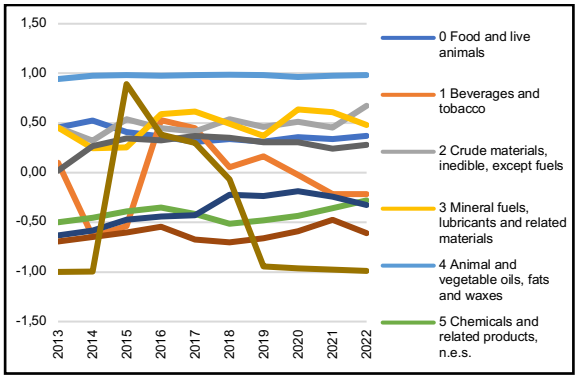

Figure 10. Results of Trade Balance Index (2013-2022)

The significant difference between the highest and lowest TBI values reflects the diverse trading dynamics at the commodity-specific level. The highest TBI value, which is for animal and vegetable oils, fats, and waxes (SITC 4), with an average value of 0.98 or equivalent to 1, indicates the high

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potential of this commodity to generate a surplus in Indonesia's trade balance. On the other hand, commodities with the lowest TBI values include beverages and tobacco (SITC 1); chemicals, and related products, n.e.s. (SITC 5); manufactured goods primarily classified by material (SITC 6); machinery and transport equipment (SITC 7); and commodities and transactions not classified elsewhere in the SITC (SITC 9). The negative TBI values for these commodities indicate that Indonesia experiences a deficit in trade for these sectors, suggesting dependence on imports or challenges in export competitiveness.

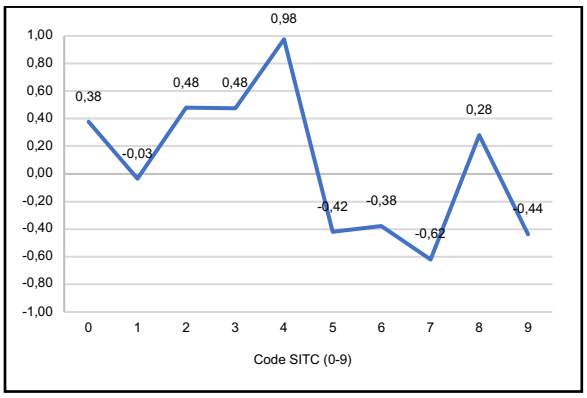

Figure 11. Average Trade Balance Index (TBI) per commodity during the period 2013-2022

From the average value per commodity during the period 2013-2022, it is concluded that five commodities generated a surplus on average, while five other commodities created a trade deficit for Indonesia**.** The figure 12 below illustrates the Trade Balance index (TBI) between South Korea and Indonesia from 2013 to 2022. The statistical analysis, using measures such as mean, median, standard deviation, and skewness, provides a comprehensive overview of the data.

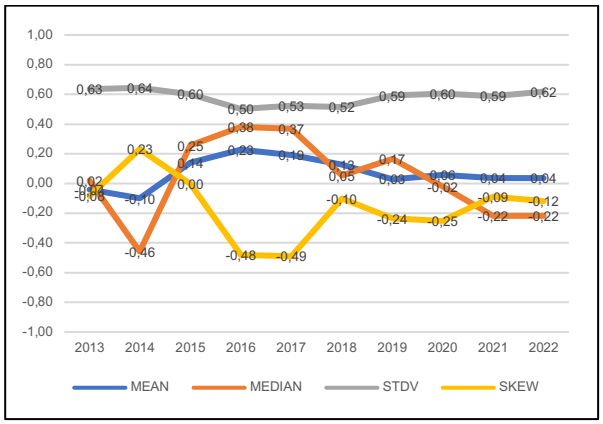

Figure 12. The statistical test results for TBI (Trade Balance Index) include measures such as mean, median, standard deviation, and skewness

The fluctuating average TBI around zero indicates a balance in exports and imports between the two countries; however, the slightly negative average suggests a tendency towards Indonesia's trade deficit. The observed annual fluctuations in the TBI median reflect significant volatility in the trade balance, with negative median values indicating Indonesia's trade deficit dominance. The high standard deviation in the range of 0.50 to 0.64 indicates substantial fluctuations in bilateral trade balance, which could be influenced by external factors such as changes in commodity prices or global demand. Although the skewness approaches zero,

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indicating a tendency towards symmetric data distribution, the annual fluctuations in skewness indicate variations in the direction and magnitude of trade imbalance. A change in trend is evident in the decreasing skewness values towards 2022, suggesting a shift in the pattern of trade integration between the two countries.

Trade Complementory Index (TCI)

In analyzing the trade relations between Indonesia and South Korea, the Trade Complementarity Index (TCI) serves as a valuable indicator for measuring the degree of complementarity between the two economie. This index helps assess how well the trade structures of Indonesia and South Korea align, providing insights into their mutual trade potential and the possibility for further economic cooperation.

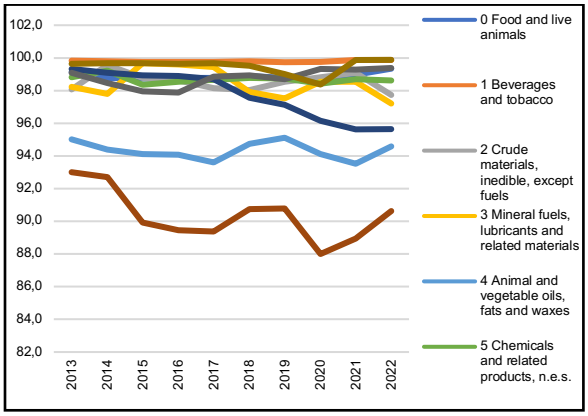

Figure 13. Results of Trade Complementory Index (2013-2022)

According to Alhayat (2012), a TCI value above 40 reflects a high level of trade complementarity between the two involved countries. The Trade Complementarity Index (TCI) tends to remain stable above 80 for all commodities. This indicates that the trade structure between the related countries maintains a high level of complementarity. The high complementarity in trade structure, as reflected in the stable TCI values above 80, suggests that the related countries tend to engage in mutually complementary trade. This means that the traded goods or services have similar characteristics, resulting in a low level of substitution between these items.

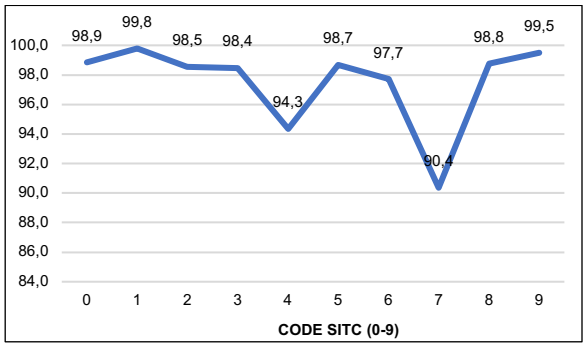

Figure 14. The result of the Trade Complementarity Index (TCI) indicates the average TCI value per commodity during the period 2013-2022.

The highest average TCI values, especially in the category of commodities with code (SITC 1) for beverages and tobacco, reflect positive prospects. This indicates good and potential opportunities for Indonesia to increase its exports to South Korea. The difference in values is not too significant, indicating that the products exported by Indonesia are in line with South

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Korea's import needs. However, almost all commodities experience a decline in complementarity indices, indicating that Indonesia has not fully optimized its resources and competitiveness to enter the South Korean market. The figure 15 below illustrates the Trade Complementarity Index (TCI) between South Korea and Indonesia from 2013 to 2022. The statistical analysis, using measures such as mean, median, standard deviation, and skewness, provides a comprehensive overview of the data.

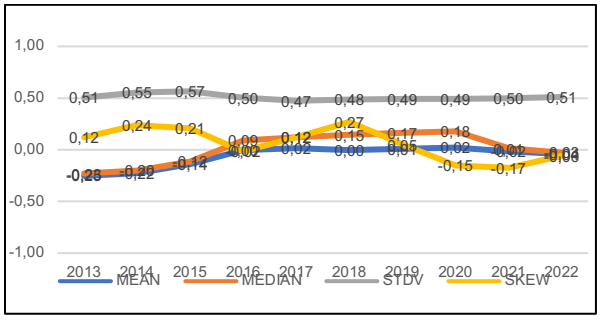

Figure 15. The statistical test results for TCI (Trade Complementory Index) include measures such as mean, median, standard deviation, and skewness.

The high average TCI, ranging from 97.00 to 98.01, reflects a strong level of trade structure compatibility between the two countries. Despite annual fluctuations, the relatively stable median TCI, ranging from 97.73 to 99.08, indicates consistency in the level of compatibility. However, the high standard deviation between 2.23 to 3.57 indicates significant fluctuations in TCI values, which could be caused by changes in trading patterns or economic policies affecting bilateral trade structure. The negative skewness, ranging from -1.43 to -2.13, indicates that most TCI values are higher than the average, indicating a high level of compatibility in bilateral trade structure. Overall, the TCI data provides an overview of consistent and compatible trade relations between Indonesia and South Korea, with fluctuations that may be subject to further analysis to understand the dynamics and potential changes in the trade cooperation between the two countries.

Revealed Symmetric Comparative Advantage (RSCA)

The RSCA (Revealed Symmetric Comparative Advantage) index values for various commodity classifications offer an overview of the extent to which Indonesia has a comparative advantage in the production and export of specific goods in its trade with South Korea. Positive RSCA values indicate that Indonesia has a comparative advantage in producing and exporting certain commodities, while negative values suggest that South Korea holds the comparative advantage in those same goods.

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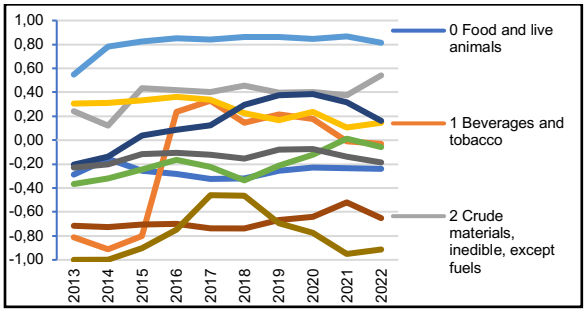

Figure 16. Results of Revealead Symmetric Comparative Advantage Index (2013-2022)

The commodity with the highest RSCA index is animal and vegetable oils, fats, and waxes (SITC 4), with a relatively high and stable value throughout the period. On the other hand, the commodity with the lowest RSCA index is m commodities and transactions not classified elsewhere in the SITC (SITC 9).

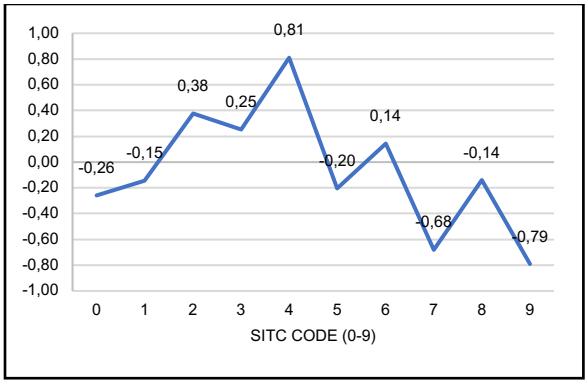

Figure 17. The result of Revealead Symmetric Comparative Advantage the indicates the average RSCA value per commodity during the period 2013-2022

The average value of RSCA for the period 2013-2019 shows that several commodities exhibit fluctuating comparative advantage characteristics between Indonesia and South Korea. Six out of ten commodities have average values less than zero, such as commodities SITC (0, 1, 5, 7, 8, and 9), indicating that Indonesia does not possess a comparative advantage in most commodities classified based on SITC (0-9). The commodity of animal and vegetable oils, fats, and waxes (SITC 4) stands out with an average RSCA value of 0.81, indicating that Indonesia has a strong comparative advantage in this commodity. This is followed by commodities 2, 3, and 6, which have average RSCA values above zero, indicating that Indonesia also has a comparative advantage in these commodities.

The figure 18 below illustrates the (Revealed Symmetric Comparative Advantage) index between South Korea and Indonesia from 2013 to 2022. The statistical analysis, using measures such as mean, median, standard deviation, and skewness, provides a comprehensive overview of the data.

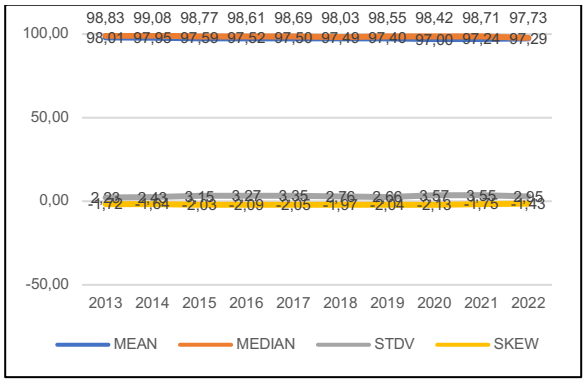

Figure 18. The statistical test results for RSCA (Revealed Symmetric Comparative Advantage) include measures such as mean, median, standard deviation, and skewness.

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The average RSCA close to zero, ranging between -0.04 to -0.25, indicates instability in relative trade advantage. Although the observed annual fluctuations reflect variations in trade profitability, the relatively stable median value (between -0.23 to 0.18) suggests that most RSCA values are concentrated around the middle value. The consistent level of standard deviation, ranging from 0.47 to 0.57, indicates a moderate level of variation in RSCA values, which may be influenced by changes in economic conditions or other factors affecting relative trade advantage. The skewness approaching zero (between -0.17 to 0.27) indicates a distribution of data that tends to be symmetrical, with slight leftward skewness.

Product Mapping

The product mapping for Indonesia and South Korea, as shown in the figure 19 and 20 below, provides a clear view of their export structures across the four groups, highlighting the strengths and weaknesses in their trade dynamics over the period 2013 to 2022. This mapping reflects the changes in comparative advantage and export specialization between the two countries, offering insights into their shifting trade patterns during the specified years.

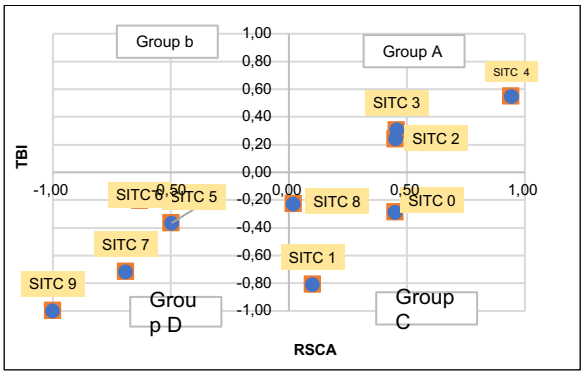

Figure 19. Results of Product Mapping in 2013

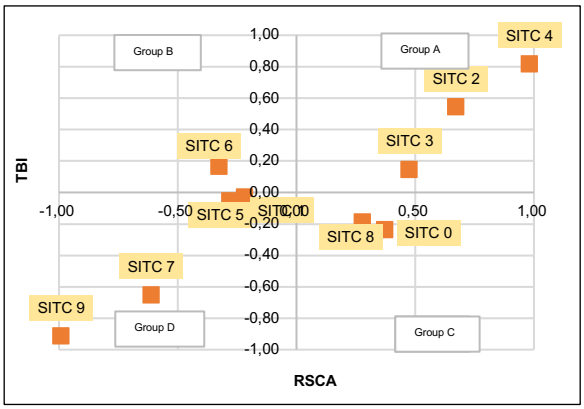

Figure 20. Results of Product Mapping in 2022

Based on the analysis of data from 2013 and 2022, there were no significant changes observed in the trade performance between Indonesia and South Korea. Group A did not experience any changes and continued to record a trade surplus while maintaining significant comparative advantage. Additionally, few commodities showed significant changes, except for commodities (SITC 1) and (SITC 6) which experienced changes. Manufactured goods primarily classified based on materials (SITC 6) increased, moving from Group D to Group B. Furthermore, Beverages and tobacco (SITC 1) experienced a decline from Group C to Group D. Thus, the conclusion drawn from both sets of data is that there were dynamic changes in

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the trade structure between the two countries during that period. Some commodity sectors saw an improvement in trade performance, while others continued to face deficit challenges. The increased comparative advantage in certain sectors may indicate opportunities for enhancing bilateral trade cooperation in the future. The higher the comparative advantage of a product, the higher the likelihood that a country becomes a net exporter. These findings strongly support Ricardo's theory of comparative advantage in (Widodo 2009): "a nation, like an individual, benefits from trade by exporting goods or services in which it has the greatest comparative advantage in productivity and importing goods or services in which it has the smallest comparative advantage."

CONCLUSION

In this study, the analysis of trade dynamics between Indonesia and South Korea during the period of 2013-2022 reveals several significant findings.

1. There is a strong integration of industries, particularly evident in the high level of Intra-Industry Trade (IIT) index, with 7 out of 10 commodity groups having an IIT value above 50 percent, indicating a robust bilateral trade framework in specific industrial sectors. Secondly,
2. The Trade Complementarity Index (TCI) consistently above 80 for all commodities indicates a high level of trade structure suitability, facilitating consistent and complementary trade relations. Thirdly,
3. While the overall Trade Balance Index (TBI) indicates a near-zero trade balance, there are significant differences among specific commodities, with 5 creating trade surpluses and 5 generating deficits, highlighting the contributions of specific sectors to the overall trade balance.
4. Fourthly, fluctuations in Revealed Symmetric Comparative Advantage Index (RSCA) reveal varying comparative advantages between Indonesia and South Korea, with Indonesia showing limited comparative advantage in most analyzed commodities. Fifthly,
5. Product mapping classification results demonstrate minimal changes over time, indicating stability in the trade structure, with only 2 commodities experiencing notable shifts.
6. Statistical analysis of IIT, TBI, TCI, and RSCA reflects bilateral trade dynamics, with stable average IIT but significant annual fluctuations, near-zero average

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TBI but notable volatility, and high average TCI suggesting strong trade structure suitability but requiring attention due to annual fluctuations and high standard deviations. The near-zero average RSCA indicates instability in relative trade advantages, with annual variations reflecting the dynamics of trade gains.

Based on a comprehensive understanding of the analysis results, it is recommended to take strategic steps to enhance competitiveness and trade sustainability between Indonesia and South Korea. Policy recommendations to strengthen trade relations between Indonesia and South Korea may include: developing trade infrastructure to enhance trade efficiency, facilitating trade and investment to reduce trade barriers, and encouraging bilateral investment growth, enhancing cooperation in research and development (R&D) to strengthen the competitiveness of both countries' industries in the global market, developing market diversification to reduce dependency on specific markets, and managing risks and volatility.

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