ANALYSIS OF COMPETITIVENESS AND FORECASTING OF INDONESIAN TEA EXPORTS TO MAIN DESTINATION COUNTRIES

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Abstract

Indonesia as a tea exporter in the world has not maximized tea export opportunities as indicated by the decline in the value of tea exports from 2016 to 2020. This study aims to further analyze the competitiveness of Indonesian tea exports to major importing countries and predict the value of exports that will occur until 2025. This study used time series data from 2001-2020 which was analyzed with Revealed Comparative Advantage (RCA) and Autoregressive Integrated Moving Average (ARIMA). The results of the analysis show that the competitiveness of Indonesian tea exports to the main destination countries, namely Russia, Malaysia, China, Taiwan, and the United States, does not have a comparative advantage (RCA<1). However, based on forecasting results, the value of tea exports to Russia, Malaysia, and China is expected to increase until 2025. This increase in tea export value also has an impact in the form of strengthening the competitiveness of Indonesian tea exports in these countries even though the RCA index value is smaller than one. Thus, although the competitiveness of Indonesian tea exports is still weak in destination countries, Indonesia can optimize tea exports to countries that have increased competitiveness, such as Russia, Malaysia, and China.

Keywords: Competitiveness; Forecasting; Revealed Comparative Advantage; Tea Export.

INTRODUCTION

Since many years ago, tea has become a prima donna plant around the world because it has a delicious taste and is accepted throughout the world (Islam et al., 2021). Tea is consumed by all walks of life and it is estimated that more than 3 billion people in the world have consumed tea (Oktaviana et al., 2017). This makes tea an important commodity and is used as a major world trade commodity. Indonesia as the sixth largest tea exporter in the world certainly benefits because of the large opportunity to earn foreign exchange through tea exports to the world (Ramadhani, 2013).

Unfortunately, the large opportunity for tea exports to international market was not responded well by Indonesia where there was a decline in the value of Indo-

nesian tea exports from 2016 to 2020. In 2016, Indonesia's tea exports to international market reached 113,108 tons with a value of 51.32 million USD and decreased by 14.83 percent in 2020 where Indonesia's exports were only 96,323 tons with a value of 45.26 million USD (BPS-Statistics Indonesia, 2021). However, the low export of Indonesian tea to the world is not due to the low domestic tea production. This is reflected in the report (BPS-Statistics Indonesia, 2021) which states that Indonesian tea production has increased by 3.67 percent from 2016 to 2020.

Indonesian tea has been exported to several countries in the world, including Russia in 2020 became the largest importer country of Indonesian tea with a value of 13.58 million USD and followed by Malaysia with a value of 12.01 million USD and the United States with a value of 6.5 million USD. Observed from previous years, the value of Indonesian tea exports to the country has decreased, where in 2016, Indonesian tea exports to Russia reached 17.38 million USD and decreased by 21.93 percent in 2020. The same thing was followed by Malaysia and the United States where the decline in the value of exports reached 19.16 percent and 4.43 percent, respectively (Trade Map, 2022).

Thus, as one of Indonesia's export commodities that acts as a foreign exchange earner, Indonesian tea exports should continue to be optimized, especially to main destination countries such as Russia, Malaysia, and the United States. However, the fact is that the value of Indonesia's exports to these countries tends to decline, so further analysis is needed on the level of competitiveness of Indonesian tea exports to major importing countries. This analysis is to detect changes in the competitiveness of Indonesian tea in the market of destination countries that may affect the decline in the value of Indonesian tea exports. Then it is also carried out forecasting the value of exports that occur within a certain period of time to these export destination countries so that Indonesia can optimize its tea exports to countries that are expected to experience an increase in competitiveness.

LITERATURE REVIEW

Tea is one of Indonesia's plantation products with good export opportunities (Wahyuni, 2021). This opportunity is supported by the number of Indonesian tea production which reaches 144 064 tons in 2020 (BPS-Statistics Indonesia, 2021). This amount of Indonesian tea production is sufficient for domestic needs so that Indonesia does not have a dependence on tea imports and can be proven by the Import Dependency Ratio which is in the range of 0 to 16 percent (Ramadhani, 2013). Based on the Trade Specialization Index (TSI) analysis, it is also known that the position of Indonesian tea exports in the international market is in the export expansion stage with the TSI value in the range of 0-0.8 (Nugrahaningrum et al., 2020).

Several research results show that Indonesian tea has competitiveness in international trade. With an average RCA value of 6.79 in the period 1979 to 2010, Indonesian tea competitiveness is considered quite strong in international trade (Ramadhani, 2013). Then in the 2010-2016 period, Indonesian tea exports were still considered competitive even though the RCA value decreased to 2.32 (Nugrahaningrum et al., 2020). In the ASEAN market, Indonesian tea also has strong competitiveness with an RCA value of 2.89 (Satryana & Karmini, 2016). Other research that uses a different analytical tool, namely Relative Trade Advantage (RTA) also shows the same results where Indonesian tea has competitiveness compared to other domestic commodities (RTA>1) (Nurohman et al., 2018). However, even so, the position of competitiveness of Indonesian tea is still inferior to that of Sri Lanka, Kenya, and India (Zakariyah et al., 2014).

Based on product classification, the most competitive Indonesian tea exports are green tea products. Indonesian green tea products with the HS code 090210 have competitiveness and are in a rising star position in the analysis using Export Product Domestic (EPD), while other tea product groups are already in a retreat position (Samudera et al., 2017). Although green tea products still have competitiveness, the competitiveness of Indonesian tea products has decreased every year, especially in black tea products which have lost their share in the international market (Khaliqi et al., 2020).

The decline in Indonesia's competitiveness and the loss of share in the international market could be due to the increasing competition in the tea trade. Indonesia only acts as a market follower with a share of 2-3 percent so that Indonesia's market share is vulnerable to being seized by higher quality tea products from other producing countries (Zakariyah et al., 2014). Compared to other producers in ASEAN, the results of the Constant Market Share (CMS) analysis show that Indonesian tea exports have a weakness in the competitiveness effect (Oktaviana et al., 2017). On another study, it was stated that Indonesia's weakness in the ASEAN market was the effect of commodity composition so Indonesian tea was less attractive due to inconsistent tea quality (Satryana & Karmini, 2016). Efforts to re-increase the competitiveness of Indonesian tea can be done by taking advantage of market opportunities through empowering farmers to produce products that meet international quality standards, increasing trade promotion, and increasing product added value (Wahyuni, 2021).

RESEARCH METHODS

This study used time series data for a period of 20 years (2001-2020). The data collected from the Trade Map in the form of tea export data (HS 0902). The data that had been collected was then used to perform a competitiveness analysis using the Revealed Comparative Advantage (RCA) method. Furthermore, export value data was also used to forecast the value of Indonesian tea exports to importing countries within the next five years (2021-2025) using the Autoregressive Integrated Moving Average (ARIMA) method.

Revealed Comparative Advantage (RCA) is a dynamic method and is used by numerous studies to measure the comparative advantage of a sector including the agricultural sector (Benesova et al., 2017; Bojnec & Fertő, 2017; Granabetter, 2016). Conceptually, RCA is the ratio of the market share of a product in the world by measuring the export performance of a country relative to the total world share (Zuhdi et al., 2020). Mathematically RCA can be explained by the following equation:

$$RCA = \frac{\left(\frac{Xki}{Xti}\right)}{\left(\frac{Wk}{Wt}\right)} \quad \text{.............................} (1)$$

where Xki is the value of Indonesian tea exports (USD), Xti is the total export value of the country i (USD), Wk is the total world export value of tea (USD) and Wt is the total world export value (USD).

The indicator used to justify the RCA value is if the RCA value > 1, it can be stated as there is competitiveness in Indonesian tea exports to importing countries. However, if the RCA value < 1, it can be stated as there is no competitiveness of Indonesian tea exports to importing countries.

Autoregressive Integrated Moving Average (ARIMA), is a method used to forecast the value of Indonesian tea exports to importing countries within the next 5 years (2021-2025). In the ARIMA model, there are Autoregressive (AR) and Moving Average (MA) components so that a model used for variable projection can be an Autoregressive (p) model, a Moving Average (q) model, or a combination model of the two (ARMA(p,q)) (Ohyver & Pudjihastuti, 2018). Autoregressive is a model that uses the assumption that the data in the previous period is very

influential on the current data so that it can be formulated as follows (Yuliawanti et al., 2021) :

$$Z_t = \emptyset_1 Z_{t-1} + \emptyset_2 Z_{t-2} + ... + \emptyset_p Z_{t-p} + e_t \quad (2)$$

where Z_t is data period t, $\emptyset_p$ is autoregressive parameter, and e_t is residual value.

While the Moving Average is a model that measures the autocorrelation between residual values which can be formulated as follows (Mardiyah et al., 2021) :

$$Z_t = e_t - \Theta_1 e_{t-1} - \Theta_2 e_{t-2} - ... - \Theta_q e_{t-q} \quad (3)$$

where Z_t is data periode t, Θ_q is moving average parameter, and e_t is residual value.

Autoregressive Moving Average as a combination of both AR (p) and MA (q) models can be denoted by ARMA (p,q) with the following formulation:

$$Z_t = \emptyset_1 Z_{t-1} + \emptyset_2 Z_{t-2} + ... + \emptyset_p Z_{t-p} + e_t - \Theta_1 e_{t-1} - \Theta_2 e_{t-2} - ... - \Theta_q e_{t-q} \quad (4)$$

where Z_t is data periode t, $\emptyset_p$ is auto-regressive parameter, Θ_q is moving average parameter, and e_t is residual value.

Using the ARIMA model for data projection requires a lot of experimentation to determine the best model (Fattah et al., 2018). Sena & Nagwani (2015) stated that the steps for using the ARIMA method consisted of three stages, namely (1) model identification, (2) parameter estimation and model calibration, and (3) model testing and validation.

RESULTS AND DISCUSSION
Overview of Indonesian Tea Exports

Tea is one of Indonesia's plantation products as an export commodity. In the international market, Indonesia's tea export volume is still below the export volume of Kenya, China, Sri Lanka, and India (Basu Majumder et al., 2015; Anjarsari, 2016;

Shahbandeh, 2019). However, in 2020, the share of Indonesian tea exports in the international market reached 2.10 percent and grew by 6.11 percent from the previous year, which experienced a decline in export share of 17.10 percent (Table 1). This export share is much lower than other tea exporting countries such as Kenya, China, Sri Lanka, India and Vietnam. As one of the world's tea producing countries, the condition of a low share of tea exports should be improved because tea as an export commodity can be interpreted as a foreign exchange earner for Indonesia which is important for the development of the country's economy (Khaliqi et al., 2020).

Indonesia's tea exports are supported by the large tea production in Indonesia. Indonesian tea production is carried out by plantations with three types of concession status, namely State-owned Plantation (PBN), Private-owned Plantation (PBS), and Smallholders Plantation (PR) where the largest contribution to tea production is produced by State-owned Plantation (PBN) and Smallholders Plantation (PR). Indo-nesia's total tea production since 2016 has fluctuated where a significant decline occurred in 2019 which was only able to produce tea of 128 724 tons (Figure 1). The amount of production of an agri-cultural product can affect the level of export of that product in the international market (Setiawan & Sugiarti, 2016). Therefore, the decline in Indonesia's export share of 17.10 percent in 2019 may be due to a decrease in the number of Indonesian tea production in the same year which is possible due to the conversion of tea plantation land into horticultural agri-cultural land which is increasingly widespread. Therefore, the decline in Indo-nesia's export share of 17.10 percent in 2019 may be due to the decline in the number of Indonesian tea production in the same year. In 2020, Indonesian tea produc-tion increased again and was able to produce 144,064 tons of tea.

Indonesian tea production, which is partly sold to the international market, is aimed at several Indonesian tea importing countries such as Malaysia, Russia, China, Taiwan, Pakistan, and the United States. These six countries are the main destinations for Indonesian tea exports. Based on data from the Central Statistics Bureau, Russia is the destination country for Indonesian tea exports with the largest volume reaching 8.048 tons or 17.78 percent of Indonesia's total tea exports in 2020 (BPS, 2021). The number of exports to Russia has increased after showing a downward trend from 2016 to 2019. The decline in Indonesian tea exports to the European region was influenced by regulations restricting the entry of tea related to the rules for limiting pesticide residues in tea (Nurohman et al., 2018). This condition caused in 2018 and 2019 the number of Indonesian tea exports to Malaysia was greater than to Russia (Figure 2). Meanwhile, other tea export destination countries such as the United States, Taiwan, and China showed export volumes that tended to be stable during the 2016-2020 period.

In 2020, Indonesian tea exports to Malaysia decreased by around 13.16 percent to 7,413 tons or 16.38 percent of total exports of Indonesian tea. This decline in export volume occurs because the competitiveness of Indonesian tea exports to Malaysia tends to weaken compared to the competitiveness of tea exports from Vietnam, which has strengthened since 2006 (Satryana & Karmini, 2016). Vietnam is also one of Indonesia's competitors in tea exports in the international market. In the 2012-2020 period, Vietnam's average share of tea exports in the international market was 6.15 percent and became an ASEAN country with the largest tea export share. To deal with this condition, the competitiveness of Indonesian products can be increased by increasing productivity and encouraging the promotion of products that have characteristics according to the prefe-

rences of international consumers (Jamil, 2019). Empowerment of tea farmers is also encouraged to produce products that meet international requirements so that export restrictions due to pesticide residue threshold rules will no longer occur in the Indonesian tea trade (Wahyuni, 2021).

Competitiveness Analysis of Indonesian Tea Exports to Main Destination Countries

Competitiveness is an aspect that needs special attention in order to survive in the international market, especially in the main export destination countries. One thing that needs to be considered is the comparative advantage or competitiveness of a product from a country, which in this case is the Indonesian tea commodity. The comparative advantage of Indonesian tea exports is measured by Revealed Comparative Advantage (RCA). RCA measures the share of a country's exports in the same industrial group as other exporting countries, so it is widely used to measure comparative advantage (Serin, 2008). Based on the analysis conducted, the five countries have a trend of RCA values that fluctuate every year with the average RCA value of Indonesian tea exported to main destination countries from 2001 to 2020 is smaller than one. If the RCA value is < 1, then Indonesia does not have a comparative advantage in the main export destination country. One of the factors causing Indonesia not to have a comparative advantage in the main export destination countries, namely the low quality of tea which can be influenced by the handling, storage, inappropriate use of pesticides, and contamination (Balasooriya et al., 2019). The Competitiveness Level of Indonesian Tea Exports to Main Destination Countries 2001-2020 can be seen in Figure 3.

The results of the Revealed Comparative Advantage (RCA) analysis in Fig. 1 shows that the fluctuations in the RCA value occurred in all of the main destination countries for Indonesian tea exports,

namely Malaysia, Russia, China, Taiwan and the USA. When compared from the five countries, Russia is a country with a higher average RCA value of 0.37. However, this RCA value is still smaller than 1 which explains that Indonesia does not have comparative competitiveness for tea commodities in the Russian market. This is also indicated by the downward trend in the graph. This result is consistent with other studies which state that the competitiveness of Indonesian tea in the Russian market is lower than other major exporting countries and has a negative trend (Cakra & Munandar, 2020). The decline in the competitiveness of Indonesian tea to Russia is due to the declining volume of Indonesian tea exports to Russia. According to Tjarsono (2013), the volume of Indonesian tea exports to Russia decreased due to various supporting factors, including differences in the results of domestic testing and the results of testing tea commodities conducted by Russia, lack of diplomatic coordination to Russia, and the inability of domestic testing due to inadequate infrastructure in national measurements governing the testing and control of tea quality.

The results of the analysis also show that the USA has a downward trend in the graph when compared to Malaysia, China and Taiwan. The decline in the competitiveness of Indonesian tea in the US market can occur because Indonesia's current position in the international tea market tends to be a market follower so that Indonesian tea does not affect the determination of world tea prices. As a result, Indonesia's position in the world tea market is vulnerable to strong market challengers (Zakariyah et al., 2014). Meanwhile, Taiwan has an increasing trend in five periods from 2013-2017. Although the trend of the RCA value is increasing, the value of the RCA index < 1 is 0.05. The average RCA value for Taiwan is not much different from the average RCA value for China, which is 0.04. Indonesia is a country that has no

comparative competitiveness in Taiwan and China.

Forecasting Export Value and Competitiveness of Indonesian Tea in Main Destination Countries

Indonesia as one of the world's tea producers will continue to export in the era of trade globalization as long as production has met domestic needs. However, forecasting exports and competitiveness of Indonesian tea is considered necessary to determine the potential of the international market which must be optimized for the development of Indonesian tea commodities. This forecasting information can be used as initial data and material for preparing adaptation steps and Indonesian agricultural planning (Sarvina, 2019).

This study uses the ARIMA model to forecast the value of Indonesian tea exports in several main destination countries in the period 2021-2025. Basically, the ARIMA model is a model that assumes that the data in the current period is influenced by the data and residual values in the previous period so that the time series data of a variable can be considered interrelated each period (Zuhdi et al., 2021). The ARIMA model is considered the best model for forecasting although there are general constraints in selecting the best model for forecasting a variable (Ramadhani et al., 2020). The best model selection can be obtained if the model has the standard error smallest.

The forecasting process using the ARIMA model begins with the identification of the model structure to test the stationarity of data on the value of Indonesian tea exports to several main destination countries. If the time series data is not stationary, then the differencing process is conducted. The stationary data or the result of differencing then identified to observe the behaviour of the Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) plots. The results of the identification of the ACF and PACF plots are used to assist the process

of estimating the ARIMA model in each country. And based on the significance test and residual model analysis, the best ARIMA model for the projection of Indonesian tea export value is obtained, namely 1) the projection model for Indonesian tea exports to Russia is the ARIMA model (1,1,1); 2) the projection model for Indonesian tea exports to Malaysia is the ARIMA model (1,1,1); 3) the projection model for Indonesian tea exports to China is the ARIMA model (1,1,1); 4) the projection model for Indonesian tea exports to the United States is the ARIMA model (1,2,2); 5) the projection model for Indonesian tea exports to Taiwan is the ARIMA (2,1,1) model.

Based on the forecasting results with each of the best ARIMA models for each destination country, it is estimated that Russia will still be the main destination for Indonesian tea exports until 2025. The value of exports to Russia is estimated to grow annually with an average growth of 3.52 percent in the period 2021-2025. This increase in export value also causes the competitiveness of Indonesian tea exports to Russia to increase from 0.19 in 2021 to 0.22 in 2025. The trend of increasing the value and competitiveness of Indonesian tea exports also occurs in the destination country of Malaysia, the export value is estimated to continue to increase every year until reached 13 494.8 thousand USD in 2025 (Table 2). The competitiveness index of Indonesian tea exports to Malaysia also increased from 0.16 in 2021 to 0.18 in 2025.

An increase in the value of exports is also expected to occur to destination countries of China and Taiwan until 2025, and the competitiveness index also increases slightly with each RCA value 0.08. Meanwhile tea exports to the United States are estimated to fluctuate but show a downward trend and cause the competitiveness index to also decline from 0.09 in 2021 to 0.07 in 2025. The decline in the value of tea exports can be caused by increased exports and competitiveness of tea producing countries in the world like India. There has been a positive and significant growth in the value of Indian tea exports to destination countries such as Russia, Iran, the United States, and the United Kingdom (Tandane et al., 2021).

Based on the results of this forecast, although the competitiveness of Indonesian tea exports is still weak in destination countries, Indonesia can optimize tea exports to countries that have increased competitiveness, such as Russia, Malaysia, and China. This optimization effort can be carried out if Indonesia can overcome various problems in tea production such as low productivity, limited post-harvest technology, and the low ability of farmers to implement technology (Oktaviana et al., 2017).
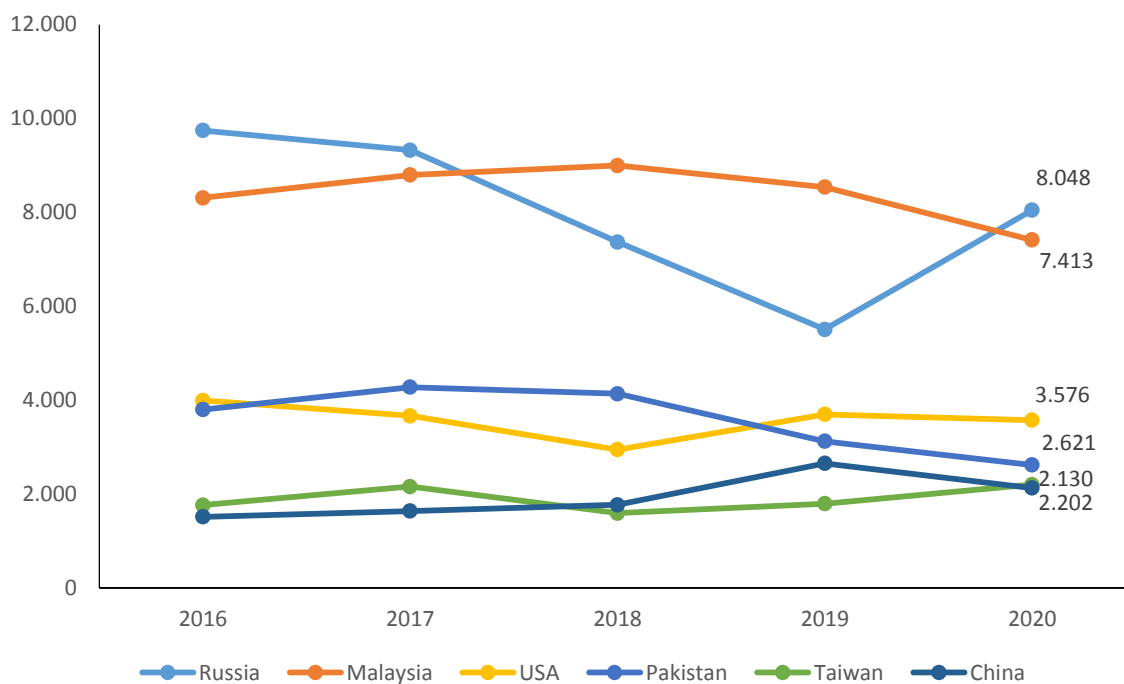
Table 1. Indonesian Tea Export Share in 2016-2020

Year	Indonesian Tea Export (ton)	World Tea Export (ton)	Indonesian Export Share (%)	Export Share Growth (%)
2016	51,317	2,074,712	2.47	
2017	54,195	2,137,578	2.54	2.50
2018	49,036	2,051,924	2.39	-5.74
2019	42,795	2,160,100	1.98	-17.10
2020	45,287	2,154,320	2.10	6.11

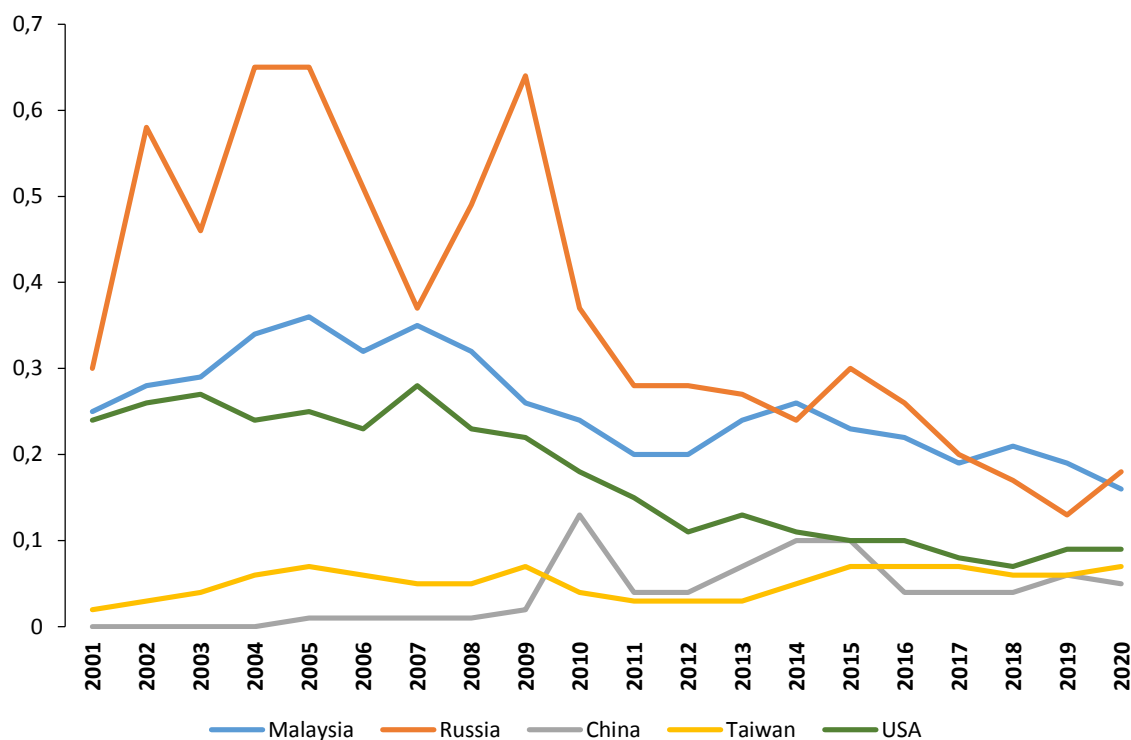Source: Secondary data processed (2022)
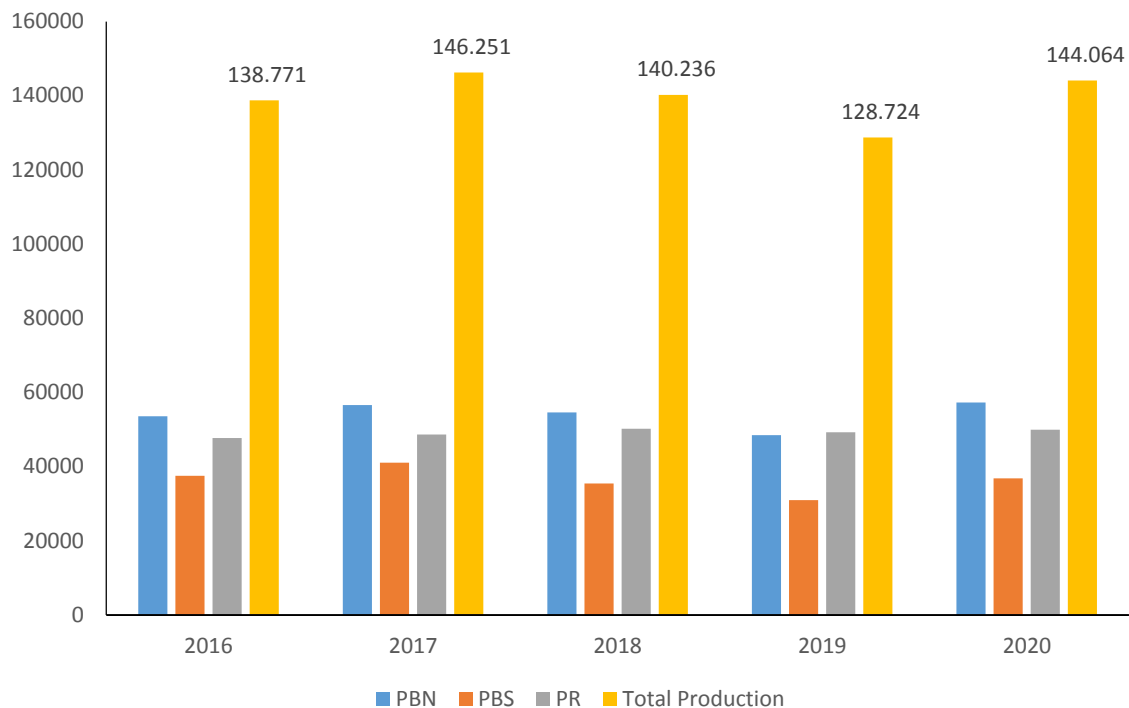
Figure 1. Indonesian Tea Production in 2016-2020 (ton)
Source: BPS (2021)

Figure 2. Indonesian Tea Export Volume to Main Destinaton Countries in 2016-2020 (ton)
Source : Trademap (2022)

Figure 3. Level of Competitiveness of Indonesian Tea Exports to Main Destination Countries in 2001-2020 Based on RCA Analysis

Table 2. Forecasting Export Value and Competitiveness of Indonesian Tea in Main Destination Countries

Destination Countries		2021	2022	2023	2024	2025
Russia	Export Value (000 US$)	14,565.8	15,317.3	15,896.5	16,353.3	16,723.2
	RCA Value	0.19	0.20	0.21	0.22	0.22
Malaysia	Export Value (000 US$)	12,476.4	12,655.1	12,966.6	13,216.3	13,494.8
	RCA Value	0.16	0.17	0.17	0.17	0.18
China	Export Value (000 US$)	4,922.48	5,465.27	5,806.04	6,078.87	6,328.86
	RCA Value	0.07	0.07	0.08	0.08	0.08
USA	Export Value (000 US$)	6,921.53	5,805.69	6,124.39	4,921.69	5,150.57
	RCA Value	0.09	0.08	0.08	0.07	0.07
Taiwan	Export Value (000 US$)	5,416.77	5,746.54	5,979.54	6,169.58	6,370.37
	RCA Value	0.07	0.08	0.08	0.08	0.08

Source : Secondary data processed (2022)

CONCLUSION AND RECOMMENDA-TION

Based on the results of the analysis, it is known that the competitiveness of Indonesian tea exports to the main destination countries, namely Russia, Malaysia, China, Taiwan and the United States does not have a comparative advantage. This is indicated by the RCA value which is smaller than one (RAC<1) in each of the Indonesian tea export destinations. However, based on forecasting results, the value of tea exports to Russia, Malaysia, and China is expected to increase until 2025. The increase in the value of tea exports also has an impact in the form of strengthening the competitiveness of Indonesian tea exports in these countries even though the RCA index value is smaller than one (RCA<1). Thus, although the competitiveness of Indonesian tea exports is still weak in destination countries, Indonesia can optimize tea exports to countries that have increased competitiveness, such as Russia, Malaysia, and China. This optimization effort can be carried out if Indonesia can overcome various problems in tea production such as low productivity, limited postharvest technology, and the low ability of farmers to implement technology to produce quality tea products according to international standards.

This research is still limited to the analysis of competitiveness in five main destination countries for Indonesian tea exports. Research can be developed by analyzing other tea export markets so that new potential markets can be identified to be optimized as Indonesian tea marketing areas. This is in line with the results of the analysis which shows that although the export volume of Indonesian tea is quite large to the five main destination countries, it turns out that Indonesian tea does not have competitiveness in each of the markets of the destination countries.

REFERENCES

Balasooriya, R., Kooragoda, M., & Jayawardhane, P. (2019). Comparative analysis on physical and chemical characteristics of commercially manufactured / processed green tea in Sri Lanka. *International Journal of Food Science and Nutrition*, *4*(4), 43–47. https://doi.org/10.13140/RG.2.2.11002.85441

Basu Majumder, A., Bera, B., & Rajan, A. (2015). Tea Statistics : Global Scenario Export. *Journal of Tea Science Research*, *8*(1), 121–124.

Benesova, I., Maitah, M., Smutka, L., Tomsik, K., & Ishchukova, N. (2017). Perspectives of the Russian Agricultural Exports in terms of Comparative Advantage. *Agricultural Economics (Czech Republic)*, *63*(7), 318–330. https://doi.org/10.17221/344/2015-AGRICECON

Bojnec, Š., & Fertő, I. (2017). The Duration of Global Agri-Food Export Competitiveness. *British Food Journal*, *119*(6), 1378–1393. https://doi.org/10.1108/BFJ-07-2016-0302

BPS-Statistics Indonesia. (2021). *Statistik Teh Indonesia*.

Cakra, G. A., & Munandar, J. M. (2020). Analisis Daya Saing Komoditas Teh Hitam Curah Indonesia di Pasar Global (Studi Kasus di Negara Russia). *Jurnal Manajemen Dan Organisasi*, *11*(1), 57–70. https://doi.org/10.29244/jmo.v11i1.28556

Dewi Anjarsari, I. R. (2016). Katekin teh Indonesia : prospek dan manfaatnya. *Kultivasi*, *15*(2), 99–106. https://doi.org/10.24198/kultivasi.v15i2.11871

Fattah, J., Ezzine, L., Aman, Z., El Moussami, H., & Lachhab, A. (2018). Forecasting of demand using ARIMA model. *International Journal of Engineering Business Management*, *10*, 1–9. https://doi.org/10.1177/18479790188 08673

Granabetter, D. (2016). Revealed Comparative Advantage Index: an Analysis of Export Trade in the Austrian District of Burgenland. *Review of Innovation and Competitiveness*, *2*(2), 97–114.

Islam, M. S., Ema, N. S., Chakrobortty, S., Jahan, H., & Hossain, M. E. (2021). Tea export competitiveness and the nexus between tea export and economic growth: The cases of Bangladesh, India and Sri Lanka. *Studies in Agricultural Economics*, *123*(2), 76–85. https://doi.org/10.7896/j.2125

Jamil, A. S. (2019). Daya Saing Perdagangan Kopi Indonesia di Pasar Global. *Agriekonomika*, *8*(1), 26–35. https://doi.org/10.21107/agriekonomi ka.v8i1.4924

Khaliqi, M., Gurning, H. R. H., Novanda, R. R., & Simamora, O. N. (2020). Competitiveness Indonesia tea in international market. *IOP Conference Series: Earth and Environmental Science*, *454*(1), 1–8. https://doi.org/10.1088/1755-1315/454/1/012039

Mardiyah, I., Utami, W. D., Candra, D., Novitasari, R., & Sulistiyawati, D. (2021). Analisis Prediksi Jumlah Penduduk di Kota Pasuruan Menggunakan Metode ARIMA. *Ilmu Matematika Dan Terapan*, *15*(3), 525–534.

Nugrahaningrum, Y., Zakaria, R., & Fahma, F. (2020). Analysis of Indonesian tea competitiveness in the international market. *AIP Conference Proceedings*, *2217*, 030067. https://doi.org/10.1063/5.0000810

Nurohman, Rifin, A., & Djohar, S. (2018). Analisis Kinerja Daya Saing Industri Teh Indonesia. *Jurnal Ekonomi Pertanian Dan Agribisnis*, *2*(5), 389–404. https://doi.org/10.21776/ub.jepa.2018. 002.05.5

Ohyver, M., & Pudjihastuti, H. (2018). Arima Model for Forecasting the Price of Medium Quality Rice to Anticipate Price Fluctuations. *Procedia Computer Science*, *135*, 707–711. https://doi.org/10.1016/j.procs.2018.0 8.215

Oktaviana, N., Masyhuri, M., & Hartono, S. (2017). Competitiveness of Tea Exports in Asean: A Constant Market Share Analysis. *Ilmu Pertanian (Agricultural Science)*, *1*(2), 88–93. https://doi.org/10.22146/ipas.10662

Pakpahan, M. S. U., & Drs. Idjang Tjarsono, M. S. (2013). Faktor-Faktor yang Mempengaruhi Lemahnya Ekspor Teh Indonesia ke Negara Rusia (2008-2012). *Journal of Chemical Information and Modeling*, *53*(9), 1689–1699.

Ramadhani, F. (2013). Daya Saing Teh Indonesia Di Pasar Internasional. *Economics Development Analysis Journal*, *2*(4), 468–475.

Ramadhani, F., Sukiyono, K., & Suryanty, M. (2020). Forecasting of Paddy Grain and Rice's Price: An ARIMA (Autoregressive Integrated Moving Average) Model Application. *SOCA: Jurnal Sosial, Ekonomi Pertanian*, *14*(2), 224–239. https://doi.org/10.24843/soca.2020.v1 4.i02.p04

Samudera, J., Daryanto, A., & Saptono, I. T. (2017). Competitiveness of Indonesian Tea in International Market. *Indonesian Journal of Business and Entrepreneurship*, *3*(1), 14–23. https://doi.org/10.17358/ijbe.3.1.14

Sarvina, Y. (2019). Dampak Perubahan Iklim dan Strategi Adaptasi Tanaman Buah dan Sayuran di Daerah Tropis / Climate Change Impact and Adaptation Srategy for Vegetable and Fruit Crops in the Tropic Region. *Jurnal Penelitian Dan Pengembangan Pertanian*, *38*(2), 65–76. https://doi.org/10.21082/jp3.v38n2.2019.p65-76

Satryana, M. H., & Karmini, N. L. (2016). Analisis Daya Saing Ekspor Teh Indonesia ke Pasar ASEAN Periode 2004-2013. *Jurnal Ekonomi Pembangunan*, *5*(5), 598–613.

Sena, D., & Nagwani, N. K. (2015). Application of Time Series Based Prediction Model to Forecast per Capita Disposable Income. *Souvenir of the 2015 IEEE International Advance Computing Conference, IACC 2015*, *3*, 454–457. https://doi.org/10.1109/IADCC.2015.7154749

Serin, V. (2008). Revealed Comparative Advantage and Competitiveness : A Case Study for Turkey towards the EU Competitiveness of Turkish Fruit and Vegetable Sectors in EU Market. *Journal of Economic and Social Research*, *10*(2), 25–41.

Setiawan, A. E., & Sugiarti, T. (2016). Daya Saing dan Faktor Penentu Ekspor Kopi Indonesia ke Malaysia dalam Skema CEPT-AFTA. *Agriekonomika*, *5*(2), 212–220. https://doi.org/10.21107/agriekonomika.v5i2.1758

Shahbandeh, M. (2019). *Tea production and exports worldwide, 2018 | Statista*. Statista.

Tandane, H., Kaur, M., & Mahal, A. K. (2021). Export of tea from india: Performance and determinants. *Indian Journal of Economics and Development*, *17*(3). https://doi.org/10.35716/IJED/21014

Trade Map. (2022). *Indonesian Tea Export*.

Wahyuni, E. D. (2021). Strategi Memanfaatkan Peluang Pasar Produk Pertanian Dalam Perdagangan Internasional. *Jurnal Ekobistek*, *10*(1), 57–64. https://doi.org/10.35134/ekobistek.v10i1.84

Yuliawanti, F. D., Novitasari, D. C. R., Widodo, N., Hamid, A., & Utami, W. D. (2021). Penerapan Metode Autoregressive Integrated Moving Average (Arima) Untuk Prediksi Bilangan Sunspot. *BAREKENG: Jurnal Ilmu Matematika Dan Terapan*, *15*(3), 555–564. https://doi.org/10.30598/barekengvol15iss3pp555-564

Zakariyah, M. Y., Ratya, A., & Baladina, N. (2014). Analisis Daya Saing Teh Indonesia di Pasar Internasional. *AGRIMETA: Jurnal Pertanian Berbasis Keseimbangan Ekosistem*, *4*(8), 29–37.

Zuhdi, F., Lola, R., & Maulana, A. S. (2020). Daya Saing Ekspor Rempah Indonesia Ke European Union-15. *AGRIC: Jurnal Ilmu Pertanian*, *15*(21), 139–152.

Zuhdi, F., Zurriyati, Y., & Novriandeni, E. (2021). Peramalan Populasi Sapi di Provinsi Riau dan Indonesia Menggunakan Pendekatan ARIMA (Autoregressive Integrated Moving Average). *Jurnal Peternakan*, *18*(2), 87–99. https://doi.org/10.24014/jupet.v18i2.11558