

MEASURING THE COMPARATIVE AND COMPETITION OF INDONESIAN WOOD CHARCOAL EXPORTS IN THE SAUDI ARABIAN MARKET

^aElpawati, ^bTitik Inayah, ^cAyu Dwi Arlita, ^dZineb Abdulaker Benalywa, ^eMohd
Manshor Ismail

ABSTRACT

Objective: This study examines the comparative and competitive export of wood charcoal in four potential countries, namely Indonesia, Malaysia, China, and Vietnam, in the Saudi Arabian Market with HS Code 4402. This study used annual data for nine years from 2014 - 2022, divided into three periods.

Method: This study used the Herfindahl-Hirschman Index (HHI) and concentration Ratio (CR), Revealed Symmetric Comparative Advantage (RSCA), Export Product Dynamic (EPD), X-Model, and Trade Specialization Index (ISP) models to measure the wood charcoal industry in the Saudi Arabian Market.

Result: The findings show that wood charcoal market in Saudi Arabia exhibits a strict oligopoly structure, with Indonesia and China dominating the market share. Indonesia emerged as the top supplier of wood charcoal to Saudi Arabia during for nine years. Malaysia showed the highest competitiveness among potential countries in certain periods. Overall, Indonesia, China, Vietnam, and Malaysia demonstrated strong competitive positions, with dynamic export growth, positioning them as "Rising Stars" in the market. These countries specialized as wood charcoal exporters to Saudi Arabia, reaching a mature stage in their market presence during the analyzed period from 2014 to 2022.

Conclusion: This study concludes that Indonesia became the highest supplier with a market share of 53.51% and had a strong comparative advantage. Malaysia has the highest optimistic market development, followed by Indonesia, Vietnam, and China. Indonesia's wood charcoal competitiveness position remains in the Rising Star position. The Trade Specialization Index of four potential countries at this stage of maturation.

Keywords: comparative, competitive, wood charcoal, export, Saudi Arabia.

^a Doctor in Agriculture, Syarif Hidayatullah State Islamic University Jakarta. Banten, Indonesia.
E-mail: elpawati@gmail.com Orcid: <https://orcid.org/0000-0001-6221-5486>

^b Master in Agriculture, Syarif Hidayatullah State Islamic University Jakarta. Banten, Indonesia.
E-mail: titikayah08@gmail.com Orcid: <https://orcid.org/0009-0006-7571-4296>

^c Bachelor in Agriculture, Syarif Hidayatullah State Islamic University Jakarta. Banten, Indonesia.
E-mail: ayudwiarlita01@gmail.com

^d Doctor in Agriculture Economics, University of Tripoly, Libya. E-mail: zineb_a14@yahoo.com
Orcid: <https://orcid.org/0000-0002-5608-9337>

^e Doctor in Agribusiness and Bioresource Economics, Putra Malaysia University, Malaysia.
E-mail: mkk@upm.edu.my



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MEDINDO A COMPARATIVIDADE E A CONCORRÊNCIA DAS EXPORTAÇÕES DE CARVÃO VEGETAL DE MADEIRA DA INDONÉSIA NO MERCADO DA ARÁBIA SAUDITA

RESUMO

Objetivo: Este estudo examina a exportação comparativa e competitiva de carvão vegetal de madeira em quatro países potenciais, nomeadamente Indonésia, Malásia, China e Vietnã, no mercado da Arábia Saudita com o código SH 4402. Este estudo utilizou dados anuais para nove anos de 2014 a 2022, divididos em três períodos.

Método: Este estudo utilizou os modelos Herfindahl-Hirschman Index (HHI) e Concentration Ratio (CR), Revealed Symmetric Comparative Advantage (RSCA), Export Product Dynamic (EPD), X-Model e Trade Specialization Index (ISP) para medir a indústria de carvão vegetal no mercado saudita.

Resultado: As constatações mostram que o mercado de carvão vegetal na Arábia Saudita exhibe uma estrutura de oligopólio rígida, com a Indonésia e a China dominando a participação de mercado. A Indonésia emergiu como o principal fornecedor de carvão vegetal para a Arábia Saudita durante nove anos. A Malásia mostrou a maior competitividade entre os países potenciais em determinados períodos. Em geral, a Indonésia, a China, o Vietnã e a Malásia demonstraram fortes posições competitivas, com um crescimento dinâmico das exportações, posicionando-os como "estrelas em ascensão" no mercado. Estes países especializaram-se como exportadores de carvão vegetal para a Arábia Saudita, atingindo uma fase madura da sua presença no mercado durante o período analisado de 2014 a 2022.

Conclusão: Este estudo conclui que a Indonésia se tornou o maior fornecedor com uma quota de mercado de 53,51% e tinha uma forte vantagem comparativa. A Malásia tem o desenvolvimento de mercado mais otimista, seguida pela Indonésia, Vietname e China. A posição da competitividade do carvão vegetal da madeira na Indonésia permanece na posição de Estrela em Ascensão. O Índice de Especialização Comercial de quatro países potenciais nesta fase de maturação.

Palavras-chave: comparativo, competitivo, carvão de madeira, exportação, Arábia Saudita.

MEDICIÓN DE LA COMPETENCIA COMPARATIVA DE LAS EXPORTACIONES DE CARBÓN VEGETAL DE MADERA DE INDONESIA EN EL MERCADO DE ARABIA SAUDÍ

RESUMEN

Objetivo: Este estudio examina la exportación comparativa y competitiva de carbón vegetal en cuatro países potenciales, a saber, Indonesia, Malasia, China y Vietnam, en el mercado saudí con el código SA 4402. Este estudio utilizó datos anuales de nueve años entre 2014 y 2022, divididos en tres períodos.

Método: En este estudio se utilizaron los modelos del índice Herfindahl-Hirschman (HHI) y la relación de concentración (CR), la ventaja comparativa simétrica revelada (RSCA), la dinámica de productos de exportación (EPD), el modelo X y el índice de especialización comercial (ISP) para medir la industria del carbón de leña en el mercado saudí.



Resultado: Los resultados muestran que el mercado de carbón vegetal de madera en Arabia Saudita exhibe una estructura oligopólica estricta, con Indonesia y China dominando la cuota de mercado. Indonesia emergió como el principal proveedor de carbón vegetal de madera a Arabia Saudita durante nueve años. Malasia mostró la mayor competitividad entre los países potenciales en ciertos períodos. En general, Indonesia, China, Vietnam y Malasia demostraron fuertes posiciones competitivas, con un dinámico crecimiento de las exportaciones, posicionándolas como "Estrellas en ascenso" en el mercado. Estos países se especializaron como exportadores de carbón de leña a Arabia Saudita, alcanzando una etapa madura en su presencia en el mercado durante el período analizado de 2014 a 2022.

Conclusión: Este estudio concluye que Indonesia se convirtió en el mayor proveedor con una cuota de mercado del 53,51% y tenía una fuerte ventaja comparativa. Malasia tiene el mayor desarrollo de mercado optimista, seguido de Indonesia, Vietnam y China. La posición de competitividad del carbón de leña de Indonesia sigue en la posición de Estrella Naciente. El Índice de Especialización Comercial de cuatro países potenciales en esta etapa de maduración.

Palabras clave: comparativo, competitivo, carbón de madera, exportación, Arabia Saudita.

1 INTRODUCTION

The need to lower greenhouse gas emissions globally and limit fossil energy reserves has shifted fossil energy use to new and renewable energy (Triani et al., 2022). Some of the alternative sources offered include solar energy, geothermal energy, water energy, wind energy, and biomass (Fitriana & Febrina, 2021). What is Biomass? Biomass is a substance generally obtained directly or indirectly from plants that can be used in large quantities for energy and fuel (Gunawan et al., 2022). Biomass is sourced from organic materials such as agricultural products, animal husbandry, wood, and community waste. Biomass energy is an environmentally friendly alternative energy because it has a low sulfur content (Nukman & Sipahutar, 2015). Biomass is divided into solid, liquid, and gaseous (Yoesgiantoro, 2017).

The increasingly limited availability of fossil fuels opens up the possibility of increasing the role of wood charcoal as an alternative energy source made from wood or wood waste from wood processing processes (Wahyudi, 2013). Indonesia has promising bioenergy potential from waste-based agriculture (Mencarelli et al., 2023). Indonesia has forests with timber production of 17.71% and an area of 125,795.31 thousand Ha in 2022 (Vinet & Zhedanov, 2011; BPS-Statistics Indonesia, 2022). Agricultural waste biomass in Indonesia such as old coconut skin waste, young coconut, and cocoa was available in large quantities and cheaper than other potential countries, but the utilization was not maximized (Nuriana et al., 2019). These agricultural wastes are generally used as fuel that was just directly burned, and it could cause pollution. So this agricultural waste could



be better used as raw material for activated charcoal, carbon paper, battery stones, and others (Nuriana et al., 2014). Unsustainable wood charcoal production can trigger forest degradation due to land conversion and excessive logging (Mostafalou & Mohammadi, 2023), so diversification of raw materials for making wood charcoal is needed such as coconut shells with a high caloric value of around 6,700-7,100 kcal/kg (Ajibola et al., 2020; Ministry of Agriculture, 2020)

Wood waste from the wood industry is broken veneer, unqualified log ends, peeled residues, log pieces, veneer sheet pieces, sawdust, sanding powder, shanks, leather saw wood, and end pieces (Sudiryanto, 2020). A large amount of wood waste also causes problems in handling, so qualified technology is needed to handle and utilize it in value-added products such as briquette charcoal (Gebresas et al., 2015; Kongprasert et al., 2019; Mostafalou & Mohammadi, 2023). Charcoal briquettes have economic advantages because they can be produced in a simple process, have high heat value, and the available raw materials can compete with other types of fuel (Eseltine et al., 2013; Kongprasert et al., 2019).

Wood charcoal has a Harmonized System (HS) code 4402 with wood charcoal specifications (including hard skin charcoal or batok charcoal) agglomerated or not in international trade (Ministry of Finance, 2022). Wood charcoal in Middle Eastern countries is an alternative fuel commonly used to support shisha (hookah) cigarettes (Rahman Tsani et al., 2022). In addition, the high pressure received by Saudi Arabia on the demand for firewood for domestic consumption (Alabdulkader et al., 2009). Wood charcoal is still a favorite among the people of the Arabian peninsula because it is easily obtained, stored, cheap, and available every year. Wood charcoal is used to fuel cooking purposes in households, restaurants, and hotels that provide typical foods such as Bukhari rice, biryani rice, and bath rice (Al-Subaiee, 2016; Seboka, 2009). The main characteristics to look for in wood charcoal for cooking fuel purposes are heating quality, durability, and odorless properties, as not cause a lot of smoke and produces a lot of ash residue (ITPC OSAKA, 2022). Saudi Arabia imposes a tariff policy or import duties of 0% for wood charcoal products with conditions: wood charcoal residue tolerance limits, product labels, product packaging, product certification, and others (ITC, 2023).

Wood charcoal is produced through a carbonization process using kilns (Dos Santos et al., 2023). The production process determines the properties and characteristics of the wood charcoal produced (Mencarelli et al., 2022). However, kiln production has a



low conversion range of 10-15%, so more wood input is needed to produce wood charcoal (Bhattarai, 1998; FAO, 2021). The problem with traditionally made wood charcoal is the high moisture content of water due to carbonization extinguishing using water spray, and it will affect the caloric value of wood (Hillring, 2006; Langgut & Lev-Yadun, 2023; Mostafalou & Mohammadi, 2023).

Why is it important to consider international trade in climate change impact analysis? After all, why is an exchange so important, and not just domestic food production? As stated previously, from the theoretical framework underlying the current analysis, namely Ricardo's (1817) comparative advantage, it is the process of international exchange that encourages the specialization of a nation. Strategies to have a competitive advantage can be obtained in various ways, for example by offering unique products or services, offering products or services at minimal costs, and focusing on certain segments (Abidin et al., 2014). Competitive advantage theory states that rebuilding the determinants of national competitive advantage as the basis of company profitability is necessary for the success of the long-term transition (Thibeault et al., 2023).

Based on the problems and opportunities previously described, we analyse the extent of the Market Share of four potential wood charcoal export countries in the Saudi Arabian market. Describe trading specialization on wood charcoal commodities. Then, we learned the comparative and competitive advantages of wood charcoal exports in the Saudi Arabian market. This study's four potential wood charcoal export countries are Indonesia, Vietnam, China, and Malaysia. The year used in this study was 2014 - 2022.

2 LITERATURE REVIEW

2.1 INTERNASIONAL TRADE THEORY

A country engages in international trade for two main reasons: to gain profits and to achieve economies of scale (Krugman & Obstfeld, 2000). The theoretical exposition on international relations was further developed and refined by Adam Smith, David Ricardo, and Heckscher-Ohlin. These theories are known as the classical theories of international trade, namely Adam Smith's theory of absolute advantage, David Ricardo's



theory of comparative advantage, and the Heckscher-Ohlin theory of factor proportions trade (Rahardja & Marunung, 2014)

Adam Smith's theory of absolute advantage explains trade between two countries based on the absolute advantage possessed by one country. Trade between two countries can be conducted by specializing in the production of commodities where there is an absolute advantage and exchanging them for commodities where there is an absolute disadvantage (Salvatore, 1997). David Ricardo's theory of comparative advantage states that countries will export goods that their labor can produce more efficiently relative to other countries, and import goods that their labor produces less efficiently. In other words, a country's pattern of production is determined by its comparative advantage (Krugman & Obstfeld, 2000). In contrast, the Heckscher-Ohlin (H-O) theory asserts that a country will export commodities that use more of the relatively abundant and cheap factors of production in that country, while simultaneously importing commodities that require relatively scarce and expensive resources in that country (Salvatore, 1997).

2.2 COMPETITIVENESS

The advantage of a country is no longer based solely on comparative advantage but also on competitive advantage (Rahardja & Marunung, 2014; Salvatore, 1997). The economic gains and losses in international trade are measured by competitiveness, which can be influenced by several variables. A country can be deemed globally competitive when the value-added of its exports exceeds that of its imports (Junior et al., 2023). Another perspective on competitiveness is put forth by Porter (1990), suggesting that competitiveness is not only limited to countries endowed with advantageous resource wealth but that a nation can choose prosperity by shaping policies, laws, and productivity institutions within its national and regional environment.

3 RESEARCH METHOD

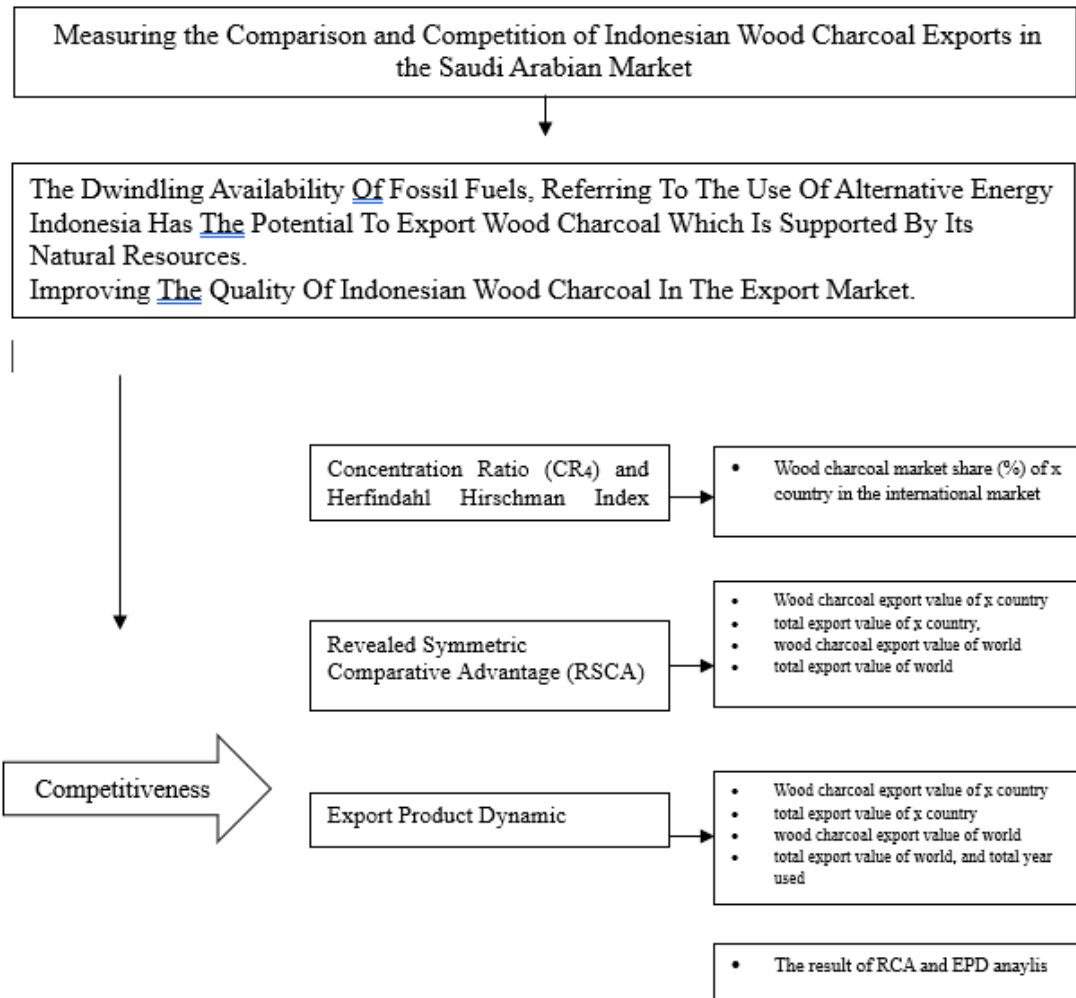
The study is wood uses wood charcoal data with Harmonized System (HS) Code 4402 namely wood charcoal (including hard-bark charcoal or shell charcoal) agglomerated or not from potential wood charcoal export countries in the Saudi Arabian market, namely Indonesia, China, Vietnam, and Malaysia to Saudi Arabia. The analysis



was carried out over a period of 9 years divided into 3 periods. period I (2014 - 2016), period II (2017-2019), and period III (2020-2022). The study conceptualization and analytical tool used is described below.

Figure 1

The Conceptualization of the Measurement The Comparative And Competition Of Indonesian Wood Charcoal Exports In The Saudi Arabian Market



In Figure 1. Illustrates how to analyze measuring the comparative and competition of Indonesian wood charcoal exports in the Arabian market The scope of this study is limited so that the discussion is more specific and focuses on wood charcoal commodities using the Harmonized System (HS) code. This study used wood charcoal data with HS code 4402, wood charcoal (including hard-bark charcoal or shell charcoal) agglomerated or not. The data processed in this study is data on the export and import value of wood charcoal products from the 4 largest exporting countries, namely Indonesia, China,



Malaysia, and Vietnam. This research also uses export and import data from ten main destination countries for wood charcoal commodities, namely Saudi Arabia. The analytical tools used in this study include the Herfindahl-Hirschman Index (HHI) and Concentration Ratio (CR) to analyze the structure of the wood charcoal market. Revealed Symmetric Comparative Advantage (RSCA) to analyze the comparative competitiveness of wood charcoal. Export Product Dynamic (EPD) and Model Potential Export Products to analyze the competitive competitiveness of wood charcoal, X and Market Specialization Index (ISP) to analyze the trading position of wood charcoal.

3.1 MODEL CONCENTRATION RATIO (CR₄) AND HERFINDAHL HIRSCHMAN INDEX (HHI)

Concentration Ratio (CR₄) is a percentage of the market share of several exporting countries in an industry. The CR₄ method in this study uses the percentage of wood charcoal market share in Saudi Arabia against wood charcoal exports from Indonesia, China, Malaysia, and Vietnam. The CR₄ method can measure the structural power of a country's wood charcoal commodity because it involves the number of countries/companies and the distribution size. CR₄ values range from 0 to 100; the lower the CR₄ value indicates the market has many competitors, and the higher the CR₄ value suggests the market has few competitors. Systematically, the Concentration Ratio (CR₄) model can be formulated as follows (Yustanto et al., 2023; Zuhdi & Rambe, 2021).

$$CR_N = \sum_{i=1}^N S_i \quad \text{with } S_i = \frac{q_i}{Q} \quad (1)$$

$$CR_4 = S_1 + S_2 + S_3 + S_4 \quad (2)$$

CR₄ is calculated by summing the timber charcoal market stocks of Indonesia, China, Malaysia, and Vietnam to Saudi Arabia. Market structure classification based on the CR₄ model, which is: (1) when CR₄ = 0 indicates a perfectly competitive market; (2) when 0 < CR₄ < 40 indicates a monopolistic competition market; (3) when 40 ≤ CR₄ < 60 indicates loose oligopoly; (4) when 60 ≤ CR₄ < 90 indicates a strict oligopoly; (5) when CR₄ ≥ 90 indicates a strict oligopoly approaching a monopoly; and (6) when CR₄ = 100 indicates a perfect monopoly market (Khansa & Shofwan, 2022).



Herfindahl Hirschman Index (HHI) is an analysis of the degree of concentration of wood charcoal commodities of all countries in export destination countries. The analysis aims to determine the strength of wood charcoal commodities in Indonesia, China, Malaysia, and Vietnam as exporting countries to Saudi Arabia as export destinations. HHI analysis can also be used to determine and compare the market concentration between Indonesian wood charcoal and competing countries, so that Indonesia can analyse the strengths and weaknesses of other wood charcoal exporting countries. Systematically, the Herfindahl Hirschman Index (HHI) can be formulated as follows (Khansa & Shofwan, 2022; Salsabilah & Widodo, 2022).

$$HHI = \sum_{i=1}^n S_{ij}^2 \quad (3)$$

$$HHI = S_1^2 + S_2^2 + S_3^2 + \dots + S_n^2 \quad (4)$$

The HHI value is derived from the total summation of squares from the market share of the timber exporting country to Saudi Arabia. The classification of market structures is based on the Herfindahl Hirschman Index (HHI) model, which is (1) when $HHI < 1000$ indicates a perfectly competitive market or monopolistic competition market; (2) when $1000 HHI \leq < 1800$ indicates a market of monopolistic competition or loose oligopoly; and (3) when $1800 HHI \leq < 10.000$ indicates a strict oligopoly or perfect monopoly.

3.2 MODEL REVEALED SYMMETRIC COMPARATIVE ADVANTAGE (RSCA)

RSCA is a modification of Revealed Comparative Advantage (RCA) because the RCA index has an infinite number and is not comparable between the two neutral sides. Analyzing comparative advantages using RCA is used as an estimate of the ability of the Indonesian wood charcoal sector to compete in the Saudi Arabian Market (Liu et al., 2018; Rudi Hartanto et al., 2021; Szczepaniak, 2018). RCA measures the performance of commodity exports from a country compared to the share of these commodities in world trade (Basri & Munandar, 2010). Systematically, the RCA index can be formulated as follows:



$$RCA = \frac{\chi_{ij}/\chi_j}{\chi_{iw}/\chi_w} \quad (5)$$

With the provision that RCA has a comparative advantage in wood charcoal commodities of four potential export countries in Saudi Arabia. At the same time, X_{ij} is the export value of wood charcoal in four likely countries: Indonesia, Vietnam, China, and Malaysia to Saudi Arabia. X_j is the export value of all exported commodities to Saudi Arabia. Furthermore, X_{iw} said the value of world wood charcoal exports to Saudi Arabia, and X_w is the export value of all world commodities to Saudi Arabia.

$$RSCA = \frac{RCA_{ij} - 1}{RCA_{ij} + 1} \quad (6)$$

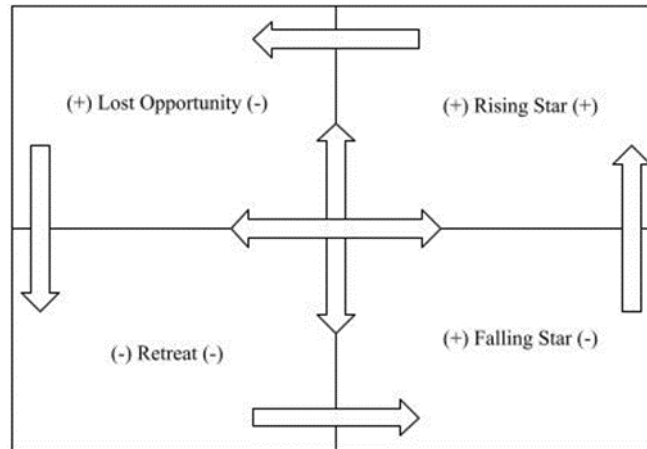
Where $RSCA_{ij}$ is a comparative advantage that a country has over the commodity with a comparative advantage of wood charcoal in four potential countries of wood charcoal at less than one and 1. Modification of Revealed Comparative Advantage (RCA) because the RCA index has an infinite number and is not comparable between the two neutral sides (i.e., one), then the RSCA index varies from one to minus 1 ($-1 < RCA < 1$) (Wang et al., 2022).

3.3 MODEL EXPORT PRODUCT DYNAMIC

This study uses the Export Product Dynamic (EPD) analysis method to determine and identify the competitiveness of wood charcoal exports of potential exporting countries from the aspect of competitive advantage in the Saudi Arabian market (Putri & Hidayat, 2023). The conditions that may arise in the EPD analysis are divided into four quadrants, namely, a Rising Star indicates that the market share of a commodity is dynamic or proliferating; a Falling Star shows an increase in market share, but demand for the commodity is declining; Lost opportunity: indicates loss of market share, but commodities are still dynamic; Retreat: shows negative demand for the market share of the commodity (Miftah Akbar & Widyastutik, 2022; Paryadi et al., 2023).

Figure 2

Matrix Theory Export Products Dynamic (EPD)



Systematically, there are two aspects in the calculation of EPD, namely the X axis or export share growth, and the Y axis or product market share growth, which can be simulated as follows (Putri & Hidayat, 2023).

X-axis (export share):

$$\sum_{t=1}^T = \frac{\left(\frac{X_{ij}}{W_{ij}}\right)_t \times 100\% - \left(\frac{X_{ij}}{W_{ij}}\right)_{t-1} \times 100\%}{T} \quad (7)$$

Y-axis (product market share):

$$\sum_{t=1}^T = \frac{\left(\frac{X_t}{W_t}\right)_t \times 100\% - \left(\frac{X_t}{W_t}\right)_{t-1} \times 100\%}{T} \quad (8)$$

Equation 7 can be described as follows: X_{ij} is the export value of the exporting country's wood charcoal to Saudi Arabia; W_{ij} is the world's wood charcoal export value to Saudi Arabia. Equation 8 can be described as follows: X_t is the total export value of all commodities of the exporting country to Saudi Arabia; W_t is the full value of exports of all world commodities to Saudi Arabia; j is an exporting country; t is the year analysed (2014 - 2022); T is the total years of analysis used which is nine years.



3.4 X-MODEL POTENTIAL EXPORT PRODUCTS

X-Model Potential Export Products analysis is used to project the future development of wood charcoal export markets. This method produces a more comprehensive competitiveness analysis because it looks at the competitiveness of wood charcoal from two aspects simultaneously, namely the comparative aspect (RCA) and the competitive aspect (EPD) (Miftah Akbar & Widyastutik, 2022).

Table 1

X-Model Potential Export Product Clustering

RCA value	EPD value	Market Development Position
RCA > 1	Rising Star	Optimistic Market Development
	Falling Star	Potential Market Development
	Lost Opportunity	Potential Market Development
	Retreat	Less Potential Market Development
RCA < 1	Rising Star	Potential Market Development
	Falling Star	Less Potential Market Development
	Lost Opportunity	Less Potential Market Development
	Retreat	Market Development N, to Potential

Source: Ministry of Trade of the Republic of Indonesia (2013)

3.5 MARKET SPECIALIZATION INDEX MODEL

Analyzing competitiveness by looking at the position or stage of development of wood charcoal exports using the Trade Specialization Index (TSI) model. TSI is used to see the tendency of wood charcoal in a potential export country based on its export value, whether it has advantages as an exporter or an importing country (Elysi et al., 2018). Systematically, the TSI Index can be measured by the following formula:

$$TSI = \frac{(X_{it} - M_{it})}{(X_{it} + M_{it})} \quad (9)$$

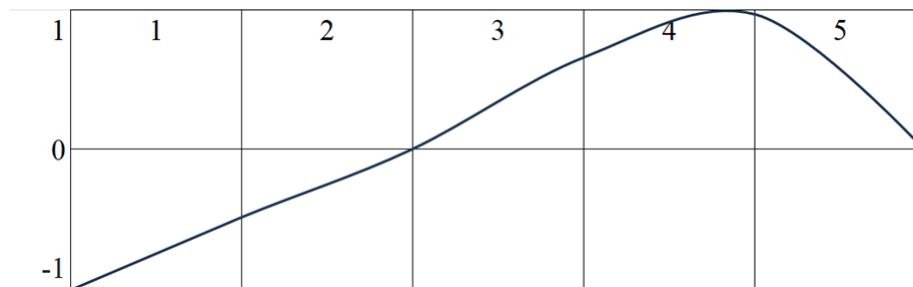
With the provision of TSI a, trade specialization index on wood charcoal commodity, es four potential export countries in Saudi Arabia. Furthermore, X_{it} is the



export value of wood charcoal exporting countries to Saudi Arabia; Mit is the import value of the exporting country's wood charcoal to Saudi Arabia. TSI is obtained by calculating the export value of wood charcoal in potential export countries with the value of world wood charcoal imports. The index value obtained ranges from -1 to 1. Suppose the value is positive, 0 to 1; it is said to have strong competitiveness, or a country tends to be an exporting country. Vice versa, a commodity has low competitiveness with a negative index value below 0 to -1, which tends to be an importer (Anggrasari & Saputro, 2022; Balqis & Yanuar, 2021). From this range, each country's commodities are classified into five stages, namely the introduction stage (-1.00 to -0.50); import substitution (-0.51 to 0.00); growth (0.01 to 0.80); maturation/maturation (0.81 to 1.00); and re-importing (1.00 to 0.00) (Nurcahyani & Salqaura, 2023).

Figure 3

Trade Specialization Indeks (TSI) curve



Source: Ministry of Trade of the Republic of Indonesia (2013)

4 RESULT AND DISCUSSIONS

4.1 THE INDUSTRIAL CONCENTRATION RATIO FOUR (CR₄) WOOD CHARCOAL EXPORTING COUNTRIES

Saudi Arabia is one of Indonesia's leading export destinations for wood charcoal. Usually, Indonesia exports wood charcoal to Saudi Arabia in processed or semi-processed form. According to (Fadilla et al., 2023) Saudi Arabia uses wood charcoal as shisha combustion material because the quality of charcoal does not cause smoke and is environmentally friendly, so it is needed for close combustion. The high export of Indonesian wood charcoal to Saudi Arabia is due to the increasing demand for wood charcoal commodities and derivative products in the Saudi Arabian market, as well as the lack of interest in wood charcoal buyers in Indonesia (Nurhafika, 2021). Based on the



research, the CR₄ and HHI values of wood charcoal in Saudi Arabia show that wood charcoal commodities in Saudi Arabia have a strict oligopoly market structure.

Wood charcoal commodities in Saudi Arabia have an oligopoly market structure because only a few companies export wood charcoal commodities, and the demand for wood charcoal in Saudi Arabia is high. The small number of wood charcoal exporting countries is accompanied by the high demand in Saudi Arabia, causing Indonesia and China to dominate the wood charcoal market share in Saudi Arabia (Bellalouna, 2021). A strict oligopoly market structure will cause countries with high market share to act as price makers, while countries with low market share only act as price takers (Apriande & Daryanto, 2012). That way, Indonesia and China can serve as tenants of wood charcoal commodity prices in Saudi Arabia. Indonesia has strong bargaining positions as a wood charcoal exporting country. Meanwhile, Malaysia and Vietnam can only accept export price decisions set by Indonesia, China, and Malaysia. Malaysia also has low bargaining positions in the Saudi Arabian market (Bellalouna, 2021). Increasing the bargaining position of wood charcoal in Saudi Arabia can be done with a promotion strategy. The increasing number of wood charcoal exporting countries will impact rising promotional costs (Pratiwi & Anggraeni, 2013). Strategies that can be done in improving the promotion of wood charcoal in Saudi Arabia, among others: (1) participating in exhibition activities in Saudi Arabia which aims to introduce wood charcoal products and be recorded in business catalogues to facilitate wood charcoal trade; (2) cooperate with the trade attaché to determine the demand conditions for wood charcoal in Saudi Arabia; and (3) have a company website to expand digital promotion globally and make it easier for consumers to buy wood charcoal (ITPC Busan, 2019). Increased promotion of wood charcoal is also helpful to increase exports and market share of Indonesian wood charcoal in Saudi Arabia. The higher export of Indonesian wood charcoal to Saudi Arabia is based on research results that show that the market share of Indonesian wood charcoal to Saudi Arabia for nine years (2014 - 2022) has fluctuated but tends to increase.

In the first period (2014 - 2016,) the average CR₄ value of wood charcoal in Saudi Arabia was 80.56% and the average HHI value of wood charcoal in Saudi Arabia was 3271.80. The figures show that wood charcoal commodities in Saudi Arabia in 2014 - 2016 had a strict oligopoly market structure. In 2014 - 2016, Indonesia became the highest supplier of wood charcoal to Saudi Arabia with a market share of 49.42%, China at 28.28%, Malaysia at 1.11%, and Vietnam at 1.76%.



In the second period (2017 - 2019), the average CR₄ value of wood charcoal in Saudi Arabia was 86.3,9%, and the average HHI value of wood charcoal in Saudi Arabia was 4280.12. The figures show that wood charcoal commodities in Saudi Arabia in 2017 - 2019 had a strict oligopoly market structure. In 2017 - 2019, Indonesia became the highest supplier of wood charcoal to Saudi Arabia with a market share of 60.60%, China at 22.10%, Malaysia at 1.38%, and Vietnam at 2.41%.

In the third period (2020 - 2022), the average CR₄ value of wood charcoal in Saudi Arabia was 89.96%, and the average HHI value of wood charcoal in Saudi Arabia was 3668.11. The figure shows that wood charcoal commodities in Saudi Arabia in 2020 - 2022 have a strict oligopoly market structure. In 2020 - 2022, Indonesia became the highest supplier of wood charcoal to Saudi Arabia with a market share of 50.52%, China at 32.53%, Malaysia at 1.35%, and Vietnam at 5.57%.

Overall, for nine years (2014 - 2022), the average CR₄ value of wood charcoal in Saudi Arabia from 2014 - 2022 was 85.64% and the average HHI value of wood charcoal in Saudi Arabia from 2014 - 2022 was 3740.01. The figures show that wood charcoal commodities in Saudi Arabia in 2014 - 2022 have a strict oligopoly market structure. In 2014 - 2022, Indonesia became the highest supplier of wood charcoal to Saudi Arabia with a market share of 53.51%, China at 27.61%, Malaysia at 1.28%, and Vietnam at 3.24%. The results of the analysis of the market share of four exporting countries and the market structure of wood charcoal in Saudi Arabia are listed in the following table.

Table 2

Market Share of Four Exporting Countries and Market Structure of Wood Charcoal in Saudi Arabia

Period	Market Share				Market Structure	
	Indonesia	China	Malaysia	Vietnam	CR ₄	HHI
I (2014 – 2016)	49,42%	28,28%	1,11%	1,76%	80,56%	3271,807
II (2017 – 2019)	60,60%	22,01%	1,38%	2,41%	86,39%	4280,12
III (2020 – 2022)	50,52%	32,53%	1,35%	5,57%	89,96%	3668,113
Track	53,51%	27,61%	1,28%	3,24%	85,64%	3740,0136

Source: Processed Data, 2023



4.2 COMPARATIVE ADVANTAGES OF WOOD CHARCOAL EXPORT PERFORMANCE

Table 3

Results of revealed comparative advantage (RCA) and symmetric comparative advantage (RSCA) calculations between Potential Countries for Wood Charcoal Exports in the Saudi Arab Market

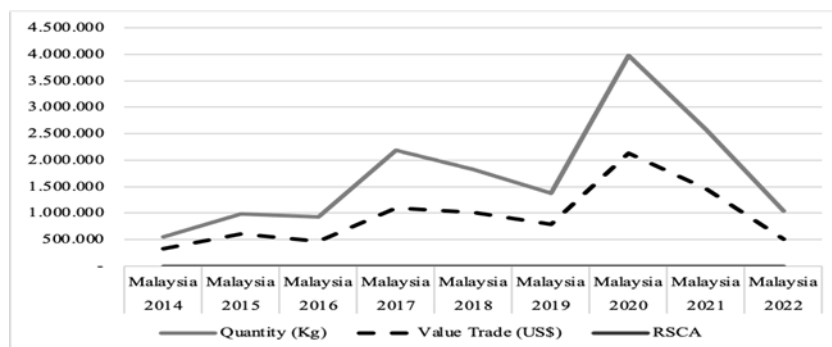
Exporting Countries	Period	RCA	RSCA
China	I (2014, 2015, 2016)	2,07	0,35
	II (2017, 2018, 2019)	1,44	0,16
	III (2020, 2021, 2022)	1,14	-0,10
Vietnam	I (2014, 2015, 2016)	5,36	0,68
	II (2017, 2018, 2019)	9,11	0,74
	III (2020, 2021, 2022)	27,18	0,73
Malaysia	I (2014, 2015, 2016)	177,36	0,99
	II (2017, 2018, 2019)	192,65	0,99
	III (2020, 2021, 2022)	114,22	0,95
Indonesia	I (2014, 2015, 2016)	40,97	0,95
	II (2017, 2018, 2019)	58,57	0,97
	III (2020, 2021, 2022)	29,13	0,85

Source: Adapted from UN Comtrade (2023)

Table 3 outlines the results of potential country RSCA calculations for the Saudi Arabian Market. The results of the analysis are divided into three periods, namely period I (2014, 2015, and 2016), period II (2017, 2018, and 2019) and period III (2020, 2021, and 2022). In the last nine years, potential countries that have a high RSCA are Malaysia in period II (2017, 2018, 2019) of 0.99, Malaysia in period I (2014, 2015, 2016) of 0.99, and Indonesia period II (2014, 2015, 2016) of 0.97.

Figure 4

Malaysia's Export Performance to Saudi Arabia in Three Periods



Source: Data Processed

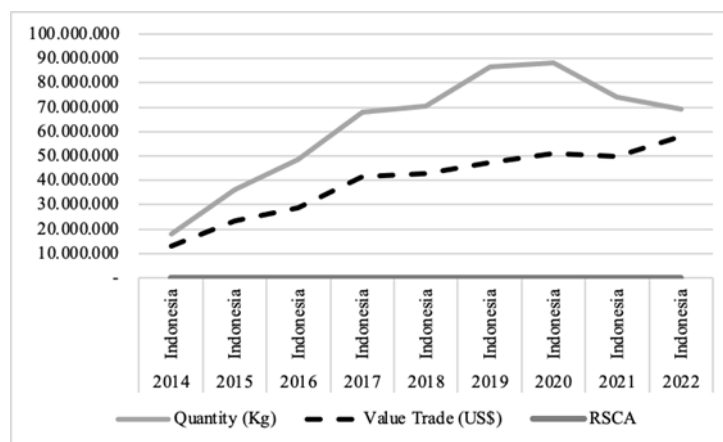


In the last nine years, Malaysia exported an average of 1,717 thousand kg of wood charcoal with an average trade value for nine years of US \$ 778,945,152. In Period I, it has an RSCA value of 0.99. Period II had a value of 0.99, and Period III had a value of 0.95. The RSCA score shows that Malaysia is comparative. Judging from the study's results, the RSCA value tends to decrease. This is evidenced by the highest trade value in 2020 of 3,970,426 Kg with a trade value of 2,130,453 US\$. After 2021 and 2021, export performance decreased from the quantity exported by the Malaysian state.

Indonesia occupies the second position where the RSCA is highest at 0.97 in period II, 0.95 in period I, and 0.85 in period III. After Malaysia, Indonesian wood charcoal has a comparative advantage in the Saudi Arabian market. However, RSCA and RCA experienced a decline in period III. This decrease was caused by reducing the volume of wood charcoal exported in the third period (2020, 2021, and 2022). In 2020, Indonesia exported 88,136,618 Kg with a trade value of 51,006,571 US\$. The decline occurred until 2022, when Indonesia could only ship 69,403,613 Kg with a trade value of 58,080,780 US\$.

Figure 5

Indonesia's Export Performance to Saudi Arabia in Three Periods



Source: Data Processed

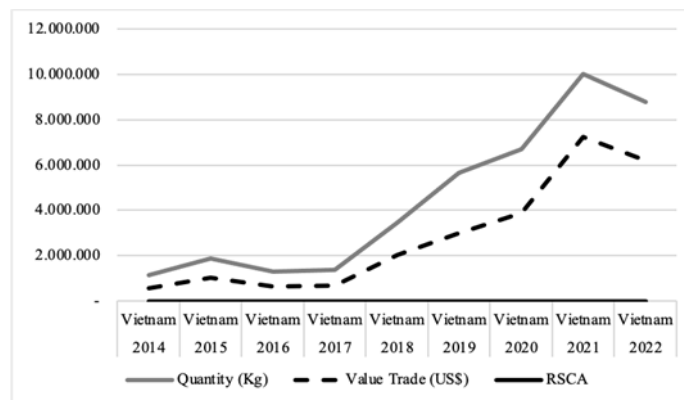
The decline in exports occurred due to COVID-19 hitting the world, resulting in limited goods and services coming out in countries, including Indonesia. Despite the decrease in export volume, the value of trade increased. There was an increase due to the price of Indonesian wood charcoal in the world to 0.65 US \$ per kilo. The import and exit duty tariff policy does not charge the export of wood charcoal. With the provisions of wood charcoal, Indonesia must pay attention to residue tolerance limits, contamination,



use of certain substances, label details, identity, quality, product safety, customs requirements, and distribution and product certification. Agreement Establishing The World Trade Organization (WTO). Indonesia has a high potential to produce wood charcoal because it has a coconut plantation area of 3.7 million hectares. Coconut shells are one of the materials used for making wood charcoal (Nurhafika, 2021; Putri & Hidayat, 2023).

Figure 6

Vietnam's Export Performance to Saudi Arabia in Three Periods



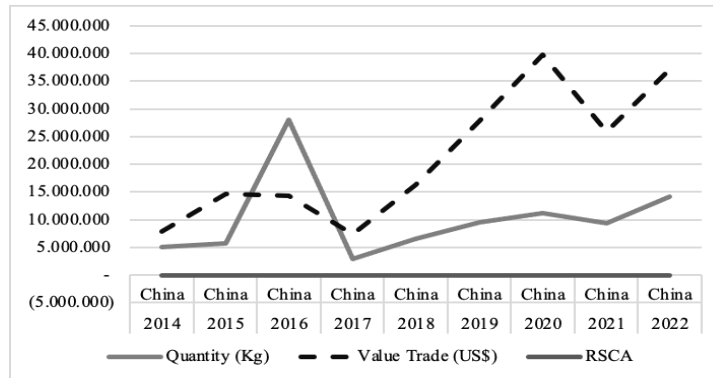
Source: Data Processed

Furthermore, the third potential country is Vietnam, where the RSCA is highest in period II at 0.74, period III at 0.73, and period I at 0.68. Vietnamese wood charcoal has a comparative advantage in the Saudi Arabian Market. It can be seen that Vietnam significantly improved in these three periods. For nine years, the average production of wood charcoal in Vietnam was 4,473,374 Kg. In 2014, Vietnam exported 1,152,135 Kg with a value of 570,557 US\$ with RSCA 0.7. However, the highest export in 2021 reached 10,011,568 US\$ with a trade value of 7,224,631, which resulted in an RSCA value of 0.5, the smallest in the last nine years.



Figure 7

China's Export Performance to Saudi Arabia in Three Periods



Source: Data Processed

The following potential country for the Saudi Arabian market is China, where the highest in Period I is with an RSCA value of 0.35, Period II has 0.16, and Period III has -0.10. In the first and second periods, China had a comparative advantage. Still, in the third period, China did not have a comparative advantage for wood charcoal in the Saudi Arabian Market. Although China is a potential country in the Saudi Arabian market, it still imports wood charcoal to meet domestic needs. The high imports made China's wood charcoal have no competitiveness. In period II, the RSCA value was -0.10, where China imported 261,409,058 Kg and only exported 14,148,847 Kg.

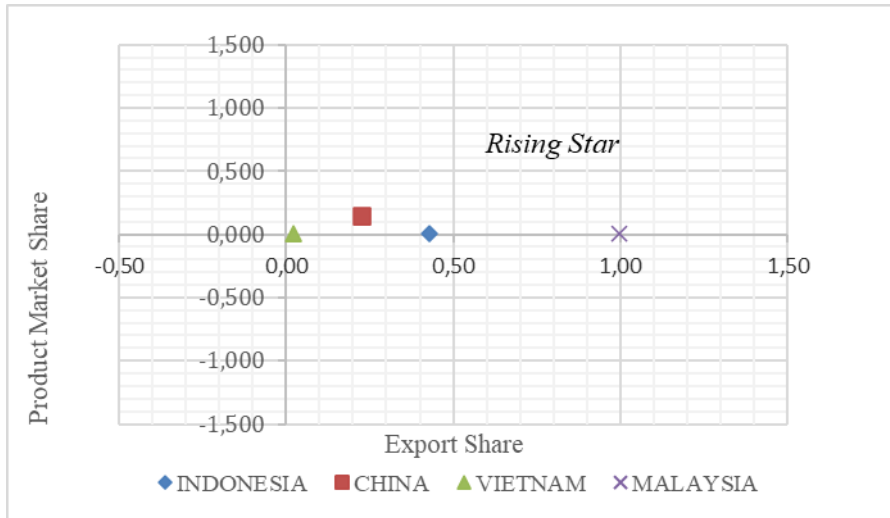
4.3 COMPETITIVE ADVANTAGES OF WOOD CHARCOAL EXPORT PERFORMANCE

The results of the EPD estimation value in Figure 7 show that four exporting countries have ideal trade positions, namely the Rising Star position, during the three analysis year periods (2014-2022). This shows that wood charcoal from the four countries has competitive competitiveness, followed by the dynamic growth of wood charcoal exports (fast-growing products) in the Saudi Arabian market. Based on the EPD analysis results, Indonesia's export share and share of wood charcoal products decreased but was still in the position of Rising Star. This condition shows rapid export growth and increased demand for wood charcoal supplies to Saudi Arabia. Indonesia and China are potential exporters with a larger market share than other countries in the Saudi Arabian market. Indonesia met the share of wood charcoal exports in Saudi Arabia up to 53.51% over three periods, with total exports reaching 33.6 million USD in 2022.



Figure 8

EPD Analysis Results



Source: Data Processed

Indonesia's wood charcoal competitiveness has remained in the Rising Star position for the last nine years because the people of Saudi Arabia are very fond of wood charcoal from Indonesia. Research by (Haryati & Amir, 2021) states that the people of Saudi Arabia favour the quality of Indonesian wood charcoal because it is odourless, smokeless, and has a long combustion resistance, especially for shisha pipe cigarettes. Furthermore, China met 27.61% share of wood charcoal exports in Saudi Arabia for three periods. The main export destinations of Chinese products are mainly developed countries, including Saudi Arabia, one of China's top 10 export destination countries (Wu et al., 2021).

Table 4

Quality Comparison of Indonesian and Malaysian Wood Charcoal

Quality Standards	Moisture Content (%)	Flying Substances Rate (%)	Ash Content (%)	Carbon Bonded Rate (%)	Caloric Value (kal g ¹)
SNI 1683 - 2021	Max 6	Max 30	Max 4	Max 79	Min 6.500
Malaysia	-	Max 10	Max 4	Min 70	Min 7.000

Source: SNI 1683:2021



4.4 POTENTIAL EXPORT PRODUCTS

Table 5

X-Model Country of Potential Export of Wood Charcoal in Saudi Arabian Market

Exporting Countries	Period	RCA	EPD	Export Development
Indonesia	I (2014 - 2016)	40,97	Rising Star	Optimistic Market Development
	II (2017 - 2019)	58,57	Rising Star	Optimistic Market Development
	III (2020 - 2022)	29,13	Rising Star	Optimistic Market Development
China	I (2014 - 2016)	2,07	Rising Star	Optimistic Market Development
	II (2017 - 2019)	1,44	Rising Star	Optimistic Market Development
	III (2020 - 2022)	1,14	Rising Star	Optimistic Market Development
Vietnam	I (2014 - 2016)	5,37	Rising Star	Optimistic Market Development
	II (2017 - 2019)	9,11	Rising Star	Optimistic Market Development
	III (2020 - 2022)	9,06	Rising Star	Optimistic Market Development
Malaysia	I (2014 - 2016)	177,36	Rising Star	Optimistic Market Development
	II (2017 - 2019)	192,65	Rising Star	Optimistic Market Development
	III (2020 - 2022)	114,23	Rising Star	Optimistic Market Development

Source: Processed from UN Comtrade (2023)

The mapping results of the x-model potential export products analysis show that the development of wood charcoal exports in Indonesia, China, Vietnam, and Malaysia is optimistic to be developed in the Saudi Arabian market (see Table 5). For three periods, the development of the exporter country's wood charcoal export market in Saudi Arabia is encouraging. The absence of a decline in the market development position of wood charcoal products by the four exporting countries in the Saudi Arabian market is due to the competitiveness of product exports from the aspect of competitive advantage in an ideal position, namely Rising Star. In addition, strengthening the comparative competitiveness of wood charcoal exporter countries is very strong or more than 1.

The development of Malaysian wood charcoal exports in the Saudi Arabian market has the highest optimistic market development, in the second position, with Indonesia, Vietnam, and China in the last position. This condition can be seen from the high RCA value of Malaysian wood charcoal, which reached 192.65 in period II (2017-2019). Furthermore, Indonesia had an RCA value of 58.57, and Vietnam had 9.11 in period II (2017-2019). In the last position in the development of export markets in Saudi Arabia, China has the highest comparative competitiveness of 2.07 in the first period (2014-2016) with its Rising Star competitive advantage.

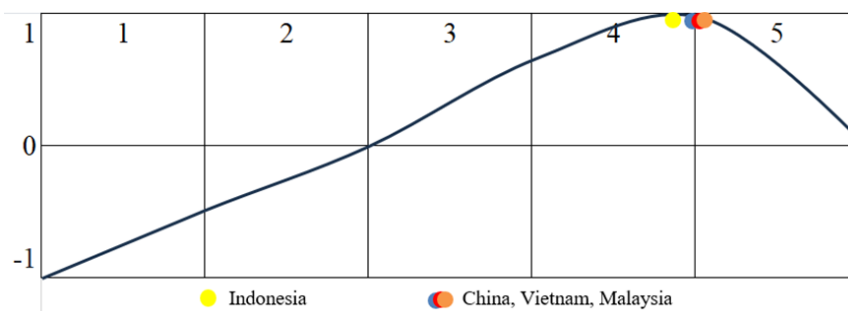


4.5 TRADING SPECIALIZATION INDEX (TSI) ANALYSIS

Figure 8 shows the position of Wood Charcoal from Indonesia, China, Malaysia, and Vietnam to Saudi Arabia divided over three periods (2014 - 2022). The results showed that the wood charcoal exported by the four countries could potentially occupy a maturation position in stage 4. The position states that the four countries are exporters of wood charcoal in the Saudi Arabian market. In line with this, the TSI value of China, Vietnam, and Malaysia is positive, which tends to be constant at 1.00. Meanwhile, Indonesia has had a continuous TSI value of 0.99 for three periods. With a positive TSI index, the four potential countries can produce wood charcoal products with lower production costs and better quality (Abdullah et al., 2013) Overall, at this stage of maturation, China, Vietnam, and Malaysia are in the highest position, followed by Indonesia at the bottom. The TSI value of Indonesian wood charcoal is low due to the import of Indonesian wood charcoal in several years. Based on the calculation results for three periods, the total imports of Indonesian wood charcoal to Saudi Arabia reached US\$ 106,662. This condition differs from China, Vietnam, and Malaysia, which did not import during the analysis period.

Figure 9

TSI Four Potential Export Countries in the Arab Saudi Market



Source: Data Processed

The country, which is in the stage of self-sufficiency, began to apply standardized technology to wood charcoal products to be exported to the Saudi Arabian market. The wood charcoal standard in demand by the Saudi Arabian market has an ash content of 2.3%. The wood charcoal industry in Indonesia, China, Vietnam, and Malaysia exports products to the upper class of their group. In contrast, the charcoal industry in other countries exports wood charcoal from the lower class of the same group. The ash content



from burning wood charcoal is an indicator of quality assessment. Whitish-gray briquettes include Grade A briquettes. The greyish-white ones include Grade B products, and Grade C is yellowish-gray (Haryati & Amir, 2021). Overall, the three countries have market share control and solid competitiveness for wood charcoal commodities; this certainly needs to be maintained so that it does not enter the 5th or re-import stage.

In maintaining its position, Indonesia conducted a development program for wood charcoal export products to the Saudi Arabian market by the Ministry of Trade. The Directorate General for National Export Development (DGNEDE) finances and facilitates the wood charcoal development program as one of the commodities that have the potential to be marketed to developing countries and collaborates with the Trade Promotion Organization (DGNEDE, 2019). The government also conducts exhibitions on non-oil and gas export products made of wood-based materials as a promotional event. This can increase the demand for wood charcoal exports, especially in the Saudi Arabian market.

5 CONCLUSIONS

The structure of the wood charcoal market in Saudi Arabia is a strict oligopoly, with the wood charcoal market share dominated by Indonesia and China; during the period (2014-2022), Indonesia became the highest supplier of wood charcoal in Saudi Arabia. The competitiveness of potential countries that have the highest possible advantage is Malaysia in period II (2017, 2018, 2019) of 0.99, Malaysia in period I (2014, 2015, 2016) of 0.99, and Indonesia in period II (2014, 2015, 2016) of 0.97. The four exporting countries have strong competitive competitiveness, being in a Rising Star position with dynamic export growth (fast-growing products) for three periods (2014-2022). During the three analysis periods (2014-2022), Indonesia, China, Vietnam, and Malaysia specialized as wood charcoal exporters in the Saudi Arabian market with maturing positions in stage 4.



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