Indonesian coffee at the international market

Deassy Apriani*; Feny Marissa; Alghifari Mahdi Igamo

Department of Economic, Economic Faculty, Sriwijaya University

*E-mail korespodensi: deassyapriani@fe.unsri.ac.id

Abstract
The research was conducted to know the competitiveness of coffee in the international market both comparatively and competitively. Measuring the strength of competitiveness in this study was conducted based on comparative analysis (analysis of RCA index, Herfindahl and CR4 Index, and Trade Specialization Index / ISP) and to analyze the competitive advantage of Indonesian coffee (Berlin Porter'/ Porter's Diamond Theory theory) to see the demand and supply side of the market. The results of this study revealed that the competitiveness of Indonesian coffee is very strong supported by the average RCA value of 4.08, the Herfindahl Index which shows free competition and reveals that the market ratio includes low market concentration and Indonesia based on the Market Specialization Index including exporting countries.

Keywords: *RCA index, herfindahl index, trade specialization index, Indonesian coffee*

INTRODUCTION

Coffee in Indonesia from 2012-2017 can be divided into 6 regions in Indonesia, namely Sumatra, Java, Nusa Tenggara, Kalimantan, Sulawesi, and Maluku Papua. Of the six areas, Sumatra is the dominant area that has the largest area (Ha) which ranges from 778,147 thousand hectares to 793,654 thousand hectares. There are 3 provinces that produce the largest coffee production on the island of Sumatra, namely South Sumatra Province, Lampung Province, and North Sumatra Province. The abundance of production obtained by the island of Sumatra so that this area is also called the granary of Indonesian coffee (Afnaria. & Nurhayati, 2021).

Table 1. Area of Coffee (Ha) in Indonesia

Years	Coffee Area (Ha)						
	Sumatra	**Java**	**Nusa Tenggara**	**Kalimantan**	**Sulawesi**	**Maluku Papua**	**Indonesian**
2012	778,147	179,003	120,810	30,804	114,043	12,483	1,235,289
2013	781,842	179,614	121,217	30,946	114,760	12,541	1,240,919
2014	793,654	185,611	114,419	27,074	114,292	11,760	1,246,810
2015	779,647	186,151	113,674	22,450	114,487	13,591	1,230,001
2016	779,576	187,181	112,446	21,829	114,033	13,447	1,228,512
2017	780,932	186,690	111,078	21,353	114,332	13,402	1,227,787

Source: Directorate General of Plantation - Ministry of Agriculture

As for other areas such as Java ranging from 179,003 thousand hectares to 186,690 thousand hectares, Nusa Tenggara has an area of about 111,078 thousand hectares to 121,217 thousand hectares. Kalimantan ranges from 21,353 to 30,946 thousand hectares, and Sulawesi has an area range of 114,033 to 114,760 thousand

hectares. For the Maluku region of Papua, it is the least extensive area of coffee, ranging from 11,760 to 13,402 thousand hectares.

Strata Indonesia coffee is very diverse, ranging from *home industry-scale* businesses to the multinational coffee industry. Products are produced not only to meet the needs of domestic coffee consumption but also to fill the market abroad. There are more than 50 destinations exported by Indonesian coffee such as the USA, Germany, Malaysia, Russia, and Italy are the main destination countries.

Regarding this position, it can be seen that the players of the world coffee market are not necessarily major producers. Two countries (Brazil and Vietnam) are the world's coffee producers, while Germany, Switzerland, and Belgium are not the world's coffee producers, but take advantage of the added value of coffee. These problems encourage producer countries to be able to anticipate and take advantage of the situation to maintain their position in the global coffee trade. According to Jamil (2019) that various problems encourage coffee-producing countries to be able to anticipate and even take advantage of the situation in order to maintain their position in the global coffee trade. In addition, the increasingly open global market and the excess global coffee supply indicate that there is increasing competition in terms of competing for the global coffee market.

In addition, the wider and open global market can indicate increased competition in the world coffee market. According to research conducted by Rosiana et al. (2018) which revealed that RCA Indonesia tends to increase compared to Vietnam and India, this is because there is no correlation between Indonesia's competitiveness and Vietnam due to differences in market share made by each country.

Indonesia as a coffee producer is trying to take advantage of the added value of coffee, by developing organic coffee, specialty coffee including developing certified coffee Geographies Indications, such as Chintamani Coffee (Bali), Gayo Coffee (Aceh), and Flores Bajawa Arabica Coffee (NTT). Coffee from Indonesia also has a unique taste and distinctive aroma so it has a great opportunity to be traded (Parnadi & Loisa, 2018). We hope that in the future Indonesia can enjoy more added value from coffee and increase its role (competitiveness) in the international market. In addition, the increased added value can boost the agricultural sector in the national economy (Parnadi & Loisa, 2018).

International trade is based on differences in demand and supply between countries. This difference occurs because not all countries have and can produce traded commodities, because the country's natural factors do not support, such as its geographical location and earth content and differences in a country's ability to absorb certain commodities at a more efficient level. According to Tambunan (2001), international trade is trade between or cross-border which includes export and import activities. International trade is divided into two categories, namely trade in goods (physical) and trade in services. According to Setiawan and Lestari (2011), international trade is trade conducted by residents of a country with residents of other countries based on mutual agreement. The population in question can be between individuals (individuals with individuals), between individuals and governments of a country, or governments of one country with governments of other countries.

International trade will only happen if no one party gains a profit and no other party is harmed. The benefits obtained from international trade are called trade benefits or gains from trade. In this case, Indonesia is one of the developing countries that adheres to a small open economy system that cannot be separated from international

trade. This condition means that there is international trade in the form of export activities but not as a price maker (Nopriyandi & Haryadi, 2017).

METHODOLOGY

This study used data from 2003 to 2017 to analyze the competitive position of Indonesian coffee in the international market. Measuring the strength of competitiveness in this study was conducted based on comparative analysis (analysis of RCA index, Herfindahl and CR4 index, and Trade Specialization Index / ISP) and to analyze the competitive advantage of Indonesian coffee *(Berlin Porter'/ Porter's Diamond Theory theory)* to see the demand and supply side of the market.

RCA is used in empirical studies to measure changes in the comparative advantage or level of competitiveness of a country's products to the world. RCA is formulated as follows:

$$RCA_{ij} = \frac{X_{ij} / \sum i\, X_{ij}}{\sum j\, X_{ij} / \sum i \sum j\, X_{ij}}$$ .... (1)

Where:

RCA_{ij}	= Comparative advantage (competitiveness) of state coffee j
X_{ij}	= Export value of commodities i (coffee) country / year to t
$\sum i\, X_{ij}$	= Total export value of all commodity countries j
$\sum j\, X_{ij}$	= Total export value of commodities i (coffee) world
$\sum i \sum j\, X_{ij}$	= Total export value for all world commodities

According to Hasibuan (1993) market structure is the number and size of the distribution of companies in the market and the ease or difficulty of entering and leaving the market. Market structure is an important measure in observing variations in industrial behavior and performance, because it can strategically affect competitive conditions and the level of prices for goods and services, the influence finally reaches the welfare of the community (social-welfare).

In this study, *the Concentration Ratio* and *Herfindahl Index* (HI) were used to determine the concentration level of the coffee market internationally. The level of market concentration measured will be categorized and lead to the form of the market occurring in the international coffee market. Based on the four characteristics of the industry, according to Sukirno (2016) the structure of the goods market is distinguished into four forms, namely the perfect competition market, monopoly, monopolistic competition, and oligopoly. The shape of the existing market will affect the level of competition that will be analyzed in the next section.

The calculation of market share is done using the following formula:

Sij = Xij / TXj .... (2)

Where:
Sij   = Country coffee market share i in international market
Xij   = Value of the country's coffee exports in the international market
TXj   = Total value of coffee exports in the international market

The same formula is then used to measure a country's market structure and market share in the international coffee trade, as follows:

$$HI = Sij_1^2 + Sij_2^2 + Sij_3^2 + \cdots + Sij_n^2 \quad \text{...} \quad (3)$$

Where:
HI = Herfindahl Index
Si = Market share of the i.e countries in the world coffee trade
n = Number of countries involved in the world coffee trade

To analyze the level of market concentration faced by coffee producers in the international market can be done with *concentration ratio* (CR) analysis tools. *Concentration Ratio is* used to measure the percentage of market share. The market concentration ratio (CR4) is formulated as follows:

CR4 = Sij1 + Sij2 + Sij3 + Sij4 ....(4)

Where:
CR4 = Market concentration value of the 4 largest coffee commodity producers in the International market
Sij = Country I coffee commodity market share in international market
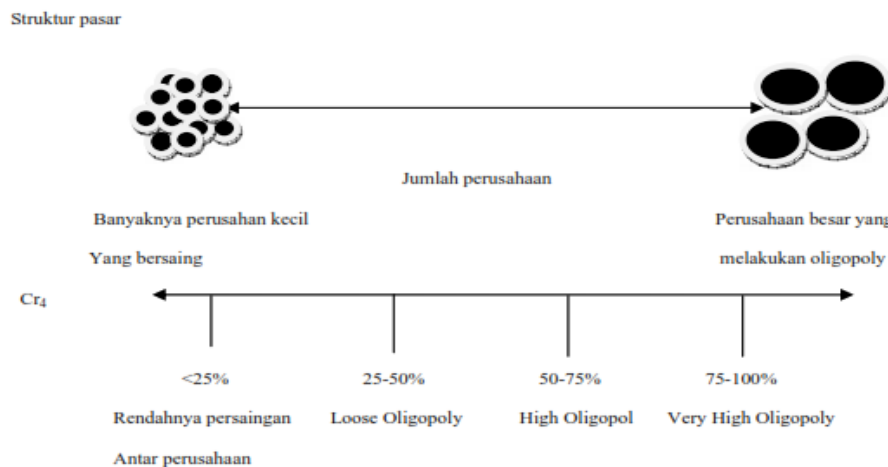
Figure 1. Types of market structure
Source: Buzzelli (2001); Ma (1993) in Arianto (2008)

ISP is used to analyze the position or stage of a commodity's development. This ISP can describe whether, for a commodity, Indonesia's position tends to be an exporter or importer of agricultural commodities. In general, ISPs can be formulated as follows:

$$ISP = \frac{X_{ia} - M_{ia}}{X_{ia} + M_{ia}} \quad \text{...} \quad (5)$$

Where:
Xia = export value of Indonesian coffee commodities
Mia = import value of Indonesian coffee commodities

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This index has a value range between -1 to 1. According to the Ministry of Trade (2014), if the positive ISP value is above 0 to 1, it can be said that the commodity under study has strong competitiveness or the country concerned tends to be an exporter of the commodity (domestic supply). greater than domestic demand). On the other hand, if the negative ISP value is below 0 to -1 then its competitiveness is low or tends to be an importer (domestic supply is smaller than domestic demand). If the index increases, it means that the competitiveness increases, and vice versa.

According to Apridar (2009) Opportunity cost is the cost sacrificed from producing one item to produce another or it can also be said how much sacrifice of production factors that can be used to produce one item, diverted to other goods that are considered to have comparative advantages.

This study analyzed the condition of Indonesian coffee into six components contained in the theory Belian Porter (Porter, 1990) The six components are: 1).Condition factors, 2).Conditions of domestic demand, 3).Related Industries and Supporting Industries, 4).Structure, competition, and strategy, 5).Role of government, 6).The role of the opportunity or the role of opportunity.

RESULTS AND DISCUSSION

Indonesian coffee overview

The five provinces that are the largest coffee producers in Indonesia are south Sumatra (18.11%), Lampung (17.44%), Aceh (10.27%), North Sumatra (9.90%) and, East Java (9.73%) with 95.46% land ownership owned by people's plantations, 2.37% owned by state plantation companies and the remaining 2.37% owned by private plantation companies.

The results of RCA calculations conducted by Utami et al. (2018) coffee commodities in Indonesia in export destination countries have very strong competitiveness in the United States, Japan, Malaysia, Germany, Italy, and Russia. Indonesia as the world's 4th largest coffee producing country after Brazil, Vietnam, and Colombia have the main target in marketing the coffee products produced. Lampung (Pelabuhan Panjang) is the gateway of Indonesian coffee exports, especially Indonesian robusta coffee, while North Sumatra (Belawan Port) is the gateway of Arabica coffee Sumatra and East Java (Tanjung Perak) is the gateway of arabica coffee robusta coffee produced from Java and eastern Indonesia.
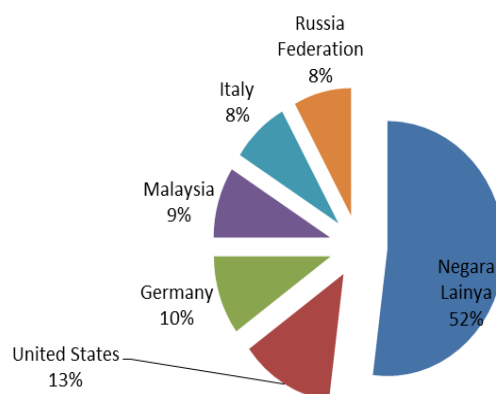

Figure 2. Indonesian coffee export volume by destination country

Figure 3, shows that Indonesia has the potential to become one of the coffee-producing countries in the world and make coffee commodities as one of the foreign

exchange sources of the country. Indonesia currently controls the world coffee export market share with an average percentage of 3.75% over the last 15 years (2003-2017). In figure 3, indicates that there must be development regarding coffee both in the field of quality, production, and cultivation of coffee so that later Indonesia can know the competitiveness capabilities in the international market and can compete for world market share. Development can also be in the form of implementing diversified processed coffee products such as roasted coffee, instant coffee, coffee mix and others so that superior commodities can compete at the international level (Narulita et al., 2014).
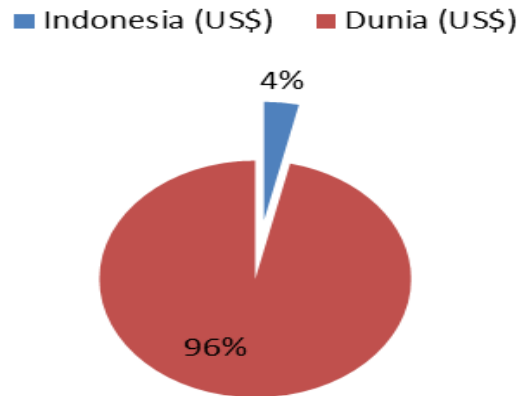

Figure 3. Comparison of total Indonesian and world coffee exports in 2003-2017

Comparative advantage analysis

The strength of coffee competitiveness (RCA)

The calculation of RCA value in 2003-2017 shows Indonesia has competitiveness in coffee commodity to the value of world exports and on the export value of all world commodities. This is evidenced by the average RCA value over the last 15 years (2003-2017) showing an RCA value of more than 1 which is 4.08 with a market share of 3.75 percent.

The values of the four export countries in table 4 have excellent competitiveness values (more than 1). Brazil has an average RCA value over the last 15 years (2003-2017) of 15.56, Vietnam at 17.73, and Colombia with the highest competitiveness of 38.56. When compared to the four countries, Indonesia has the lowest competitiveness of 4.08. Nonetheless, this suggests that the competitiveness of the countries concerned for coffee commodities on the world market is above the world average. Conversely, if the RCA score is less than 1 means that the country has weak competitiveness in the world market. Research conducted by Baso & Anindita (2018) also showed RCA results from four exporter countries namely Columbia, Vietnam, Brazil, and Indonesia concluded that Indonesia's RCA value is lower than that of three other exporter countries and This study is in line with research by Alexander & Nadapdap (2019)   the statement that from the results of the RCA analysis of the export of Indonesian coffee beans in 2002-2017 in the global market, the results were 4.11.

This is due to the involvement of the government or the role of the government on the development of coffee exports in each exporter country such as irrigation development, dicentra road coffee production, conducting research on coffee, providing counseling, facilitating credit, as well as providing processing rights with an unlimited area. In addition, different types of coffee varieties are traded. In Indonesia varieties of

coffee are traded robusta varieties (lower prices), while in Columbia the type of varieties is traded arabica type (the price is higher) so the value of Columbia exports is higher than the value of Indonesian exports.

However, the results of the measurement of competitiveness using RCA cannot be used as the main measure to measure the small amount of competitiveness, because there are many other factors to influence the competitiveness of a country by using the *Berlin Porter Model* of international competitiveness that will also be analyzed at a later stage.

Market structure and market share (*Herfindahl Index* and CR4)

The method used to measure the distribution of market mastery or concentration calculation in an industry using *the Herfindahl Index* or HHI. The more concentrated an industry is the market force/ ability to determine the price of industry will increase.

Table 2. Results of calculation of market share of four countries of the world's largest coffee exporters

Years	Market Share of The World's Four Largest Exporters (%)				HI	Concentration Ratio Value (CR4) (%)
	Brazil	**Vietnamese**	**Colombia**	**Indonesian**		
2003	17.58	6.75	10.88	3.46	484.82	38.66
2004	19.26	7.03	10.56	3.22	542.39	40.08
2005	20.79	6.08	12.25	4.14	636.32	43.25
2006	20.3	8.37	10.22	4.04	602.79	42.93
2007	19.45	10.95	9.91	3.64	609.76	43.95
2008	19.8	10.04	9.11	4.71	597.81	43.65
2009	19.38	8.85	8.05	4.21	536.35	40.49
2010	21.76	7.74	8	3.41	609.24	40.91
2011	22.5	7.74	7.45	2.91	630.18	40.60
2012	17.56	10.85	5.98	3.82	476.51	38.22
2013	16.8	9.32	7.02	4.29	436.80	37.43
2014	19.11	10.46	7.95	3.28	548.65	40.80
2015	18.38	7.98	8.51	3.96	489.54	38.82
2016	16.28	10.19	8.25	3.38	448.33	38.10
2017	14.95	10.05	8.37	3.85	409.58	37.23

Source: Secondary Data Research Results from UN *Commodity Trade Statistic Database* (Processed Data, 2019)

Table 2 shows that the value of the Herfindahl Index 4 countries of the world's largest coffee producers is 537.27. This leads to the structure of the open market industry because the total value of the Herfindahl Index 4 countries of world coffee producers (Brazil, Vietnam, Colombia, and Indonesia) less than 1000 / (0-1000 low concentration). CR4 results from the world's four largest coffee producers, it can be said that Moderate Loose Oligopoly with a CR4 value of 40.34 percent. At a concentration value of 40.34 percent categorized as low market concentration. The higher the value of the concentration ratio, the greater the dominance of the producing country and tends to

have the potential to determine economic profits and prices (Hanafi and Tinaprilla, 2017)

Coffee demand and supply (trade specialization index)

This index will give an overview of Indonesian coffee as an importer country or exporter. In addition, the Market Concentration Index or commonly known as *the Hischman Herfindahl Index (HHI)* can also provide an overview of the vulnerability of coffee exports to Indonesia's main export destinations.
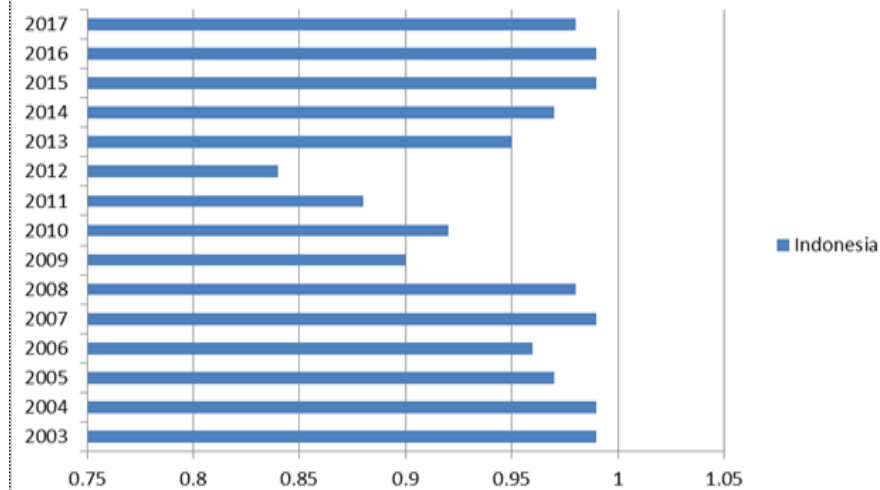

Figure 4. Value of coffee specialization index in Indonesia

Specialization Index Coffee with an average of 0.95. The four largest coffee exporting countries in the world namely Brazil, Vietnam, Colombia, and Indonesia each have a Trade Specialization Index (ISP) value between 0 to 1. These four countries indicate that the country is still a coffee exporter with a greater domestic supply compared to demand. Vietnam is the country that has the highest ISP value compared to Brazil, Colombia, and Indonesia, it shows that Vietnam has more domestic supply compared to the most demand compared to 3 competitor countries.

Analysis of Indonesia Coffee's Competitive Advantage

Condition factors (Resources)

One of the production factors that are very important to compete in the international world is the resources owned by a nation. One of the components in the theory of *Porter's Diamonds System* is the condition component of the factor (resource). Condition factors (resources) that affect the competitiveness of coffee commodities are natural resources, human resources, and science and technology resources (Hadi, 2001).

Natural resources

Rainfall is sufficient and has a tropical climate allows Indonesia to develop coffee commodities. Coffee commodities developed in Indonesia is a type of Robusta coffee but other types of coffee such as arabica and liberika are still developed. Indonesian coffee opportunities that need to be achieved are *specialty coffee* (specialty-coffee) or organic coffee. Organic coffee is a coffee produced by following the understanding of sustainable agriculture for example known as Toraja coffee (South Sulawesi), Kintamani coffee (Bali), Mandailing coffee (North Sumatra), and other types of

Indonesian coffee. Here is the data area (Ha) and Production (Ton) robusta and Arabica type coffee in Indonesia in 2003-2017.

Indonesian coffee is dominated by two types of coffee, namely Arabica coffee and Robusta coffee because Arabica coffee grows very well in areas with an altitude of 1000-2100 m above sea level (asl). the higher the location of the Arabica coffee plantation, the better the taste of the coffee. while Robusta coffee is able to adapt better than Arabica coffee because this coffee can grow in lower areas (Rukmana, 2014). The year 2003 to 2017 showed a land reduction in robusta coffee because Indonesia currently wants to try the development of other types of coffee such as arabica coffee. According to the Directorate General of Plantation Indonesia, currently the area of coffee commodities is 1,228,642 ha with a total production of 637,539 Tons in 2017. Of the total land, 80.31% planted robusta coffee, and 19.68% planted arabica coffee. Coffee production produced on average per year towards the type of coffee is 80.02% for robusta coffee types and 19.97 for arabica coffee types.

Human resources

In addition to natural resources, another factor that is very important for the development of a country is human resources. Problems related to human resources who still have limitations in some cases such as problems with capital, use of technology, low knowledge of agriculture which results in less than optimal production (Maharani et al., 2015). The quality of human resources affects the achievement of competitiveness excellence in coffee commodities. Indonesia as the fifth-ranked country with the largest population in the world makes the availability of large amounts of human resources. According to the Central Bureau of Statistics (BPS), the Human Development Index (HDI) in Indonesia in 2017 reached 70.81 points, an increase of 0.63 points or grew by 0.90% compared to last year. This shows that government policies to improve the quality of human resources show positive results.

Science and technology resources

In order for coffee competitiveness to continue to increase and develop, the role of science and technology resources is needed. The development of science and technology (IPTEK) is carried out by research institutes and educational institutions, starting from the production stage up to the packaging stage.

Capital resources

Sources of capital in coffee commodities in the form of investments that have legal entities such as PMA (Foreign Investment), PMDN (Domestic Investment), BUMD (Regional Owned Enterprises, State-Owned Enterprises), and Cooperatives. Capital for coffee commodities is still very lacking, this is because there are still many landholdings that do not have certification. In addition, the interest of foreign investors is still very lacking due to taxation and government policies that are sometimes inconsistent. As a result, the capital of coffee commodities has not been fully supported to improve the competitiveness of Indonesian coffee.

Infrastructure resources

One of the determinants of success for efforts to improve the competitiveness of coffee commodities is infrastructure resources. These facilities and infrastructures include coffee storage and transportation infrastructure, coffee cultivation, transportation and, telecommunications. For example, for arabica coffee cultivation that

can be grown in low-temperature environments and usually found in the highlands, still not supported by adequate infrastructure. Therefore, the problem of infrastructure facilities has an effect on the distribution of products that will increase transportation costs.

Request condition

Demand conditions, especially domestic demand according to ditjenbun consists of the confectionery industry, household industry, beverage industry, and other industries. Based on the composition of domestic demand, the household industry that has the highest percentage to consume coffee is about 85 percent.

According to Ditjenbun (2017), coffee consumption from 2003 to 2017 always fluctuates with an average of 1.1719 kg/capita/year. With the increasing consumption of coffee in the country, it is necessary to import coffee from other countries such as coffee imports from Brazil and Vietnam which is the first and second-largest coffee exporting country in the world.

In addition, the condition of demand from the foreign side or demand for coffee exports can determine the competitiveness of Indonesian coffee commodities in the world market. Indonesia's coffee export destinations are the United States, Germany, Malaysia, Italy, and Russia. Most of the coffee exported is in the form of fresh or raw coffee beans, while for processed products or in the form of coffee powder, Indonesia is still very low. This is the problem of competitiveness of Indonesian coffee commodities because of most export raw products instead of processed products / finished products. These problems encourage coffee producing countries to be able to anticipate and even take advantage of the situation in the global coffee trade (Jamil, 2019).

Related and supporting industries

The existence of related industries and supporting the competitiveness of Indonesian coffee commodities in the International market is a factor that determines the existence or the excellence of national coffee. Related industries and supporting industries such as the provision of raw materials/procurement of superior seeds, production infrastructure, and management or development of coffee commodities.

PT Treno Kenangan is one of the industries that provide superior coffee seeds located in the West Nusa Tenggara area. In addition to superior coffee seeds, supporting industries such as the processed coffee industry include PT Santos Jaya Abadi (East Java), PT Sari Incofood Corporation (North Sumatra), PT Mayora Indah Tbk (Banten), PT Nestle Indonesia (East Java), and PT Aneka Coffee Industry (East Java).

Competition, structure, and strategy

The results from CR4 shows that the market concentration value in the four largest coffee-producing countries in the world is 40.34 percent which means low market concentration. This indicates that the market structure that occurs in coffee commodities of the world's four largest coffee-producing countries is a *Moderate Loose Oligopoly.*

Government role

The existence of Indonesia to be one of the world's coffee producers is inseparable from the role of the government. However, the role of the government is sometimes an obstacle to improve the competitiveness of Indonesian coffee. One of the government's

roles in improving the competitiveness of Indonesian coffee commodities is as a facilitator, regulation, and motivator of economic supervisors.

Coffee development, human resources improvement, partnership and institutional development, increased business investment and management information system development can be overcome by the government through general policies supported by technical policies to improve the competitiveness of Indonesian coffee in the international market. For example, the policy of improving the productivity and quality of coffee plants is carried out by the rejuvenation of people's coffee, the conversion of robusta coffee with arabica coffee, expansion of acreage, and others.

The increase in exports and added value of coffee is focused on exporting processed products, not just raw materials. In addition, the role of the government in terms of capital is needed, namely by facilitating capital derived from banking and non-bank institutions.

Role of opportunity

When viewed in terms of resources, coffee commodities have the opportunity to compete in the global market. Indonesia has superior varieties for coffee commodities, production potential with an area of development supported by geographical and climatic conditions suitable for the development of coffee commodities.

The increasing demand for Indonesian coffee opens up opportunities for the development of this commodity. Indonesia also has potential markets for coffee exports, namely in some countries such as the United States 13%, German 10%, Malaysia 9%, Italy 8%, and Russia 8%. The existence of this opportunity or opportunity, it is expected that the role of government plays an active role to encourage efforts to improve the competitiveness of Indonesian coffee in the International market.

CONCLUSION

The results and discussion of this research can be concluded that Indonesian coffee has competitiveness both comparatively and competitively in the International market during the period 2003-2017. Comparative results are shown in *Revealed Comparative Advantage* with an average of 4.08, *Herfindahl Index* with an average of 537.27 (free competition), concentration ratio value (C4) of 40.34 percent (low market concentration), and Trade Specialization Index of 0.95 percent indicating that Indonesia is a coffee exporting country. From the competitive side, the internal and external factors of *Porter's Diamond Theory* coffee show that coffee commodities in Indonesia have an advantage in the International market.

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