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MEASUREMENT OF THE LEVEL OF COMPETITIVENESS AND DETERMINANTS OF SOUTHEAST SULAWESI COCOA TRADE

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ABSTRACT

The objective of this research is to see the development of cocoa competitiveness and its determining factors in the Southeast Sulawesi trade. The data used in the study were collected from several institutions, namely Central Statistics Agency, the Ministry of Agriculture, and the International Cocoa Organization (ICCO), in the form of time series data from 2011-2022. The research methodology applied the Revealed Comparative Advantage (RCA) for determining the development of cocoa competitiveness and Multiple Linear Regression Analysis for the determinants of cocoa trade. The results of the analysis show that Southeast Sulawesi's superior cocoa commodity has competitiveness. The RCA value can be seen from 2011 to 2018 and is still quite good. It is proven that the average RCA is above 4, although in the following year the RCA value shows a decreasing trend until 2022. Moreover, the determining factors for the competitiveness of Southeast Sulawesi's cocoa are land area, production factors, domestic prices and international prices. Only the domestic price variable partially has a notable effect on its competitiveness. This research can be made a reference for the local government to adopt any policies regarding the export of cocoa beans and processed products so that it can encourage and increase the competitiveness of Southeast Sulawesi cocoa through implementing downstreaming, improving infrastructure and national cocoa research and development.

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INTRODUCTION

Indonesia has a considerable potential to be the third-largest cocoa producer worldwide as the raw material for chocolate. This statement is in line with the

acceleration of the downstream of the cocoa industry. Based on data from its Ministry of Industry, Indonesia has the potential to obtain an annual production capacity up to 739,483 tons. In 2022, the national export value of processed cocoa products will reach US$1.12 billion (BPS, 2023). Cocoa plants are one of the mainstay export commodities of the State of Indonesia. This is evidenced by Indonesia's crowning as one of the largest cocoa exporters worldwide by an agency in the United Nations (UN), namely Food and Agriculture Organization (FAO). A superior strategic plantation commodity, namely cocoa, has a significant role in supporting Indonesian economy, as an earner of the foreign exchange, a source of income for small farmers, job opportunity, domestic agribusiness and agro-industry encouragement, environmental protection, as well as the regional development (Purbaningsih et al., 2023). This statement is also supported by the availability of the planting area in Indonesia, the workforce, and cocoa experts, while the world demand for cocoa keeps rising every year. Cocoa is a profitable plant for farmers having a notable effect in the Indonesian economy, for providing more employment, income, and a source of the foreign exchange. Besides, this important commodity encourages regional and agro-industrial development for supporting the revitalization program of cacao plants in North Kolaka Regency, Southeast Sulawesi, Indonesia (Masitah et al., 2023).

Based on 2022 cocoa production data, which can be seen in Figure 1, the main centres for cocoa production are located in the Eastern Indonesia, including Central Sulawesi, Southeast Sulawesi, and Southeast Sulawesi. Of these three provinces, Southeast Sulawesi is known as the second largest cocoa-producing region in Indonesia, with a contribution (of 16.08%), a production value at 219.18 thousand tons, and a total export value of US$503.42 million in 2022 (BPS, 2023). Production affects export activities, where if production increases, it can meet the needs of domestic cocoa, so that it can export. The export value from cocoa as the important commodity remains high, compared to 2021 during the outbreak of COVID-19 pandemic. In Southeast Sulawesi, cocoa remains the most significant source of income for many small farmers. Despite the region's favourable climate and soil conditions, productivity has been declining in recent years. This is largely due to inadequate farming practices, limited access to extension services, a lack of farmer cooperatives that could provide economies of scale and fluctuating global prices. Furthermore, pest and disease outbreaks, particularly the cocoa pod borer, have significantly affected yields. These region-specific challenges underscore the need for tailored interventions that go beyond general national policies. According to data from the Trademap, the value of 2021 Indonesian cocoa export was US$1.2 billion, 2.9% lower than previous year.

The harvested area for cocoa plants in Southeast Sulawesi in 2022 will be 104,649.07 Ha with cocoa production of 135,932 tons. North Kolaka Regency is a region with the highest cocoa production of 78,970.00 tons. Therefore, cocoa is an important commodity because of having two major effects in the local economy. First, cocoa provides more income for the exports and a source of employment opportunity for the millions of small farmers in the rural Indonesia (Arsyad et al., 2014). The problems faced in cocoa development are that product quality is still low, cocoa product development at upstream and downstream is not yet optimized, and the continuity of the cocoa supply has not been realized (Putri & Prihtanti, 2020; Rahmadona et al., 2023).

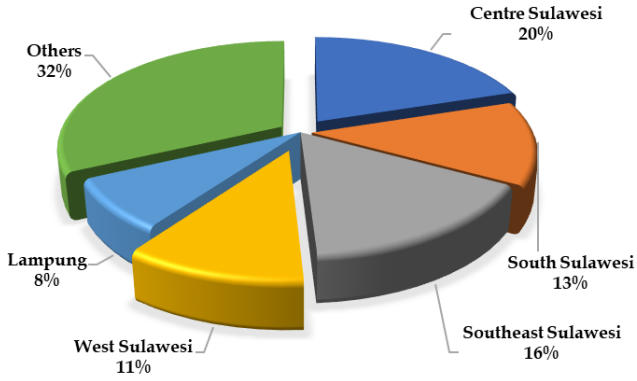


Figure 1.
Percentage Of Cocoa Production Centers In Indonesia
Source: Ministry of Agriculture, 2022.

The research shows the result that Indonesia belongs to the exporter in general for all kinds of cocoa products, in terms of beans or the processed cocoa. Furthermore, almost all cocoa products from Indonesia have a comparative advantage, while only few of them do not have any comparative advantage (Hanafi & Tinaprilla, 2017; Hapsari & Yuniasih, 2020; Saragih, 2021). For this reason, Indonesian cocoa export, in beans and the processed ones, must have the comparative and competitive advantages to compete and lead the international market. In terms of the comparative advantage, a region without this advantage can produce and export the products with the smallest comparative advantage. Meanwhile, competitive advantage can be interpreted as a broader advantage in general, including pricing, quality control, marketing strategy as well as the policy advantages. The Southeast Sulawesi's cocoa commodity has the export potential, which is expected to meet the demand in the Indonesian cocoa export market. The obstacle that hinders the cocoa production in Southeast Sulawesi is the cocoa-processing system, which is not yet well developed. However, Southeast Sulawesi has a considerable potential to develop the cocoa commodity, the processed one in particular. Thus, a study is required for improving the cocoa competitiveness in Southeast Sulawesi, in accordance with the study concerning the competitiveness, in terms of the exports of Indonesia's processed cocoa in the international market.

This research shows the result that Indonesia's processed cocoa products have certain comparative advantage in terms of cocoa beans, chocolate paste, chocolate fat and chocolate powder, without any comparative advantage in the chocolate commodity. The results of the RCA analysis proves that the Indonesian chocolate fat commodity has the highest RCA index compared to other processed cocoa products (Ginting et al., 2021). The competitiveness of Southeast Sulawesi cocoa needs to be improved by raising the volume of cocoa exports, domestic prices of cocoa, export prices of cocoa, and the export duty policies for cocoa beans. This is in accordance with a study analyzing the factors and efforts to improve the competitiveness of East Java cocoa. Factors significantly affecting the competitiveness of East Java's processed cocoa are export volume, export price and cocoa productivity at the 10% level (Harya, 2018). Cocoa agribusiness on Sulawesi Island is strongly supported by

the readiness of plantation land to provide a greater cocoa production with good factory management and cocoa seed processing, so as to produce quality cocoa beans. Southeast Sulawesi is among the province in Sulawesi having the widest area (445.91 ha) in 2030, but the Central Sulawesi Province actually occupies a position as the leading production centre in 2030 with production of 151.68 tons/ha (Tenriawaru, et al, 2022; Prihantini, et al, 2023).

Based on the aforementioned background, the current research is significant for analyzing competitiveness which can be comprehended from the comparative advantage of Southeast Sulawesi's cocoa production in the international market and the determining factors of cocoa trade. This statement is different from previous research which focuses on competitiveness, only in terms of comparative advantage. While numerous studies have examined cocoa production and trade at the national level in Indonesia, there is still a significant gap in comprehending the specific trade determinants at the provincial level. In particular, Southeast Sulawesi—despite being a key cocoa-producing region—has received limited scholarly attention. Existing literature often generalizes trends and policy implications without accounting for the local socio-economic, infrastructural, and institutional contexts that uniquely shape the trade. Furthermore, this research aims to quantitatively analyze the export competitiveness in the Southeast Sulawesi's cocoa products and determine the crucial factors of cocoa trade. Southeast Sulawesi was chosen because previous research had not analyzed the determinants of cocoa exports specifically for Southeast Sulawesi, only competitiveness within one country. The results of this research can be made the reference for local governments to adopt any policies regarding the export of cocoa beans and their processed products for developing the agriculture industry and increasing the competitiveness of cocoa in particular through the implementation of downstreaming, improving infrastructure and national cocoa research and development. As well as providing input regarding the sustainable development for competitiveness of the processed cocoa, particularly for the processed cocoa agro-industry players and farmers in the research area.

RESEARCH METHOD

This research was intended to comprehend the competitiveness level of Southeast Sulawesi's cocoa product in the international market, while the type of research was quantitative research. Furthermore, the data for the research was time series data from 2011-2022. Data were collected from several agencies, namely the Central Statistics Agency (BPS), UN Comtrade, World Bank, Trademap, Directorate General of Plantations, Agricultural Data and Information Center (PUSDATIN), Southeast Sulawesi Plantation and Livestock Service and Food and Agriculture Organization, International Cocoa Organization. This research applied the Comparative Advantage Analysis or Revealed Comparative Advantage for determining the competitiveness.

To analyze the competitiveness level in cocoa commodities to be made one of the Indonesia's leading export products, several formulas were applied to provide some insight. Among other things, to find out the Export Share of Indonesian cocoa product, formula below is used (Tambunan, 2001):

$$\text{Share Ij} = \frac{Lesson}{xiw} \quad \text{.....(1.1)}$$

Description: Lesson = export value of commodity i to country j; Xtj = total export value of country j; xiw = export value of commodity i for the whole world; Xtw = total value of world exports.

For determining the magnitude of the contribution of Indonesian cocoa to international trade (exports), the following formula is used:

$$\text{Pi} = \frac{Xi}{Xt} \times 100\% \quad \text{.....(1.2)}$$

Description: Xi = export value of commodity I; Xt = total export value.

For assessing the comparative advantage of the Indonesia's cocoa products, the Revealed Comparative Advantage (RCA) formula was applied. The RCA method was utilized to comprehend the comparative advantage from a commodity in a country by comparing the ratio of commodity exports with that of worldwide exports in a country. Revealed Comparative Advantage (RCA) is traditionally applied at the national level to assess a country's relative advantage in exporting specific goods. However, in a regional context—such as at the provincial level in Indonesia—RCA can be adapted to measure a region's export strength relative to other regions within the same country. When applied to Southeast Sulawesi, RCA helps to identify whether the province is relatively specialized or competitive in cocoa exports compared to other Indonesian provinces. When the RCA value is > 1, a country has certain comparative advantage beyond the worldwide average and the commodity itself has a considerable competitiveness. For the RCA value < 1, it means that certain country has the comparative advantage which is still below the worldwide average, so that a commodity has weak competitiveness.

This regional RCA was calculated by comparing the share of cocoa exports in Southeast Sulawesi's total exports to that of cocoa in national exports. An RCA value higher than 1 indicates that cocoa is a relatively stronger export sector for Southeast Sulawesi, suggesting a comparative advantage. This interpretation allows local governments and stakeholders to better understand their regional strengths in trade and to design more targeted development policies. RCA analysis has become a tool that is often applied for identifying the changes in comparative advantage in various sectors, especially the agricultural sector, in this case the cocoa commodity which is an export product. The concept used in RCA analysis in the agricultural sector is the ratio or comparison between the market share of a commodity from a country in a market, whether global or international, with the share of other countries' exports of total exports in the world. Cocoa commodity data includes data on exports, production, cocoa prices both domestically and internationally, which is secondary data obtained from BPS, UN Comtrade, Trademap and similar institutions through websites and direct interviews with relevant stakeholders to ensure data security. Mathematically, RCA is formulated as follows (Tambunan, 2001):

$$RCA = \frac{\frac{lesson}{Xj}}{\frac{xiw}{Xw}} \quad \text{.....(1.3)}$$

Note: RCA = Revealed Comparative Advantage; Lesson = Country j's cocoa commodity export value (US$); Xj = Total export value of country j (US$); xiw = World export value of cocoa commodities (US$); Xw = World total export value (US$).

To determine the determinants of cocoa trade using the multiple linear regression equation models determined in this research is as follows:

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \text{.....(1.4)}$$

Note: Yt = Competitiveness (RCA); A = Constant coefficient; b1, b2, b3, b4 = Estimated Parameters; X1 = Southeast Sulawesi cocoa production (Tons); X2 = Cocoa land area of Southeast Sulawesi (Ha); X3 = Domestic cocoa price (Rp/ton); X4 = World cocoa price (US$/Ton).

Next, an evaluation is carried out on this model. The tests carried out for the model are (a) model reliability test, (b) F-stat test, (c) t-stat test, (d) multicollinearity test, (e) heteroscedasticity test, and (f) normality test. The decisions taken are based on the hypotheses that have been formulated.

(a) Model Reliability Test
This test aims to evaluate the model. This test is carried out by looking at the coefficient of determination (R2) value of the model. The R2 value can explain the extent to which the diversity of dependent variables can be explained by the independent variables (Prihantini, 2024). R2 value (closer to 1) means a greater diversity in the dependent variables.

(b) F Statistic Test
The F-statistic test was applied for analyzing the model. The test aims to see whether all independent variables can explain the dependent variables.

(c) Statistical Test t
The statistical test t was used to conclude whether or not every independent variable has an effect on its dependent variable at the α level.

(d) Multicollinearity Test
This test is used to see whether there is a perfect linear significance between each independent variables in this model. Multiple regression models with many independent variables often experience strong correlations between independent variables. This problem can be seen by looking directly at the output of the program used, namely if the Varian Inflation Factor (VIF) value <10 there is no multicollinearity problem.

(e) Heteroscedasticity Test
The main objective of this test was to conclude whether or not there is inequality of residual variance in the regression model. The model that has been prepared needs to be tested because a good regression model is a model that has equality of residual variance (homoscedasticity). To see whether the resulting model experiences heteroscedasticity or not, it can be seen directly through this program output, namely through the Ghozali (2006) plot graph.

RESULT AND DISCUSSION

Development of Land Area and Cocoa Production in Southeast Sulawesi

Sulawesi belongs to the main cocoa producer in Indonesia, in which its largest cocoa producers are in Central Sulawesi, Southeast Sulawesi, and Southeast Sulawesi. Furthermore, Southeast Sulawesi is the second largest area for cocoa plantations. The cocoa plantations in Southeast Sulawesi in the last 10 years have been significantly in the range of 200 thousand Ha. In 2022, the area of cocoa plantations will decrease from 236.200 Ha to 244.700 Ha in 2021 as a result of the transfer of agricultural commodity functions. As a result, Southeast Sulawesi's cocoa production also decreased, from 114.800 Tons in 2021, to 106.700 Tons in 2021. Comparison between land area and cocoa production, namely cocoa productivity according to Figure 2 shows that in the last 5 years cocoa production was less than optimal, where in 2014 cocoa production reached 213.691 tons, but in the following year the productivity of cocoa decreased significantly. Several things, including pest attacks on cocoa plants, cause this. Apart from that, several things cause cocoa productivity to decline, including lack of plant maintenance, pest and disease attacks, excessive use of pesticides, and inappropriate harvesting techniques, as well as similar ecological arrangements (Adejuwon et al., 2023; Oyenpemi et al., 2023). The following is a graph of cocoa production and land area for Southeast Sulawesi 2011-2022 which can be seen in Figure 2.

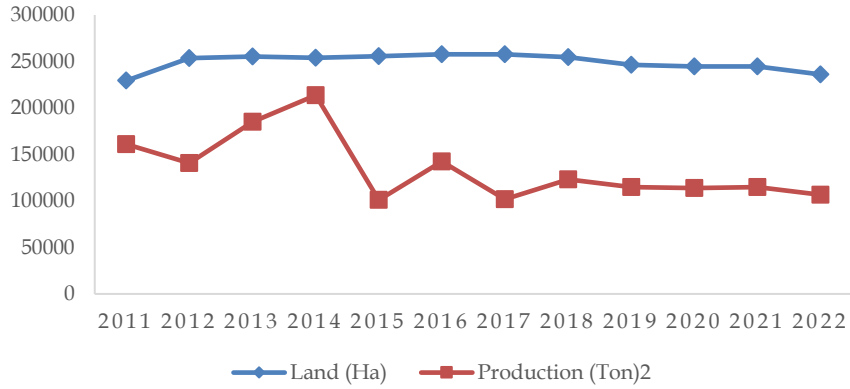


Figure 2.
Production & Area of Cocoa Land in Southeast Sulawesi, 2011-2022

Figure 2. shows that the cocoa plantation area in Southeast Sulawesi has a tendency to decline over the last 12 years as a result of which cocoa production has a tendency to decline, the highest cocoa production since the previous 12 years was in 2014, namely 213.641 tons, while the worst cocoa production in 2015 reached 101.030 tons. However, Southeast Sulawesi's cocoa production has never been the figure below 100 tonnes. The production graph shows a trend that tends to decrease every year for the last 8 years until 2022. Meanwhile, the trend in the development of cocoa land area in Southeast Sulawesi also shows fluctuations, although it tends to decrease, the land area trend is still quite stable at around 250 thousand hectares. As

experienced by production, the development of the cocoa land area in Southeast Sulawesi also shows a trend that tends to decrease every year.

Development of Cocoa Export Value in Southeast Sulawesi

The value of Southeast Sulawesi's cocoa exports in the 2011-2022 period, as shown in Figure 3, proves the fluctuations in the changing trend of Southeast Sulawesi's cocoa export value. The highest value of cocoa exports from the Southeast Sulawesi Province was in 2018, namely US$23,975 million, while the lowest export value was in 2020, namely US$10,812 million. However, during the last 4-year period, namely 2018-2022, it shows a trend that tends to continue to decline every year. This is due to a decrease in production quantities, accompanied by a decline in the quality and price of cocoa. Apart from that, research related to the causes of the decline in export value, namely domestic cocoa prices, land area, domestic Gross Domestic Product (GDP), and cocoa production (Assoua et al., 2022; Irawan, 2019). The significant decline in Southeast Sulawesi's RCA for cocoa in 2020 is broadly attributed to a disruption as a serious consequence of the COVID-19 pandemic. However, a closer examination reveals that the drop was not solely due to domestic production issues, but also due to shifts in global and national trade dynamics. International demand for cocoa slowed as key importers, particularly in Europe and the United States, faced lockdowns, reduced consumer spending, and disrupted supply chains. In addition, logistical constraints such as port closures, container shortages, and increased freight costs hindered the movement of goods from rural production centres to international markets. At the national level, some Indonesian provinces were able to maintain or reroute their exports through more resilient trade networks or diversified product portfolios, which Southeast Sulawesi lacked. The province's heavy reliance on raw cocoa exports, without significant value-added processing or alternative market destinations, made it more vulnerable to global demand shocks. As a result, its share in national cocoa exports decreased, directly impacting its RCA.

To better understand the relative strength of Southeast Sulawesi's cocoa trade, it is useful to compare its RCA with other major cocoa-producing provinces in Indonesia, such as West Sulawesi, South Sulawesi, and Central Sulawesi. Prior to the pandemic, Southeast Sulawesi consistently recorded an RCA above 1.5, signalling a strong comparative advantage. However, provinces like West Sulawesi often recorded higher RCA values—sometimes exceeding 2.0—due to larger production volumes and more integrated value chains. Post-2020, the drop in Southeast Sulawesi's RCA contrasted sharply with more stable figures in provinces that had greater access to processing facilities or diversified export destinations. The government is expected to increase cocoa productivity by providing support facilities to cocoa farmers in Indonesia so that the value of cocoa exports can be increased.

This trend highlights a missed opportunity for policy intervention. For instance, a strong RCA should trigger investment in infrastructure, value-added processing, market diversification, and farmer capacity building to maintain and deepen the region's comparative advantage. Conversely, a declining RCA should prompt policymakers to examine weaknesses in the supply chain, trade logistics, and market access. The lack of alignment between RCA trends and actual policy responses in Southeast Sulawesi suggests a disconnect between trade performance

indicators and strategic planning, emphasizing the need to integrate RCA analysis more directly into regional economic policy frameworks. The development of Southeast Sulawesi's cocoa export value is detailed in Figure 3.

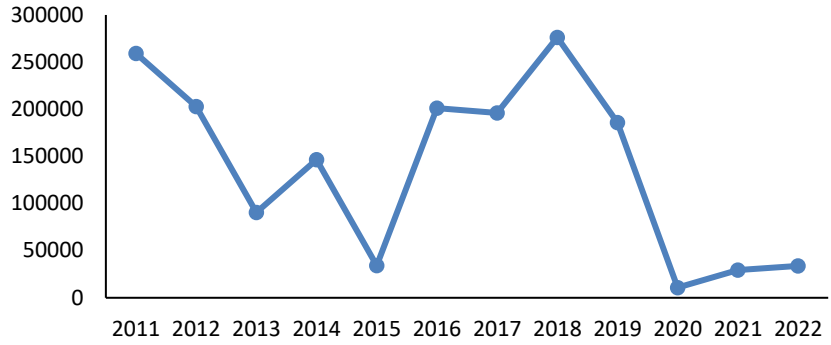


Figure 3.
Southeast Sulawesi Cocoa Export Value (Millions of US$), 2011-2022

Development of Domestic Cocoa Prices

The average price for Indonesia's cocoa product (which is still dry bean) at the producer or farmer level in the 2011-2022 period fluctuates, but the price tends to get higher. In 2011, the price for this cocoa commodity was IDR. 19,259/kg and the price increased to IDR. 23,067/kg in 2014. The highest cocoa price was in 2020 when the price reached IDR. 30,000/kg but domestic cocoa prices will decrease in 2021 by IDR.25817/kg. Domestic cocoa prices are influenced by several factors including international cocoa price, foreign exchange rate, domestic cocoa production, and world cocoa consumption (Nurchaini et al., 2020; Nursalam et al., 2021; Arsal et al., 2022; Masitah & Hasbiadi, 2022; Putri & Prihtanti, 2020). Additionally, cocoa trade is a highly concentrated market and to succeed the vision of sustainable trade, the gaps in the scope of commitments must be closed by expanding any efforts to small traders and indirect suppliers to address the risk of undermining the capability of these pricing mechanisms to solve farmer's poverty (Parra-Paitan et al., 2023). The change of cocoa price at the producer level in Indonesia is presented in Figure 4.

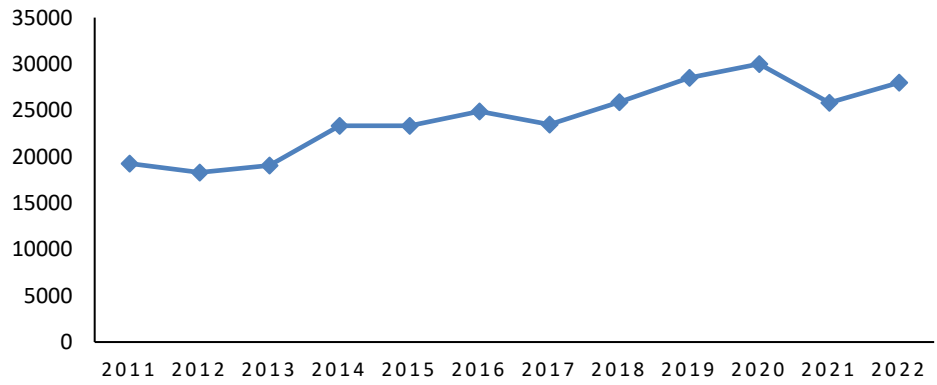
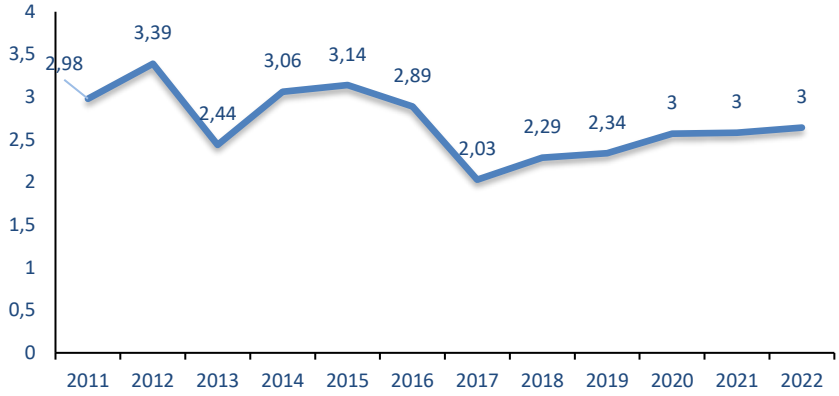


Figure 4.
Cocoa Price Development (IDR/kg), 2011-2022

Development of International Cocoa Prices

Based on World Bank data, developments in world cocoa prices during the 2011-2022 period fluctuated. In 2012, the price of cocoa product in the international market was recorded at 3.39 US$/kg then fell to 2.44 US$/kg in 2013, and then in the following years tended to fluctuate. The highest price ever occurred in 2012 which reached 3.39 US$/kg and the lowest price occurred in 2017 at 2.03 US$/kg. Global policies that influence cocoa supply and demand involve the realization of export duties for exported cocoa beans, quarantine certificate requirements, and sanitary and phytosanitary certificates so that the international price of cocoa will affect cocoa exports (Wajuba et al., 2023). Policymakers need to prioritize building institutional expertise to track, monitor, and block the resulting sources of tax base erosion for the sake of the economic sustainability of cocoa plantations (Ahene-Codjoe et al., 2022; Tennhardt et al., 2022). The development of international cocoa prices is presented in Figure 5.

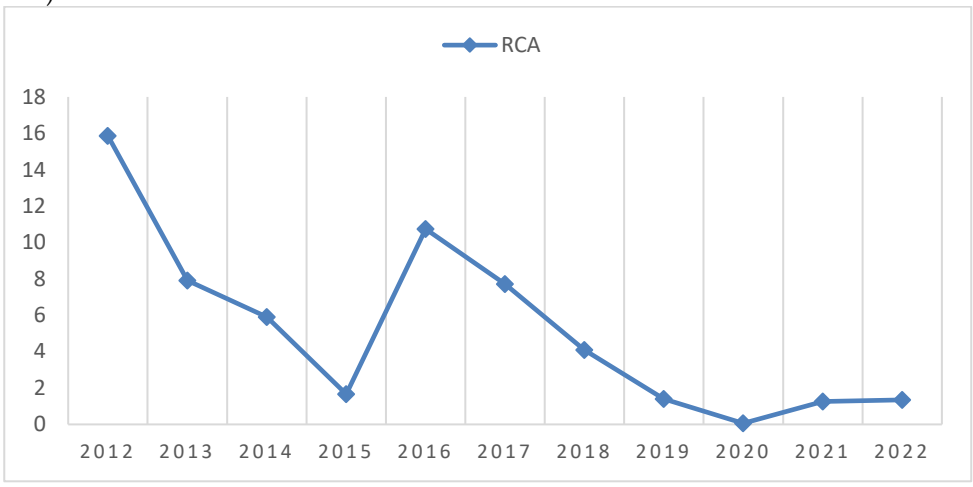


International Cocoa Prices (World) (US$/kg) 2011-2022

Analysis of the Competitiveness of Cocoa Commodities in Southeast Sulawesi

Competitiveness is among the criteria for determining the success of a country or region in the international trade. A competitiveness indicator for a commodity is the market share. Cocoa trading consists of two markets, each known as the physical market and the futures market (Ndubuto et al., 2010). The market share of certain commodity increases, along with the competitiveness level of that commodity itself. Therefore, this research analyzes the competitiveness of cocoa from Southeast Sulawesi, which is generally carried out using a market share and growth approaches based on the export value. The competitive advantage of Indonesia's cocoa product is an important agenda in Indonesia facing global competition. The results show a transition in the global cocoa management with three notable characteristics, namely diversification, flexibilization, and coordination (Iyoboyi, n.d.; Lee & Park, 2023) (Iyoboyi, n.d.). Efforts to sustain the cocoa trade require cooperation from key trade actors in adopting sustainability commitments (Parra-Paitan et al., 2023).

The competitiveness level of cocoa commodities is detailed in the Revealed Comparative Advantage value analysis. Comparative advantage is the concept that a region or place without any advantage can produce or export with the smallest comparative advantage (Abukari, 2023; Juchniewicz, 2014; Utama & Setiawina, 2023). The comparative advantage in Southeast Sulawesi cocoa was measured with the aid of RCA. If the RCA value is > 1, it indicates that Southeast Sulawesi cocoa has a comparative advantage above the worldwide average or highly competitive. For the RCA value <1, Southeast Sulawesi's shows a comparative advantage below the worldwide average or is slightly competitive (Masitah & Hasbiadi, 2022; Perwira, 2023).



Graph 6.
Development of Southeast Sulawesi Cocoa RCA Value, 2011-2022.

The change of the RCA value in terms of cocoa commodities in Southeast Sulawesi, based on its export value during the 2011-2022 period, is detailed in the graphs and tables, in Graph 6 and Table 1.

Table 1. RCA Calculation Results for Southeast Sulawesi Cocoa, 2011-2022

Year	RCA	Indicator
2011	20.58	Strong
2012	15.86	Strong
2013	07.91	Strong
2014	05.89	Strong
2015	01.65	Strong
2016	10.73	Strong
2017	07.71	Strong
2018	04.08	Strong
2019	01.39	Strong
2020	00.05	Weak
2021	01.26	Strong
2022	01.34	Strong
Rate-rate	6.530	Strong

Table 1 explains results of the estimated RCA value for Southeast Sulawesi cocoa/chocolate commodities, namely the average RCA value from 2018 to 2022 is 1.62. This proves that cocoa/chocolate is a commodity having a strong competitiveness or a comparative advantage as shown in the average RCA value > 1. Furthermore, the highest RCA value for cocoa/chocolate commodities during the last 12 year period from 2011-2022 was 20.58 in 2011. Meanwhile, the lowest RCA value for cocoa/chocolate reached a value of 0.05, as a serious consequence of the COVID-19 pandemic. For improving the competitiveness of cocoa farming in Indonesia, the islands with 80% of total contribution to the cocoa bean production in Indonesia, namely Sulawesi and Sumatra, require special policies, in terms of output and input price policies, productivity, and increasing other cocoa commodities. System Agriculture (Fahmid et al., 2018). When the RCA index is examined, it turns out that its value is very high since cocoa is one of the most significant export products (Merleau et al., 2023). Almost all Indonesia's cocoa products have the comparative advantage, while only its cocoa powder does not have any comparative advantage (Hanafi & Tinaprilla, 2017; Irawan, 2019). In addition, the cocoa industry has a significant influence on cocoa's competitive advantage (Hatani et al., 2016). Future interventions demands approaches targeting the underrepresented sustainability issues and allowing the synergistic effects among environmental, social, and economic sustainability for cocoa farms (Akande et al., 2023; Tennhardt et al., 2022; Prihantini, et al., 2024).

The development of cocoa agribusiness needs to be encouraged for accelerating the deepening of the industrial structure, both upstream and downstream. Deepening the structure of the cocoa industry is also intended to strengthen competitiveness. The positive results of the RCA analysis indicate that Indonesia has certain comparative advantage in exporting cocoa butter to the European Union region (Izaati & Annas, 2022). If it only relies on primary commodities (dry cocoa beans), Southeast Sulawesi will tend to act as a price taker in the world cocoa market or a supplier of raw materials for downstream industries in other countries. Government needs to optimize the potency and competitiveness of its cocoa to make the cocoa exports the driving of national economy (Fahmid et al., 2022).

The role of government is required in improving productivity and quality of the agricultural products in a country, and the competitiveness of exports to compete in the international market (Nutjaree et al., 2017). Apart from that, strengthening industry will give birth to many industries that will absorb workers so that they can help the country's economy. The cocoa problems currently being experienced can become a momentum that further encourages planning in the cocoa sector in the future needs to be more open, mature and integrated, including plans for the development of road infrastructure, warehousing, ports and industries that support cocoa in the area. Stakeholders in cocoa should prepare sustainable cocoa handling patterns or systems so that production and productivity do not continue to decline.

Analysis of Determinants of Southeast Sulawesi Cocoa Trade

Increasing competitiveness, which is an absolute requirement for the success of increasing exports, needs to be carried out not only in export business activities, but in every link and the entire chain of business activities from the production of

goods, to the time the goods are delivered to consumers abroad. Thus, increasing competitiveness is certainly influenced by several determining factors. Based on the results of a literature study by the researchers, four predictor variables were found that could influence the competitive performance of cocoa commodities, namely land area, production quantity, domestic and international cocoa prices.

Table 2. Estimation Results of the Model for Determining Factors of Cocoa Competitiveness in Southeast Sulawesi

Variable	Coefficient	Standard Error	T-Statistic	Sig.
(Constant)	85.39400000	43.965	1.942	0.093
Land (X_1)	0.000100000	0.0000	-1.303	0.234
Production (X_2)	0.000003270	0.0000	0.750	0.942
Domestic Price (X_3)	-0.001000000	0.0000	-3.165	0.016
International Prices(X_4)	0.587000000	3.7310	0.157	0.879
R^2 = 0.715				
F-Count = 4.401				
Sig. = 0.043				

We have previously demonstrated that the model we developed is our best and has successfully passed the tests outlined in the research methods section. Moving forward, we will address the aspects of the model that yielded less satisfactory results. The R-squared value of the factor model affecting the competitiveness of Southeast Sulawesi's cocoa was 0.715. This shows that the diverse factors affecting the competitiveness of Southeast Sulawesi's cocoa can be explained cumulatively by 71.5% by the variables of land area, production, domestic and international prices. Meanwhile, the rest 28.5% percent is detailed by other factors excluded in the model. The estimated model is described as follows.

$$Y_t = 85.394 + 0.0001X_{1t} + 0.00000327X_{2t} + 0.001X_{3t} + 0.587X_{4t} \quad \text{.....(1.5)}$$

Land area has a positive but non-significant effect on the competitiveness level of Southeast Sulawesi's cocoa, as viewed from the sig value. This variable is higher than the real alpha level of 5 percent (0.234 > 0.05). Besides, the coefficient value from the land area variable was 0.001. Based on the result, the increase in the land area by 1 percent is followed by the increase of the competitiveness of Southeast Sulawesi's cocoa by 0.001 percent, ceteris paribus.

The addition of land is very dependent on the incentives received from each agricultural business activity resulting from the level of productivity of the agricultural business. In the cocoa farming business in Southeast Sulawesi, farming productivity was decreasing, where cocoa productivity only reached 400 kg/ha, lower than the potential level of 1,500 kg/ha (ICCO, 2012; 2016). In response to this, the government intervened by disbursing 350-million US dollars for the Gernas Pro Kakao revitalization program. The intensification program is considered effective because the reduction in production effectiveness is caused by cocoa diseases and pests. Land expansion is not the main option because it will only exacerbate the outbreak of diseases and pests. The government's push for intensification has encouraged a slow increase in land area (Prishchepov et al., 2013; Budiman et al., 2020; Prihantini et al., 2024). Even though cocoa production increases along with the increase in land area,

the constraints of pests, diseases and government intensification programs mean that the increase in land area does not significantly increase cocoa productivity, so that technically it will reduce the rate of increase in cocoa competitiveness.

Production does not have any significance towards the competitiveness level of Southeast Sulawesi's cocoa, as viewed from the sig value. This variable is higher than the real alpha level of 5 percent (0.942> 0.05). Furthermore, the coefficient value of the production variable is 0.000003270. These data show that an increase in the amount of production by 1 percent also means the increase in the competitiveness level of Southeast Sulawesi's cocoa by 9.42 percent ceteris paribus.

The availability of domestic cocoa production is the basis for meeting domestic and foreign needs, thus supporting increased cocoa competitiveness. The high disparity in domestic and foreign prices results in low cocoa prices. One of the factors that determines the competitiveness of cocoa is low cocoa prices (Juliatmaja, 2017; Hapsari & Yuniasih, 2020). Apart from production, cocoa quality also determines the competitiveness of Indonesian cocoa. Factor Lack of knowledge, proper post-harvest techniques, and a lack of modern processing facilities mean that a lot of cocoa is processed traditionally, resulting in low cocoa quality (Ariningsih, 2021). In the long run, the low quality of cocoa means that cocoa's competitiveness level does not develop evenly along with high production.

Domestic prices have a significance towards the competitiveness level of Southeast Sulawesi's cocoa, as viewed from the sig. This variable is greater than the real alpha level of 5 percent (0.016 > 0.05). Besides, the coefficient value of the domestic price variable is -0.001. As shown in the result, when the domestic prices increase by IDR 1/ton ceteris paribus, it can lower the competitiveness level of Southeast Sulawesi's cocoa by 0.01 percent, Cateris Paribus. These results are not in accordance with a hypothesis, in which an increase in the domestic cocoa prices will have certain positive effect towards the competitiveness level of Southeast Sulawesi's cocoa. However, the results obtained in this research are also in line with the results of research (Raswatie, 2014) which implies that inflation is the dominant factor influencing agricultural exports. The increase in inflation, which reflects an increase, reduces the export value because the price of agricultural products becomes more expensive and reduces the competitiveness level of agricultural products in the international market. Higher prices attract investors to reduce export volumes because they prefer the domestic market. The main policy that the government can impose in preserving the cocoa land area is to guarantee the price stability for the cocoa commodity itself. Most of cocoa farmers have always faced price uncertainty, while cocoa's value chain and sustainability in Southeast Sulawesi Province need to be clarified (Rifin et al., 2019; Prihantini, et al., 2024b,c,d). These conditions point to broader inefficiencies in the value chain. Weak farmer organizations, insufficient government support for downstream processing, and a lack of integration into international buyer networks all contribute to an export system overly dependent on price. Addressing these inefficiencies will require coordinated policy efforts that go beyond pricing mechanisms, including capacity building, investment in post-harvest infrastructure, and strengthening of institutional frameworks to support export competitiveness.

International prices tend to have a positive but non-significant effect on the competitiveness level of Southeast Sulawesi's cocoa, as viewed from sig. This variable

is greater than the real alpha level of 5 percent (0.879 > 0.05). Furthermore, the coefficient value of the domestic price variable is 3,731. Based on the results, an increase in the international cocoa's prices by 1 percent is capable of improving the competitiveness level of Southeast Sulawesi cocoa by 3.73 percent ceteris paribus. It has a positive effect towards the competitiveness level of Southeast Sulawesi's cocoa, and is in line with the law of supply, in which prices and products are related positively. In other words, when the price of certain product increases, the goods offered by producers also increase, and vice versa. On the contrary, when the price of certain product decreases, the supply increases. Producers will increase their production for obtaining more profits. Thus, the increase in the international price of cocoa leads to the increase of Indonesia's cocoa exports and the competitiveness of Indonesia's cocoa.

CONCLUSION

The results of competitiveness analysis with the aid of the RCA method carried out towards the cocoa commodities in Southeast Sulawesi from 2011 to 2022 show a fluctuating RCA value with an average value of 6.53. With a value higher than 1, it can be said that the Southeast Sulawesi's cocoa commodity has a strong competitiveness or a comparative advantage. However, from 2018 to 2022, the RCA trend shows a significant decline every year. The decrease in RCA was caused by a decrease in demand by export destination countries, resulting in a decrease in the value of cocoa exports. The results of multiple linear regression analysis show that the land area variable has a positive effect, without any significant effect towards the sig value. For variable at 0.234, the production variable has no significant effect towards the sig value. For variable at 0.942, the domestic price variable has no significant effect towards the sig value. For variable at 0.016, and the international price variable has a positive but non-significant effect on the sig value. Variable at 0.879 simultaneously affects the competitiveness of Southeast Sulawesi's cocoa. Based on a comprehensive analysis and supported by several previous studies, it can be stated that three out of the four variables analyzed in the study did not significantly influence the factors affecting the competitiveness of cocoa. Only one variable, namely the domestic cocoa price, was found to have a significant impact. This indicates that one key policy the government can implement to maintain cocoa competitiveness is ensuring stable domestic cocoa prices. Another challenge highlighted the phenomenon of cocoa land being converted to other plantation commodities, driven by the uncertainty of domestic cocoa prices. This issue affects the sustainability of cocoa production in Southeast Sulawesi, which in turn impacts its competitiveness. Therefore, it is crucial for the government to take serious measures to stabilize domestic cocoa prices.

Based on the findings in this study, it is recommended to increase the competitiveness of Indonesia's cocoa as the most crucial factor affecting the export of the commodity. Efforts that can be made include the increase of productivity in cocoa production, the improvement of cocoa bean quality, in terms of post-harvest management, and the need for government support and role in socializing the cultivation technology towards the cocoa farmers. Thus, these measures are expected to improve the competitiveness level of Indonesia's cocoa exports in the international market. Besides, the research team further suggests introducing the use of android devices among cocoa farmers to assist them in responding to fluctuations in cocoa

prices at both national and international levels. Embracing digitalization is a strategic step that relevant stakeholders should take to ensure cocoa farmers as well as other participants in the cocoa value chain can adapt more effectively to price changes in local, national, and global markets.

AUTHOR CONTRIBUTION STATEMENT

[Author 1]: Conceptualization, research designed, data collection, Formal analysis, Writing – original draft; [Author 2]: Formal analysis, Methodology; [Author 3]: Writing – review & editing; [Author 4]: Formal analysis, Writing - review & editing; [Author 5]: Supervision, Writing - review & editing; [Author 6]: Visualization, Writing–original draft; [Author 7]: Data curation, Funding acquisition.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no conflict of interest.

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ETHIC STATEMENT

Ethical review and approval were waived for this study as it did not involve any intervention and posed minimal risk to participants. Nevertheless, informed consent was obtained from all respondents prior to participation, and all data were anonymized and kept confidential

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