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Effects of the COVID-19 Pandemic on Indonesian Cocoa Exports to the United States, the Netherlands and India

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Abstract Indonesia is the sixth-largest cocoa bean exporter globally, following Ivory Coast, Ghana, Ecuador, Cameroon, and Nigeria. The prospects for Indonesian cocoa production look promising, but the COVID-19 pandemic in 2020 harmed the country's cocoa trade. This study used a statistical method called seemingly unrelated regression analysis to investigate how the pandemic affected Indonesian cocoa exports and the demand for cocoa in the United States, India, and the Netherlands between January 2014 and February 2021. The findings revealed that the COVID-19 pandemic did influence Indonesian cocoa exports rate to the United States and India. Still, it had no significant impact on exports to the Netherlands. Surprisingly, cocoa demand from these three countries remained steady despite the pandemic. This research provides valuable insights into how the pandemic affected agricultural exports, especially in the cocoa industry. Governments should consider launching extensive educational programs to support cocoa farmers to enhance their knowledge of cocoa cultivation techniques and provide them with appropriate agricultural technologies. Additionally, improvements in the quality and quantity of cocoa seeds and processed cocoa can be achieved through the implementation of good corporate governance practices in the downstream sector.

Keywords Cocoa, COVID-19, Export, Seemingly Unrelated Regression

1. Introduction

Cocoa is a profitable annual crop. World cocoa demand has increased by 3% per year in the last hundred years based on estimates from The World Cocoa Foundation. The most famous processed cocoa bean is chocolate, which still has a strong market and is consumed by all ages. Chocolate contains good nutritional values such as high fat and protein content [1]. Chocolate is also indispensable as a flavor enhancer in beverages or food products such as milk, candy, cakes and biscuits. Cocoa powder is not only processed into food or drinks, but is also necessary in cosmetic or skincare products. The antioxidant and anti-inflammatory contents in chocolate or cocoa contribute to endogenous photoprotection which is crucial for maintaining healthy skin [2, 3]. Chocolate has compounds that help inhibit the work of the SARS-Cov-2 infection which attacks the human immune system [4].

Indonesia is the biggest cocoa bean exporter in Asia and ranks as the sixth-largest exporter worldwide. The difference of fat composition puts Indonesian cocoa beans apart from African cocoa. They boast a low level of free fatty acid and a high level of melting point, qualities that make Indonesian cocoa highly sought after by the cosmetic and pharmaceutical industries [5].

However, Indonesian cocoa production declined in 2016-2019 due to land conversion in cocoa plantations. The volume and number of Indonesian cocoa exports fluctuate yearly. Indonesian cocoa must be continuously developed in the future due to its remarkable potential. However, the 2020 COVID-19 pandemic was suspected to impact Indonesian cocoa trade. The spread of COVID-19 is feared to affect world food security which could lead to a global food crisis. This crisis may be attributed to restrictions on trade flows among while working in the field [6]. The COVID-19 pandemic impacted various sectors of life, particularly the economy, countries and the vulnerability of farmers to COVID-19. The European commission provides a 9.7% estimate of decline in global trade and the World Trade Organization estimates a possible decline in trade between 13%-32% in 2020 [7]. On another note, the World Bank predicts that there will be a decrease in the worldwide export supply, ranging from 6% to 20%, and an uptick in average global prices by approximately 2% to 6% during the initial quarter following the COVID-19 pandemic [8].

Several prior research studies focused on the cocoa trade in Indonesia have explored various factors, including domestic cocoa production, international cocoa prices, exchange rates, gross domestic product, and cocoa export taxes [9-11]. Meanwhile, the study on cocoa trade in COVID-19 pandemic is still partially complete, such as the decline in cocoa farmer productivity in South Sulawesi (Indonesia) at the time of the COVID-19 pandemic [12] and the investigation of the competitiveness dynamics of cocoa commodities in Indonesia and Ivory Coast before and during the COVID-19 pandemic [13].

The impact of the COVID-19 pandemic has also led to a downturn in the Indonesian economy [14, 15]. Interestingly, a study by [16] discovered that the pandemic didn't substantially impact the overall value of Indonesia's agricultural exports. Among these exports, cocoa is a prominent commodity. The global demand for cocoa bean products is rising due to economic growth and population growth worldwide [17]. However, cocoa bean production in Indonesia experienced a decline during the years 2016-2019 [18].

In response to the pandemic, cocoa farmers in South Sulawesi, Indonesia, tended to reduce their farming activities, resulting in decreased productivity. A few things that contribute to the decline in productivity levels involve the lack of information obtained by farmers in dealing with barriers and pests that attack cocoa crops. Learning media required by cocoa farmers are direct and indirect learning. Direct learning media from government and non-private workers are still the most effective learning media for cocoa. Moreover, the impact of the COVID-19 pandemic on farmers in South Sulawesi was examined [12].

In another research effort [13], researchers analyzed the competitive dynamics of cocoa commodities in Indonesia and the Ivory Coast before and during the COVID-19 pandemic. This study highlights the shifts in competition for cocoa commodities in Indonesia and the Ivory Coast due to the pandemic. Consequently, the chocolate industry network should prioritize good governance practices to promote sustainable agricultural resources. It includes implementing fair labor policies and green supply chain incentives.

The study focuses on three destination countries: the United States, India, and the Netherlands. The United States plays a significant role in global cocoa trade, while the Netherlands is the world's largest cocoa importer. In 2021, India emerged as the second-largest recipient of Indonesian cocoa exports in value. These three countries consistently ranked among the top five destinations for Indonesian cocoa exports from 2018 to 2020.

The present research delved into how the COVID-19 pandemic affected Indonesian cocoa exports to the United States, India, and the Netherlands. This study examined the impact of the pandemic on the value of Indonesian cocoa exports and the demand for cocoa in these destination countries using a statistical method known as seemingly unrelated regression (SUR).

2. Materials and Methods

2.1. Materials

The data used cover the period 2014m1-2021m2, sourced from [17,19] World Bank, and UN Comtrade. This study applied the SUR design to estimate the impact of different factors in the terms of Indonesian cocoa export and demand rate to the United States, India, and the Netherlands. The factors were selected based on previous research. The dependent variable was the value of Indonesian cocoa exports to the three countries (with HS code 18). The independent variables were world cocoa prices, destination country economic growth, inflation, and the COVID-19 outbreak. The detailed information about the variables is in the Table 1.

Table 1. The Result of Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max
World cocoa price (PR_{ti})	2,585	433.11	1,917.68	3,360.84
Rupiah Exchange Rate (ER_{st})	13,577.04	934.68	11,420	16,367
Value of Indonesian Cocoa Export to The United States (AQ_{sti})	22,900,000	6,671,921	7,177,986	38,200,000
The United States Cocoa Demand (AY_{ti})	100,250,761	57,755,421	15,105,102	266,908,663
The United States economic growth (AG_{ti})	- 0.0174	0.734	- 4.7576	1.9262
The United States inflation rate (AI_{ti})	0.136	-0.8	0.5	0.219
Value of Indonesian Cocoa Export to India (IQ_{sti})	5,441,642	3,180,902	281,839	17,400,000
India's Cocoa Demand (IY_{ti})	22,031,948	15,903,898	11,152,813	161,907,719
India's economic growth (IG_{ti})	- 0.022	1.71708	- 11.94401	4.33887
India's inflation rate (II_{ti})	0,366	0,601	-1,01	2,14
Value of Indonesian Cocoa Export to Netherlands (BQ_{sti})	6,213,142	4,188,314	96,711.6	16,700,000
Netherlands Cocoa Demand (BY_{ti})	190,006,363	45,593,441	86,370,164	339,228,801
Netherlands economic growth (BG_{ti})	- 0.0676	0.8389	- 5.75535	2.17034
Netherlands inflation rate (BI_{ti})	0.140	0.481	-0.9	1.1

The world cocoa price has the highest and lowest score of 3,360.84 USD and 1,917.68 USD per ton, while the average was 2,585 USD per ton. The rupiah exchange rate has maximum and minimum values of 16,367 and 11,420 rupiah per USD, respectively, with an average value of 13,577.04 rupiah per USD.

The level of Indonesian cocoa export to the United States had a maximum and minimum values of 38,200,000 and 7,177,986 USD, respectively. The average value of Indonesian cocoa exported to the United States is 22,900,000 USD. The highest and lowest values of The United States cocoa demand were 266,908,663 and 15,105,102 USD, respectively. The average cocoa demand for the United States was 100,250,761 USD. The highest US economic growth was 1.9262% and the lowest value was - 4.7576%. The average growth of the United States economy was - 0.0174%. The highest and lowest of the United States inflation rates were 0.5% and -0.8%. The average US inflation rate was 0.136%

The export level from Indonesian cocoa in India has maximum and minimum values of 17,400,000 and 281,839 USD, respectively. The average value of Indonesian cocoa export to India was 5,441,642 USD. The highest value of India's cocoa demand is 161,907,719 USD and the lowest value is 11,152,813 USD. The average demand for India's cocoa is 22,031,948 USD. The economic growth of India was the highest at 4.338% and the lowest value was -11.944%, demonstrating an average economic growth of -0.022%. The inflation rate of India was the highest and the lowest at 2.14 % and -1.01 %, respectively. The average of India's inflation rate is 0.366 %.

The Indonesian export level on cocoa to the Netherlands ranged from 96,711 USD to 16,700,000 USD, with an average of 6,213,142 USD. The demand for cocoa in the Netherlands ranged from 86,370,164 USD to 339,228,801 USD, with an average of 190,006,363 USD. The economic growth of the Netherlands ranged from -5.57553% to 2.170%, with an average of -0.0676%. The inflation rate of the Netherlands ranged from -0.9% to 1.1%, with an average of 1.140%.

The stationary test results are shown in Table 2. The Dickey-Fuller test in every root was applied in this study.

Table 2. Stationarity Test of Variables *(*Dickey-Fuller test for unit root in first difference)

Variables	Prob*	Values of Critical Test			The Statistics of Augmented Dickey-Fuller
		1% level	5% level	10% level	
World cocoa price (PR_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 7.868
Rupiah Exchange Rate (ER_{st})	0.0000	- 3.532	- 2.903	- 2.586	- 14.447
Value of Indonesian Cocoa Export to the United States (AQ_{sti})	0.0000	- 3.532	- 2.903	- 2.586	- 16.116
the United States Cocoa Demand (AY_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 10.484
the United States economic growth (AG_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 9.149
the United States inflation rate (AI_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 6.750
Value of Indonesian Cocoa Export to India (IQ_{sti})	0.0000	- 3.532	- 2.903	- 2.586	- 14.209
India Cocoa Demand (IY_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 14.948
India's economic growth (IG_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 8.812
India's inflation rate (II_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 16.153
Value of Indonesian Cocoa Export to the Netherlands (BQ_{sti})	0.0000	- 3.532	- 2.903	- 2.586	- 14.447
The Netherlands Cocoa Demand (BY_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 13.899
The Netherlands economic growth (BG_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 10.039
The Netherlands inflation rate (BI_{ti})	0.0000	- 3.532	- 2.903	- 2.586	- 11.170

After conducting a stationarity test using the augmented Dickey-Fuller test, all of the variables used are stationary with a confidence level of 95%, because the probability value of all variables is smaller than 0.05.

2.2. Methods

The SUR model [20] estimates a model with a dependent variable p > 1 that allows the regressor matrices to differ in each equation (eg Xi ≠ Xj) and considers correlations of concordance, E(εitεjt) ≠ 0. The SUR equation is written as follows:

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_p \end{bmatrix} = \begin{bmatrix} X_1 & 0 & 0 & 0 \\ 0 & X_2 & 0 & 0 \\ 0 & 0 & \ddots & 0 \\ 0 & 0 & 0 & X_p \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_p \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_p \end{bmatrix} \quad (1)$$

The equation is in the following:

$$Y = X\beta + \varepsilon$$

where:

Y is the concatenated dependent variable vector.

X is the design block diagonal matrix.

β is the estimated parameter vector.

ε is the error term vector.

The total number of parameters estimated for all submodels p is K = Σ_(i=1)^p ki, where ki is the number of parameters in submodel i. The SUR estimators that consider the interrelationships between single submodels can be obtained by:

$$\beta SUR = [X'\Omega\text{-}1X]\text{-}1[X'\Omega\text{-}1Y]$$

where Ω is the inner covariance matrix.

The inner covariance matrix can be calculated by:

$$\Omega = \Sigma\_(i=1)^p \Sigma\_(j=1)^ki \operatorname{cov}(x\_ij, x\_kj)$$

where Σ_(i=1)^p Σ_(j=1)^ki is the summation over all submodels i and all variables j in submodel i.

$$\sigma_{ij} = \frac{\varepsilon_i' \varepsilon_j'}{N} \quad (2)$$

Thus, SUR was implemented to generalize the least square approach and the unrevealed residual covariance matrix. It was estimated from the data.

The equation used in this study is as follows

$$\ln Q_{Sti} = \alpha_0 + \alpha_1 \ln PR_{ti} + \alpha_2 \ln ER_{St} + \alpha_3 \ln G_{ti} + \alpha_4 C19 + \varepsilon_t \quad (3)$$

$$\ln Y_{ti} = \beta_0 + \beta_1 \ln PR_{ti} + \beta_2 \ln I_{ti} + \beta_3 C19 + \varepsilon_t \quad (4)$$

In this study, the log transformation was used to reduce the skewness of the variables. The following variables were log transformed:

Qsti: The Indonesian cocoa export level to the destination country i in month t in USD.

PRti: The price of cocoa on the international market in month t in USD /ton.

ERst: The rupiah exchange rate against the dollar in month t in the rupiah.

Gti: The economic growth of the destination country i in month t in per cent.

Yti: The cocoa demand of the destination country indicated by the cocoa import value of destination i in month t in USD.

Itl: The inflation rate of destination country i in month t in per cent [17].

The log transformation is a mathematical operation that takes the logarithm of a variable. This has the effect of reducing the skewness of the variable, making it more normally distributed. This is important for statistical analysis, as many statistical tests assume that the data showed a normal distribution.

The data for this study was obtained from a variety of sources, including the Indonesian Ministry of Agriculture, the International Cocoa Organization, the Economic Cooperation and Development Organization, and UN-Comtrade.

3. Results and Discussion

3.1. Results

Figure 1 displays the outcomes of a seemingly unrelated regression analysis. This analysis revealed that specific independent factors had impacted the Indonesian cocoa export value to the United States, India, and the Netherlands.

For exports to the US, some significant influencing factors were the world cocoa price, the economic growth of the United States, and the COVID-19 pandemic. Concerning exports to India, the crucial factors were the exchange rate of the Rupiah and the COVID-19 pandemic. As for exports to the Netherlands, the key determinant was the Rupiah exchange rate.

Furthermore, the world cocoa price changes influenced the cocoa demand in all three destination countries. In simple terms, when the global cocoa price rises, it increases demand for cocoa in all three countries.

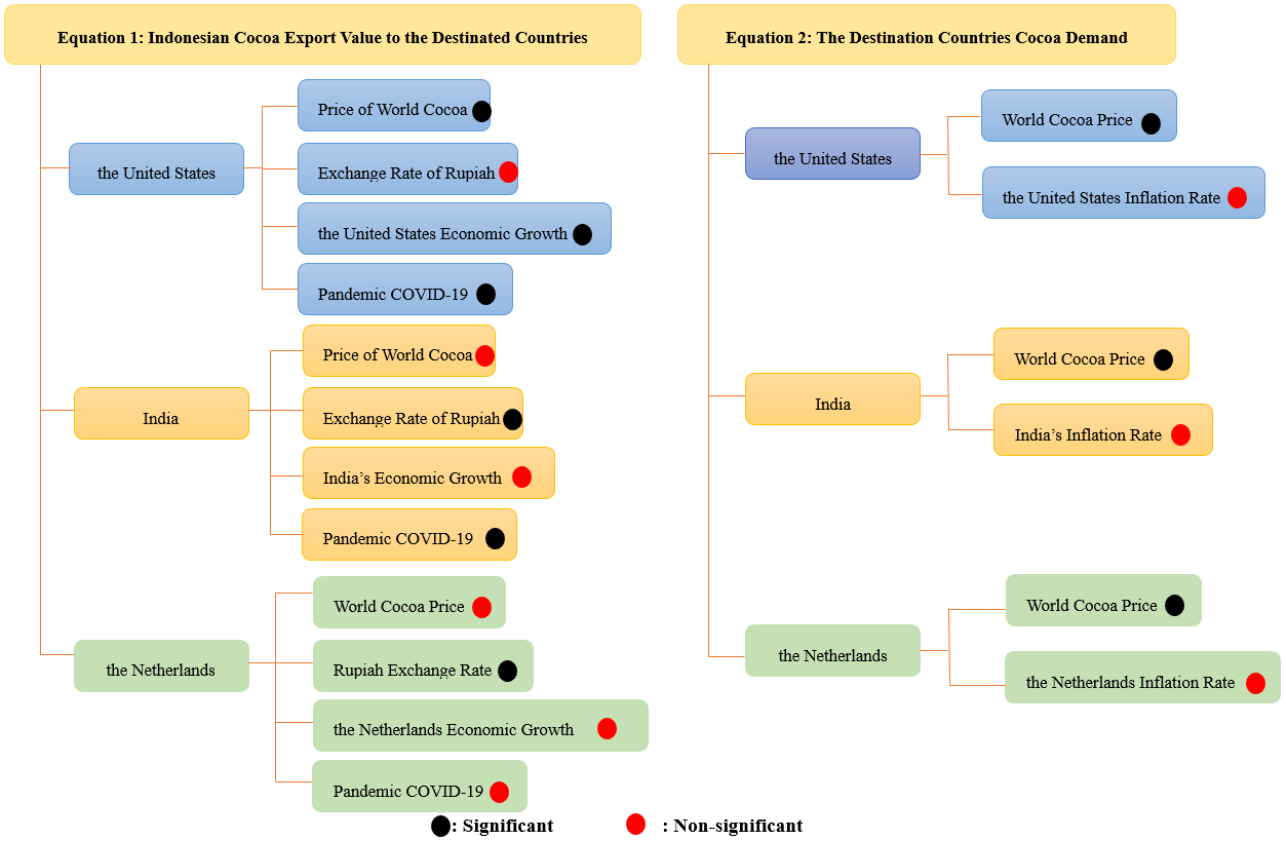


Figure 1. SUR Results

Table 3. SUR Results Factor Indonesian Cocoa Export Value to the United States and Demand for US Cocoa

Value of Indonesian Cocoa Exports to the United States ($LnAQ_{Sti}$)			
Variable	**Coefficient**	**Standard Error**	**P > |z|**
World cocoa price ($LnPR_{ti}$)	-0.398**	0.194	0.041**
Rupiah exchange rate ($LnER_{st}$)	0.368^{ns}	0.519	0.478^{ns}
The United States economic growth ($LnAG_{ti}$)	-0.251***	0.084	0.003***
Dummy COVID-19 pandemic (C19)	-0.550***	0.089	0.000***
Constant	16.98***	5.869	0.004***
R^2	0.345		
Chi2	45.04		
RMSE	0.256		
Number of observations	86		
The United States cocoa demand ($LnAY_{ti}$)			
Variable	**Coefficient**	**Standard Error**	**P > |z|**
World cocoa prices ($LnPR_{ti}$)	-0.114^{ns}	0.198	0.564^{ns}
The United States Inflation ($LnAI_{ti}$)	0.769*	0.404	0.057*
Constant	12.204***	3.171	0.000***
R^2	0.0456		
Chi2	4.17		
RMSE	0.620		
Observation Numbers	86		

* Significant at the 10% level; ** Significant at the 5% level; ***Significant at the 1% level, ^{ns}Non-significant

The regression equation for Indonesian cocoa export value to the United States and its cocoa demand based on Table 3 is respectively presented as follows.

$$LnAQsti = 16.98 – 0.398\ LnPRti + 0.368\ LnERst – 0.251\ LnAGti – 0.550\ C19 \quad (5)$$

$$LnAYti = 12.204 - 0.114\ LnPRti + 0.769\ LnAIti \quad (6)$$

Various factors impact the Indonesian cocoa export value to the United States. These include the world cocoa price. Notably, a 1% increase in the world price results in a 0.398% decrease in the value of Indonesian cocoa exports to the United States. Additionally, the United States economic growth plays a role. A 1% increase in U.S. economic growth leads to a 0.251% decrease in the value of Indonesian cocoa export value to the United States.

Furthermore, the severity of the COVID-19 pandemic has an influence. Specifically, a 1% increase in the influence of the COVID-19 outbreak results in a 0.550% decrease in the Indonesian cocoa export value to the United States. Interestingly, the Rupiah exchange rate does not significantly influence the United States. This study reveals that these factors collectively explain 34.5% of the variation to the United States. The remaining 65.5% of the variation is influenced by other factors such as Indonesian cocoa production, government policies in Indonesia, and marketing strategies employed by Indonesian cocoa exporters.

The independent variable that has significant effect on the United States cocoa demand variable (LnAYti) is the world cocoa prices variable (LnPRti). If world cocoa prices increase by 1% then the value of The United States cocoa demand will decrease by 0.114%. The influence of world cocoa prices (LnPRti) and the United States inflation rate (LnAIti) on the demand for the United States cocoa (LnAYti) is 4.56% and the rest of 95.44% is contributed by other variables which were not researched in this study.

Table 4. SUR Results Factor of Indonesian cocoa export value to the India and Demand for India's Cocoa

Indonesian cocoa export value ($LnIQ_{sti}$)			
Variable	**Coefficient**	**Standard Error**	**P > |z|**
World cocoa price ($LnPR_{ti}$)	-0.688^{ns}	0.424	0.105^{ns}
Rupiah exchange rate ($LnER_{st}$)	3.615***	1.109	0.001***
India's economic growth ($LnIG_{ti}$)	0.1225^{ns}	0.106	0.252^{ns}
Dummy COVID-19 pandemic (C19)	0.545***	0.199	0.006***
Constant	-14.061^{ns}	12.489	0.260^{ns}
R^2	0.370		
Chi2	50.44		
RMSE	0.562		
Number of observations	86		
India's cocoa demand ($LnIY_{ti}$)			
Variable	**Coefficient**	**Standard Error**	**P > |z|**
World cocoa price ($LnPR_{ti}$)	-0.445**	0.204	0.029**
India's inflation rate ($LnII_{ti}$)	-0.032^{ns}	0.047	0.489^{ns}
Constant	20.331***	1.604	0.000***
R^2	0.059		
Chi2	5.46		
RMSE	0.314		
Observation number	86		

*Significant at the 10% level; ** Significant at the 5% level; ***Significant at the 1% level, ^{ns}Non-significant

The regression equation for Indonesian cocoa export value to India based on Table 4 is as follows.

$$LnIQ_{sti} = -14.061 - 0.688\ LnPR_{ti} + 3.615\ LnER_{st} + 0.1225 LnIG_{ti} + 0.545\ C19 \quad (7)$$

$$LnIY_{ti} = 20.331 - 0.445\ LnPR_{ti} - 0.032\ LnII_{ti} \quad (8)$$

The variables that have a significant impact on the value of Indonesian cocoa exports to India (LnIQsti) include the Rupiah exchange rate variable (LnERst) and the COVID-19 pandemic (C19). If the Rupiah exchange rate increases by 1%, Indonesian cocoa export value to India is expected to rise by 3.615%. Similarly, if the COVID-19 pandemic increases by 1%, Indonesian cocoa export value to India is projected to increase by 0.545%. The combined effect of world cocoa prices (LnPRti), the Rupiah exchange rate (LnERst), India's economic growth (LnIGti), and the COVID-19 pandemic (C19) on the Indonesian cocoa export value to India (LnIQsti) accounts for 37% based on the R-squared value. However, the other 63% is influenced by other variables not examined in the present study. Moreover, the sole independent variable that significantly affects India's cocoa demand (LnIYti) is world cocoa prices (LnPRti). When world cocoa prices increase by 1%, India's cocoa demand is anticipated to decrease by 0.445%.

Table 5. SUR Results Factor Indonesian cocoa export value to the Netherlands and Demand for Netherlands Cocoa

Indonesian cocoa export value to the Netherlands ($LnBQ_{sti}$)			
Variable	**Coefficient**	**Standard Error**	**P > |z|**
World cocoa price ($LnPR_{ti}$)	-0.709	0.570	0.214^{ns}
Rupiah Exchange Rate ($LnER_{st}$)	6.875***	1.520	0.000***
Netherlands economic growth ($LnBG_{ti}$)	0.163^{ns}	0.243	0.501^{ns}
Dummy COVID-19 pandemic (C19)	-0.061	0.264	0.816^{ns}
Constant	-44.778***	17.188	0.009***
R^2	0.319		
Chi2	42.43		
RMSE	0.75		
Number of observations	86		
Netherlands cocoa demand ($LnBY_{ti}$)			
Variable	**Coefficient**	**Standard Error**	**P > |z|**
World cocoa price ($LnPR_{ti}$)	-0.044	0.048	0.363
Netherlands inflation rate ($LnBI_{ti}$)	-0.454***	0.159	0.004***
Constant	22.596***	1.253	0.000***
R^2	0.0889		
Chi2	8.57		
RMSE	0.245		
Number of observations	86		

*Significant at the 10% level; ** Significant at the 5% level; ***Significant at the 1% level, ^{ns}Non-significant

The regression equation for the Value of Indonesian Cocoa Exports to the Netherlands based on Table 5 is as follows.

$$LnBQ_{sti} = -44.778 - 0.709\ LnPR_{ti} + 6.875\ LnER_{st} + 0.163LnBGti - 0.061\ C19 \quad (9)$$

$$LnBY_{ti} = 22.596 - 0.044\ LnPR_{ti} - 0.454\ LnBI_{ti} \quad (10)$$

The variables that significantly impact Indonesian cocoa export value to the Netherlands (LnBQSti) include the Rupiah exchange rate (LnERst). If the Rupiah exchange rate increases by 1%, Indonesian cocoa export value to the Netherlands is projected to surge by 6,875%. Interestingly, the variable related to the COVID-19 pandemic (C19) does not mainly influence Indonesian cocoa export value exports to the Netherlands.

The collective influence of world cocoa prices (LnPRti), Rupiah exchange rate (LnERst), economic growth in the Netherlands (LnBGti), and the COVID-19 pandemic (C19) on the variable Indonesian cocoa export value to the Netherlands (LnBQSti) accounts for 31.9% based on the R-squared value. The other 68.1% is impacted by other variables not considered in the present study.The independent variable that has a main effect on the Netherlands cocoa demand variable ($LnBY_{ti}$) is the world cocoa price variable ($LnPR_{ti}$). When the world price of cocoa increased by 1%, the demand for Dutch cocoa will decrease by 0.044%. The influence of world cocoa prices ($LnPR_{ti}$), the Netherlands inflation rate ($LnBI_{ti}$), and the COVID-19 pandemic (C19) on Netherlands cocoa demand ($LnBY_{ti}$) was 8.89%.

3.2. Discussion

3.2.1. Indonesian Cocoa Export Value to the United States, India and the Netherlands

The world cocoa price significantly influences Indonesian cocoa export value to the United States, but its impact on exports to India and the Netherlands is insignificant. The world cocoa price represents the monthly international cocoa price determined by the ICCO (International Cocoa Organization). Research by [10] found that changes in international cocoa prices notably affect the Indonesian cocoa export volume to the United States.

On the other hand, the exchange rate of the Rupiah against the dollar significantly influences Indonesian cocoa export value to India and the Netherlands. Still, it doesn't substantially impact exports to the United States. As explained by [21], the exchange rate represents the country's currency and is a crucial variable in open economies. The price of exported goods will become increasingly cheap in the international market and the

prices of goods imported by that country from abroad will become highly expensive when the currency of a country depreciates. Conversely, the prices of goods exported in international markets will become considerably expensive, and the prices of imported goods will become markedly cheap when the currency of a country appreciates.

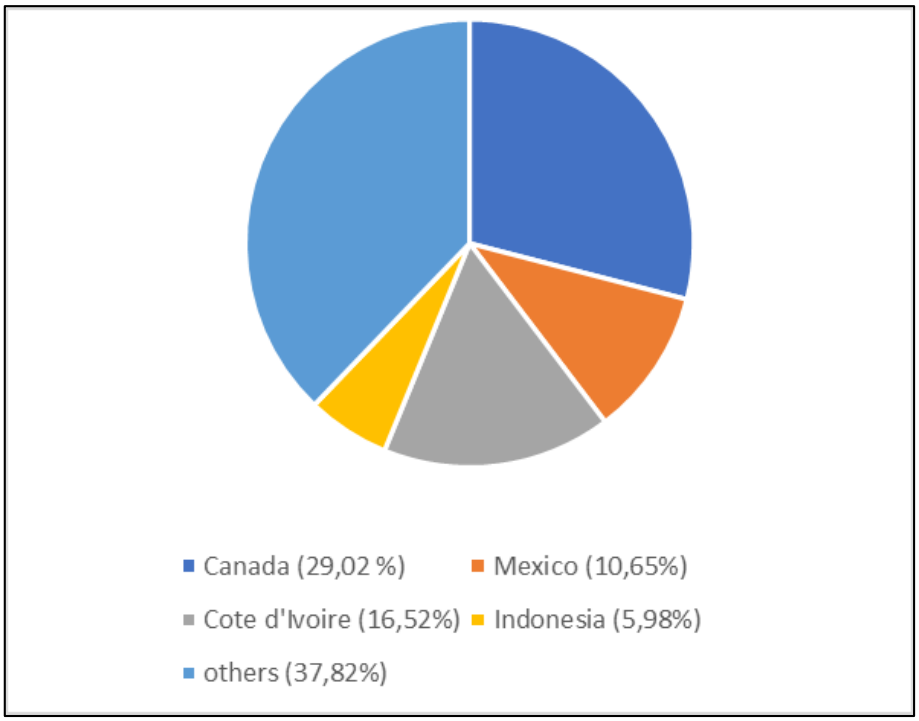
Exchange rate fluctuations did not affect Indonesian cocoa export value to the United States since during the COVID-19 pandemic, a trade war occurred between the United States and China which resulted in the United States temporarily closing trade cooperation from China. As the result, the United States opened trade cooperation with other countries to meet the United States needs. One, of example was Indonesia for cocoa commodity. In addition, the United States was also one of the largest consumers of cocoa in the world, consuming around 20% of all consumption in the world. The United States has the largest cocoa processing industry, such as Mars Inc. and Hersey. This encouraged the United States demand for cocoa from Indonesia.

The COVID-19 outbreak dummy has a significant impact on the value of Indonesian cocoa exports to the United States and India, but does not significantly affect Indonesian cocoa export value to the Netherlands.

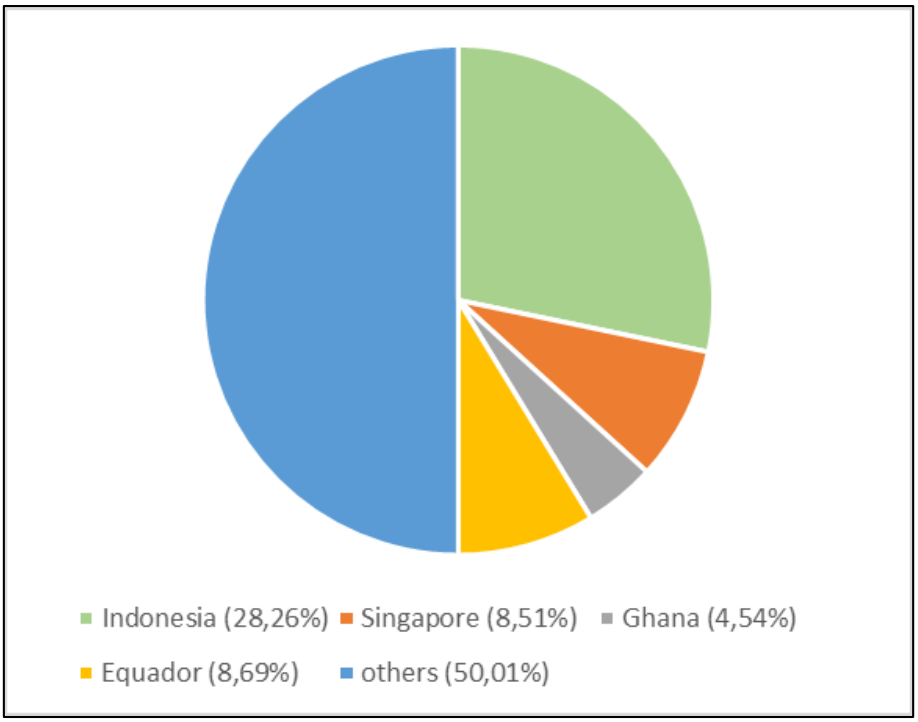
The COVID-19 outbreak showed a negative effect on the value of Indonesian cocoa exports to the United States because Indonesia was not the main supplier of cocoa to the United States. As shown in Figure 2(A), Indonesia is only the fourth largest supplier of cocoa to the United States, with a market share of 5.98%. This means that the United States could easily source cocoa from other countries, such as Ghana, the Ivory Coast, and the Netherlands.

On the other hand, the COVID-19 outbreak represented a positive impact on the value of Indonesian cocoa exports to India because Indonesia was the main supplier of cocoa to India. As shown in Figure 2(B), Indonesia is the first largest supplier of cocoa to India, with a market share of 28.26%. This means that India was less likely to source cocoa from other countries during the pandemic, as Indonesia was still able to export cocoa to India. The COVID-19 pandemic did not mainly impact Indonesian cocoa export value to the Netherlands because Indonesia is not a major supplier of cocoa to the Netherlands. As shown in Figure 2(C), Indonesia is only the 11th largest supplier of cocoa to the Netherlands, with a market share of 1.42%.

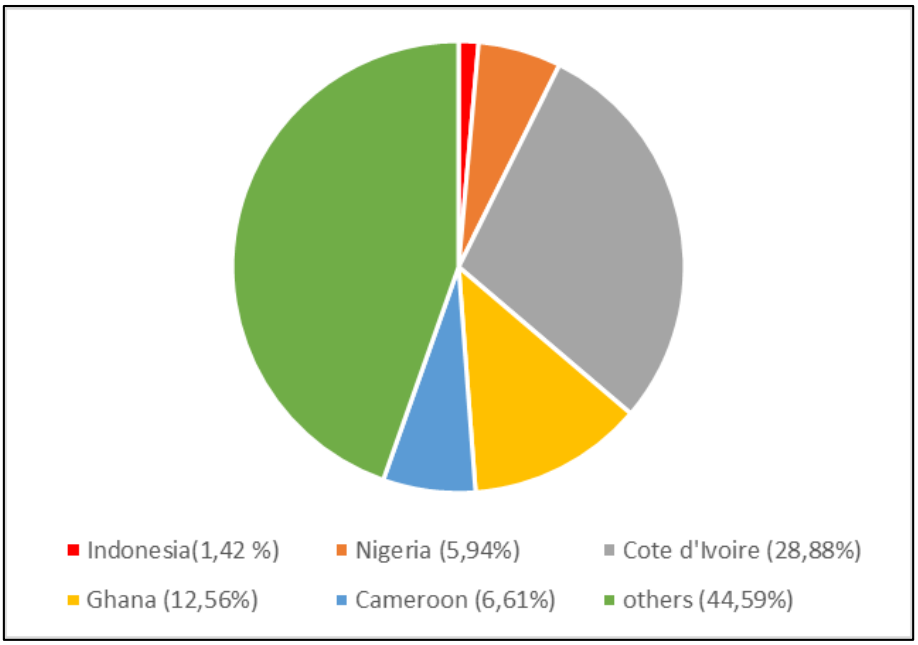
The export and import values of agricultural commodities in Indonesia have decreased during the COVID-19 pandemic [22]. The COVID-19 outbreak has a negative side on the Indonesian economy, due to low investor sentiment toward the market [23]. This pandemic has also caused layoffs, decreased imports, increased prices (inflation) and losses in the tourism sector in Indonesia, which have resulted in decreased occupancy [15]. International trade flows during the COVID-19 pandemic were affected by reduced capital flows amid the pandemic because investors tended to hold, monitor and decide on their investment plans [24]. Numerous shocks were observed on the supply side of goods and services during the COVID-19 pandemic. Many workers had to work from home to cut the chain of distribution of SARS-Cov-2. In addition, workers are forced to quit their jobs due to their exposure to COVID-19 or caring for their families who are COVID-19 patients [25].



A



B



C

Figure 2. Cocoa Suppliers to (A) the United States, (B) India, and (C) the Netherlands 2016-2020

The decreased export value of cocoa during the COVID-19 pandemic was caused by the decreased productivity of cocoa farmers. Cocoa farmers in South Sulawesi reduced their gardening activities during the spread of COVID-19. In addition, these cocoa farmers have not mastered communication technology as a means of learning media such as smartphones or the internet [12]. Learning media such as smartphones can be used by cocoa farmers to absorb learning regarding the increase cocoa production.

3.2.2. India, the United States, and the Netherlands Cocoa Demand

The cocoa demand from the United States, India and Netherlands are equally influenced by world cocoa prices. According to [26], a country will decide to become an exporter when the international price of a commodity is

higher than its domestic price. Conversely, a country will decide to become an importer if the international price is lower than the domestic price.

3.2.3. International Perspective

The COVID-19 pandemic has different influences on Indonesian cocoa export value to each destination country in this study. This pandemic induced a negative impact on Indonesian cocoa export value to the United States. By contrast, the COVID-19 pandemic induced a positive impact on Indonesian cocoa export value to India. Meanwhile, this pandemic did not affect the value of Indonesian cocoa exports to the Netherlands. This finding is influenced by the trade policies implemented by each country. The policy could be related to the distribution between the two countries and the fluctuation in COVID-19 cases in each country. Product traffic restrictions can be made specifically for some countries by implementing a blacklist system.

The COVID-19 pandemic definitely affects the entire trade activity in all major cocoa exporters and producers in the world. The preparedness and resilience of each country in the face of the economic shock caused by the COVID-19 pandemic must be different. This finding also determines the competitiveness of exporting countries in gaining the export market of cocoa.

Agricultural commodities are one of the main drivers of economic growth in many countries during the COVID-19 pandemic. The need for food remains while social distancing or lockdown is applied. Therefore, an interdependence still exists between countries to trade agricultural commodities, especially agricultural goods, and outside of basic food materials such as annual crops (cocoa).

4. Conclusions, Recommendations, and Implications

The COVID-19 pandemic has varied the effects on Indonesian cocoa export value to different destination countries in this study. It has caused a decline on Indonesian cocoa export value to the United States. Surprisingly, the pandemic has led to an increase Indonesian cocoa export value to India. In contrast, the pandemic has not significantly influenced Indonesian cocoa export value to the Netherlands, largely due to the trade policies implemented by each respective country. These policies might involve regulations related to trade between the two countries and are influenced by the fluctuation in the number of COVID-19 cases in each nation. Some countries have even implemented product traffic restrictions through a blacklist system, specifically targeting certain nations.

The study results show that the Indonesian cocoa export value to the United States is affected by world cocoa prices, its economic growth, and the COVID-19 pandemic, while the cocoa demand of the United States is unaffected by the model factors. Indonesian cocoa export value to India is influenced by the rupiah exchange rate and the COVID-19 pandemic. Meanwhile, Indonesian cocoa export value to the Netherlands is influenced by the rupiah exchange rate, while the cocoa demand of the Netherlands is influenced by world cocoa prices.

This study yields important insights regarding the effect of the COVID-19 outbreak on agricultural exports, especially cocoa commodities. Indonesia had implemented free trade in accordance with market conditions before the COVID-19 pandemic; therefore, Indonesia still had a share of the cocoa market (export destination country) despite the occurrence of the COVID-19 pandemic. This finding is supported by the development of the cocoa processing industry in Indonesia that meets the market needs. Approximately 80% of the processed cocoa industry products are absorbed by the export market.

The resilience of Indonesian cocoa exports during the pandemic period is also supported by the GRATIEKS policy of the Indonesia Ministry of Agriculture. The policy represents a government urge for entrepreneurs and exporters to triple agricultural export traffic. However, the implementation of good corporate governance (GCG) in downstream sector is still needed to enhance the quality and quantity of cocoa seeds and processed cocoa. GCG is a system used to direct and control the activities of the company in regulating the division of duties of rights and obligations of shareholders, board of directors, and interested managers.

In addition, during the COVID-19 pandemic, cocoa farmers are still experiencing various barriers in the production and distribution process, which require government policies to support the increased productivity of cocoa farms. Governments can conduct considerably massive education to cocoa farmers to enhance their knowledge in cocoa cultivation techniques and the provision of appropriate agricultural technologies.

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Author Contributions

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Informed Consent Statement

Not applicable.

Data Availability Statement

Data used in the study may be available upon request from the corresponding author.

a. https://comtrade.un.org/
b. https://fred.stlouisfed.org/
c. https://www.pertanian.go.id/
d. https://www.bps.go.id/
e. https://www.icco.org/

Conflict of Interest

The authors declare no conflicts of interest

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