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The Determinant of Indonesian Cocoa Export Growth to the Main Export Destination Countries

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ABSTRACT

Indonesia remains the sixth largest cocoa producer globally. As global cocoa demand and consumption increase, it is imperative that leading cocoa-producing countries, including Indonesia, capitalize on this trend. To facilitate informed future decisions, Indonesia must identify the key drivers of growth for its cocoa bean exports. This study analyses the factors influencing the growth of Indonesia's cocoa bean exports to top five export destinations by volume of Indonesian cocoa bean exports, namely Malaysia, America, India, China, and the Netherlands, using panel data (cross section and time series) analysis. The study found that the growth of Indonesia's cocoa bean exports was significantly (p-value > α) impacted by four variables, namely the export volume of cocoa beans (0.000), Indonesia's GDP (0.002), economic distance (0.041), and the population of export destination countries (0.059). On the other hand, the variables such as GDP of export destination countries, production, productivity, exchange rates, prices of world cocoa beans, harvested area, and domestic cocoa bean prices did not demonstrate any noteworthy impact on the exports. The policy implications of the findings is the results of this study can inform that sustainable cocoa bean export development has great economic potential in the competitive global marketplace, if the Indonesian government wants to increase cocoa bean production centres, a collaborative strategy is needed, especially among stakeholders to support sustainable cocoa bean export development. The contribution of this research is to find sustainable practices in the cocoa industry, especially in improving global trade competitiveness, in terms of determinants.

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1. INTRODUCTION

The focus of the research is on Indonesia's economy, which grew by 1.55% (q-to-q) in quarter III-2021 in comparison to quarter II-2021. The agriculture, forestry, and fishery sectors were among the top contributors to the country's GDP growth during this period. According to Table 1 [1], the plantation sub-sector accounted for the most significant share of GDP distribution in 2021.

Cocoa is the primary agricultural commodity for many countries, both exporters and importers. According to the World Cocoa Foundation, cocoa demand has increased by 3% annually over the last century, and it is anticipated to continue to do so in the coming years. This development certainly benefits Indonesia [2], the cocoa export value demonstrates that this commodity represents a crucial export for Indonesia's agriculture, forestry, and fisheries sub-sectors.

Based on estimates [3], Indonesia's cocoa production is projected to total only 220,000 tons during the 2018/2019 period, a decrease from 270,000 tons in the 2017/2018 period. This decline in national cocoa

production is a result of low productivity due to the advanced age of the plants. Indonesia's cocoa exports are predominantly in the form of beans (80%). The increase in exports of cocoa beans from Indonesia offers an opportunity for the country to earn foreign exchange through this commodity. According to Permenkeu No. 67/PMK.011/2010, from 2010 onwards [4], there has been a steady growth in these exports. Five export destinations of indonesian cocoa beans in 2022 show in Table 2.

Table 1. Distribution of GDP by Business Field in Quarter III/2021 (billion rupiahs)

No	GDP by Business Field	Constant Price Basis in 2010	Current price
1	Food Crops	79,372.30	117,136.00
2	Horticultural Plants	42,610.70	69,304.10
3	Plantation crops	131,654.90	210,737.60
4	Farm	42,038.90	67,938.40
5	Agricultural and Hunting Services	5,637.60	8,912.90
Agriculture, Livestock, Hunting, and Agricultural Services Sub-sectors			301,314.40
Forestry and Logging Sub-Sector			16,673.00
Fishery Sub-Sector			65,527.20
Total Agriculture, Forestry and Fisheries Sectors			383,514.60

Source : [1]

Table 2. Five Export Destinations of Indonesian Cocoa Beans in 2022

No	Country	Export Volume (Thousand Tons)	Percent (%)
1	Malaysia	67.47	32.87
2	America	49.04	23.89
3	India	38.1	18.56
4	China	29.04	14.15
5	Netherlands	21.6	10.53
Total			205.25
Forestry and Logging Sub-Sector			16,673.00
Fishery Sub-Sector			65,527.20
Total Agriculture, Forestry and Fisheries Sectors			383,514.60

Source : [5]

The ranking of Indonesian cocoa bean exporters (position 6) decreased compared with the previous year, due in part to the decreased export value of cocoa beans. Indonesia has developed affiliations with international trade organizations, including AFTA, to obtain export advantages for Malaysia. However, the competitive standing of Indonesian cocoa beans is not appealing enough to Malaysian customers. The escalating Indonesian cocoa exports and global cocoa consumption suggest that the potential of the cocoa market remains high within the international sphere. Approximately 2,848,900 tons of cocoa beans are demanded worldwide each year, with demand constantly increasing. Nevertheless, there are concerns that the supply of cocoa beans may eventually fall short. Indonesia's cocoa production accounts for only 15% of global production [6].

Exports play an essential role for developing countries as they provide a valuable source of foreign currency. To achieve growth, these nations must invest in capital goods. To do so, they require hard currencies (such as dollars) to import machinery and intermediate goods from foreign nations. In this sense, expanded exportation encourages economic growth by generating foreign exchange, which is necessary to support the imports necessary for investment in capital goods. Comparably, it was noted by [7] that enlarging exports may facilitate the importation of superior-quality products and technologies. This, in turn, could positively influence technological development, labor efficiency, capital efficiency, and ultimately, national production. Exportation is important not just for its potential to generate revenue, but also for its ability to enhance productivity through exporting learning which has been evidenced in numerous studies [8], [9]. Furthermore, [10] discovered that the starting magnitude of exportation is a crucial factor for its longevity. Additionally, [11] ascertained that merchandise sold for exportation, which is related to elevated productivity levels, expands rapidly [12], [13], [14], [11], [15] indicate that the length of trade relationships is crucial for ensuring the survival of export growth [16], [17] assert that the duration of trade flow plays an important role in maintaining export growth [18], [19] discovered that the prolonged survival of a product confers a comparative advantage on the country.

Conditions of free trade facilitate the control of the international market by competitive countries, thereby increasing the exports of Indonesian cocoa beans. The importance of cocoa exports in the context of Indonesia's

agricultural sector will have an impact on the economy, especially in its contribution to the country's GDP.To analyze the determinants of trade between countries, the Gravity model approach can be employed. This approach omits the distance variable in the equation. In this study, the distance variable used has been adjusted to reflect the economic distance [20]. The gravity model, an economic model commonly utilized to forecast bilateral relationships, is grounded in the gravitational theory of the attraction force between two objects initially proposed by Sir Isaac Newton in 1687. In 1962, Jan Tinbergen proposed that the same functional form could be adapted for international trade flows [21]. No changes are needed as the text already adheres to the principles and lacks context.

The previous research about relevant work is as follows: the research model adopted in this study is based on the research by [22]. However, this study differs from the research conducted by [23] owing to the inclusion of the price variable from the research of [24] and the incorporation of the exchange rate variable from the research of [25]. The research conducted by [26], [27] concluded that Ethiopia's turmeric and Korarima export performances were significantly influenced by various factors. This is similar to the research conducted by [28], [29], [30] investigates the determinants of dependent variable has a partially positive and significant impact on independent variable. A study conducted by [31], [32] analyzed the impact of international organizations using a panel data model, concluding that both GDP and population growth are positively influenced by trade. However, as distance increases, the effect of trade becomes negative. The gap between this research and previous studies is the unprecedented specific knowledge, such as the determinants of export growth that are important for the Indonesian cocoa industry.

This research have spesific aims to identify the factors influencing the flow of trade in cocoa beans. The main hypothesis to be answered in this study is that cocoa bean export volume, economic distance, export destination country population, export destination country GDP, production, productivity, exchange rate, world cocoa bean price, and harvested area positively stimulate export growth. Indonesia's GDP, and domestic cocoa bean price give negative impact. A country's Gross Domestic Product (GDP) is one of the indicators for producing these commodities. The larger the GDP of Indonesia, the more the country will produce or process the product domestically. Therefore, exports will decrease, and growth will be negative. The same is true for domestic cocoa bean prices. If the price of cocoa beans in Indonesia is more expensive than the international price, farmers will sell their products domestically. Hence, exports fall.

The findings will support the Government in formulating policies related to the cocoa bean trade. The significance of this investigation lies in its potential impact on increasing food self-sufficiency through greater production of plantation crops, such as cocoa. Additionally, research provides evidence for the exportation of high-quality plantation products within the agricultural industry, given its sustainable nature, primarily with upstream products. Additionally, research provides evidence for the exportation of high-quality plantation products within the agricultural industry, given its sustainable nature, primarily with upstream products. Importantly, there is a requirement for competitiveness when penetrating foreign markets. The gap between this research and the previous literature is that previous studies have not discussed much about export growth. Though this factor can show the trend for the next few years. The contribution of this research is to find sustainable practices in the cocoa industry, especially in improving global trade competitiveness, in terms of determinants. The continued export potential of cocoa beans is an important point for Indonesian cocoa, especially in terms of presence and position in the trade. If the existence of Indonesian cocoa beans in the international market remains in demand by global consumers, it will provide economic benefits for Indonesia, such as increased foreign exchange.

This article is organized as follows. Section 2 describes the data, and the methodology applied. Section 3 shows the empirical results and discussion. The last part concludes.

2. METHODS

This investigation employs quantitative secondary data types, specifically panel data (pooled data), which were analyzed using STATA 14.2 software and Microsoft Excel. The yearly data from 2000 until 2020 utilized in this research was obtained from various sources, including UN Comtrade, World Bank, FAO, WTO, and Federal Reserve Economic Data [33]. The panel data is constructed from a combination of cross section data (consisting of the 5 largest importing countries of cocoa beans from Indonesia) and time series (consisting of 2000-2020). The econometric tools of gravity modeling in recent decades have been significantly enriched due to the advent of modified gravity equations based on the theory: of fixed or random effects options [34], [35]. The gravity model has the advantage of greater credibility than other regression models. According to [34], one of the advantages of the gravity model is that the empirical model can be easily augmented to consider additional control and policy variables. Research flowchart show in Fig. 1. Table 3 provides an overview of the description of variables and data sources:

Table 3. Description of Dependent Variable and Independent Variable

Variable	Description	Data source
Y_{ij}	Export growth (%)	UN Comtrade
GDP_{jt}	GDP of export destination countries (US$)	World Bank
GDP_{it}	Indonesia's Real GDP (US$)	World Bank
DIS_{ij}	Economic distance (km)	http://indonesia.distanceworld.com/dc
$PROD_{it}$	Production (tons)	FAO (Food and Agriculture Organization)
$PROTY_{it}$	Productivity (tonnes/ha)	FAO (Food and Agriculture Organization)
ER_{ij}	Real exchange rate (local currency unit (LCU)/US$)	World Bank
$PRICE_{it}$	The world price of cocoa beans (US$/MT)	Federal Reserve Economic Data
$PRICE_{jt}$	Domestic price of cocoa beans in Indonesia (US$/MT)	Ministry of Industry and Trade of the Republic of Indonesia
VOL_{it}	Export volume (tons)	FAO (Food and Agriculture Organization)
POP_{it}	Population in a region of the country that imports Indonesian cocoa beans (people)	World Bank
$AREA_{it}$	Harvested area of cocoa cultivation in Indonesia (ha)	FAO (Food and Agriculture Organization)
TAX_{it}*	Taxes that will be imposed by the government for an export activity. Export tax was introduced in Indonesia in 2010 (%)	Ministry of Agriculture

Source: Secondary data, 2022
* This is an index that measures aid/tax from government policies in the agricultural sector

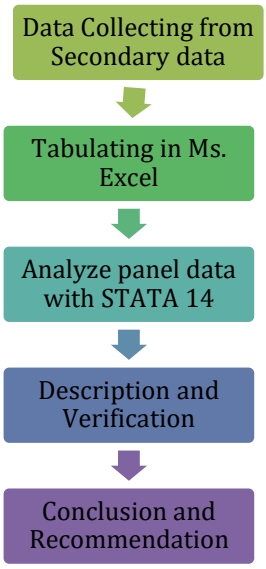

Fig. 1. Research flowchart

2.1. Gravity model

This study utilizes a Gravity model employing a Pooled Least Square approach. Panel data's advantages infer that it is unnecessary to evaluate conventional assumptions, such as multicollinearity, heteroscedasticity, autocorrelation, and normality in the panel data model [36]. The equation as follows:

$$\begin{aligned} In\ Y_{ij} = \beta_0 + \beta_1 InGDP_{jt} + \beta_2 InGDP_{it} + \beta_3 InDIS_{ij} + \beta_4 InPROD_{it} \\ + \beta_5 InPROTY_{it} + \beta_6 InER_{ij} + \beta_7 InPRICE_{jt} \\ + \beta_8 InPRICE_{it} + \beta_9 InVOL_{it} + \beta_{10} InPOP_{it} \\ + \beta_{11} InAREA_{it} + \beta_{12} InTAX_{it} + \mu \end{aligned} \quad (1)$$

where Y represents the percentage growth in export value of Indonesian cocoa beans to destination country j, GDP_{jt} refers to the importing country's GDP (US$), GDP_{it} represents Indonesia's GDP real (US$), DIS_{ij} is the economic distance (km), PRO_{it} is Indonesia's cocoa bean production (tons), and PROTYit is Indonesia's cocoa bean productivity (tons/ha). ER_{ij} represents the actual exchange rate of the Indonesian (local currency unit (LCU)/US$), while $PRICE_{jt}$ is the worldwide price of cocoa beans in year t (US$/MT), and $PRICE_{it}$ denotes

the domestic price of cocoa beans in Indonesia (US$/MT). VOL_{it} represents the volume of cocoa beans exported by Indonesia (tons), while POP_{it} refers to the country's population (people), and $AREA_{it}$ denotes the harvested area of Indonesian cocoa beans (hectares). Export tax is denoted as TAX_{it} (%), while the constant is represented by β_0 and the regression coefficients are represented by β_1, β_2, and βn. Additionally, the error is denoted as μ.

2.2. Statistical Test

2.2.1. F-statistic (Concurrent Hypothesis Test)

In the Pooled Least Square (POLS) model approach, the test is carried out by looking at the null hypothesis, which will be rejected if the value of (Prob >F) = 0, which means (Prob >F) < (α).
Hypothesis 0: The independent variable has no significant effect on the dependent variable together
Hypothesis 1: The independent variable has significant effect on the dependent variable together

2.2.2. t-statistic (Individual Hypothesis Test)

In the Pooled Least Square (POLS) model approach, the test is carried out by looking at the null hypothesis, which will be rejected if the value of (P-value) = 0, which means (P-value) < (α).
Hypothesis 0: The independent variable has no significant effect on the dependent variable partially
Hypothesis 1: The independent variable has significant effect on the dependent variable partially

2.2.3. Test Goodness of Fit

The model's suitability is calculated by the coefficient of determination (R^2) value, which aims to measure the diversity of the dependent variable that the independent variable can explain.

3. RESULTS AND DISCUSSION

The data was comprised of time series data from 2000 to 2020, as well as cross-sectional data from the five destination countries. Pooled Least Squares (POLS) was determined to be the ideal model based on the results of the model selection test.

3.1. Cocoa bean production and export volume

The development of production and export volume of Indonesian cocoa beans to export destination countries from 2000 to 2020 tends to fluctuate. Production and export volume play an important role in export growth. Although an increase in production will not necessarily be followed by an increase in exports, if production is accompanied by quality, it is possible that export volumes will increase. Graph of production and export volume of indonesian cocoa beans to five export destinations show in Fig. 2.

Fig. 2. Graph of Production and Export Volume of Indonesian Cocoa Beans to Five Export Destinations

Based on the image above, the quantity of Indonesian cocoa beans exported to Malaysia, America, China, India, and the Netherlands varied and decreased between 2014 and 2019. This decline was caused by the implementation of the Indonesian cocoa bean export tax in 2010. Understanding the export volume of cocoa beans enables an estimation of the demand for cocoa beans in export markets from their producing countries [37]. Indonesia's production of cocoa beans is on the rise, which will increase consumer demand in export markets [38].

Over the past 21 years, there has been a decline in cocoa bean productivity in Indonesia. Low cocoa productivity, especially among small cocoa farmers, is due to their failure to plant many of the varieties recommended. Quality also affects the productivity of cocoa beans. The decline in the quality and yield of cocoa beans can be attributed to various factors, such as infection by diseases and the cocoa pod borer, as well as post-harvest handling, cropping systems and the quality of planting material [39]. The Ivory Coast is known worldwide for its cocoa beans, while in Indonesia cocoa beans are known for their high levels of sourness and low levels of cocoa. The trends and data points shown in Fig. 2 shed light on the relationship between export volume and cocoa bean production. Based on Fig. 2, by the end of 2020, the export volume of cocoa beans is less than the production. The following will present data on the export value of cocoa beans.

3.2. Export value of Indonesian cocoa beans to export destination countries

The export value to five export countries varies, which are expressed in US$ starting from 2000-2020. The development of the export value of Indonesian cocoa beans from 2000-2020 can be seen in Fig. 3. Cocoa export value is one of the measuring variables in looking at the competitiveness of a country with consideration of international prices.

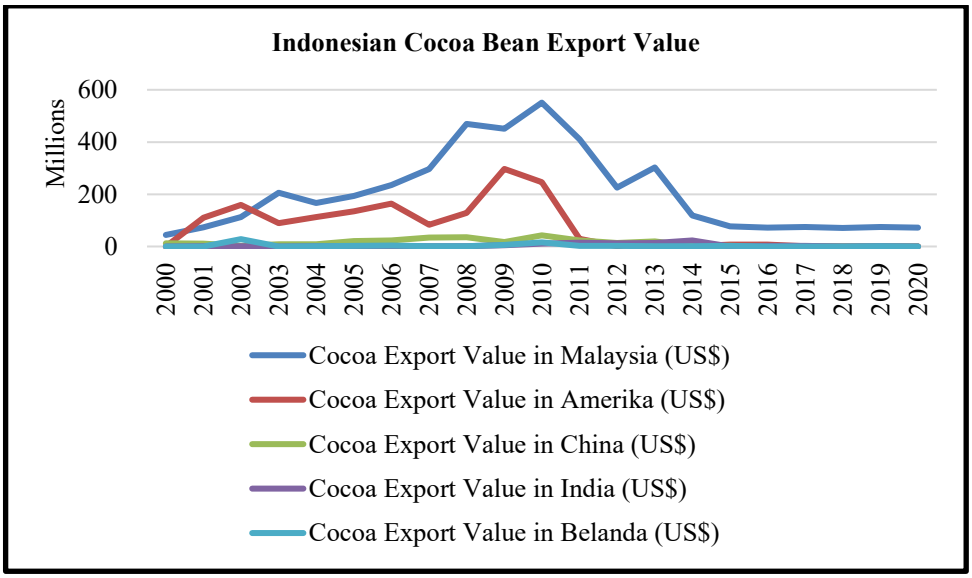

Fig. 3. Value of Indonesian Bean Exports to Destination Countries

Based on Fig. 3, it shows that by the end of 2020, the export volume of cocoa beans is directly proportional to the export value of cocoa beans. Where in that year, the export value of cocoa beans tends to have a zero trend. Indonesian cocoa bean export value from 2000 to 2020 fluctuated and tended to "return to scale". The increase in export value occurred before 2010 and decreased after 2010-2020. The peak of the highest export value occurred in 2010, where exports to Malaysia amounted to US$ 550,917,224; America amounted to US$ 246.501 million; India amounted to US$ 42,741,414; China amounting to US$ 10,752,232; and the Netherlands for US$ 15,563,587. This is due to the export tax on cocoa beans by the Indonesian government. The tax was introduced after 2010. With the export tax, the government expects farmers and exporters to export in processed form, resulting in a decrease in the export value of cocoa beans.

3.3. Determinant Factors of Indonesian Cocoa Beans to Export Destination Countries

The determinants of the export value of cocoa beans from Indonesia to destination countries were analyzed using Pooled Least Square (POLS). The following are the results of the estimated determinants of cocoa bean exports using panel data regression. Table 4 presents the model estimation results.

The R^2 value of 0.8356 indicates that 83.56% of the export value variable is due to the variation of the hypothesized variables. The F test results demonstrate that the value (Prob > F) = 0.0000 < = 0.05. The results of the t-test show that both the GDP of the exporting state and the export volume are significant at the 99%, economic distance is significant at the 95% confidence level. The population of the exporting country is significant at the 90% confidence level, but other variables are not significant. The confidence level means that the study provides 99%, 95%, 90% confidence that the variable effect is not due to random chance.

Table 4. Five Export Destinations of Indonesian Cocoa Beans

Variable	Coef	Std. Error	(P-value)
Constant^{ns}	5.19e+07	1.24e+07	0.675
Export Destination GDP^{ns}	2.29e-06	1.49e-06	0.126
Indonesia's GDP***	-0.000155	0.0000486	0.002
Economic Distance**	-4,274.871	2,057.745	0.041
Production^{ns}	98.018	164.6362	0.553
Productivity^{ns}	-9.65e+07	1.89e+08	0.612
Exchange rate^{ns}	288,004.3	35,2475.2	0.416
World Cocoa Bean Price^{ns}	-24,391.09	52,053.07	0.640
Export Volume***	1,458.667	135.2194	0.000
Population of Exporting Countries*	-0.0359665	0.018818	0.059
Harvest Area^{ns}	35.03634	98.66113	0.723
Domestic Cocoa Bean price^{ns}	42,584.2	53,159.4	0.425
Export Tax^{ns}	-133,384.2	2,353,908	0.955
Prob >F			0,0000
R^2			0.8356
Observation			84

Source: Authors' calculation, 2022

*Significant at α = 10% , **Significant at α = 5%, ***Significant at α = 1%, ^{ns} = not significant.

Based on the calculated coefficients of the independent variables, the gravity model equation is developed as follows:

$$\begin{aligned} In\ Y_{ij} = {} & (5.19e+07) + (2.29e-06)InGDP_{jt} + (-0.000155)InGDP_{it} \\ & + (-4{,}274.871)InDIS_{ij} + (98.018)InPROD_{it} \\ & + (-9.65e+07)InPROTY_{it} \\ & + (288{,}094.3)InER_{ij}(-24{,}391.09)InPRICE_{jt} \\ & + (42{,}584.55)InPRICE_{it} + (42{,}584.55)InVOL_{it} \\ & + (-0.0359665)InPOP_{it} + (35.03634)InAREA_{it} \\ & + (-133{,}384.2)InTAX_{it} + \mu \end{aligned} \quad (2)$$

This gravity model equation shows that if Indonesia's GDP increases, the dependent variable will decrease by 0.000155 US$, if the economic distance is 1 km further, then the export value of Indonesian cocoa beans will decrease by 4,274.871 US$, ceteris paribus. In addition, if the export volume of cocoa beans increases by one ton, the export value of Indonesian cocoa beans will increase by US$ 1,458,667, ceteris paribus. Likewise, the more the population of the export destination country increases by 1 person, the export value of Indonesian cocoa beans will decrease by 0.0359665 US$, ceteris paribus.

The data indicates that Indonesia's GDP (GDPi) variable has a negative and significant impact. The hypothesis proposed in this study suggests a positive and significant influence of Indonesia's GDP variable on the value of growth exports. This aligns with research [33] indicating that if a country's real GDP increases, so too will the size of its economy. Consequently, individuals' income will rise, leading to an increase in domestic consumption. According to research [41], an increase in the gross domestic product of the exporting country correlates with increased production capacity and consumption patterns within the domestic community [42], [43].

The economic distance (km) is used to measure the distance between two countries. According to the gravity model, exports decrease in value as the distance between the importing and exporting countries increases. This is because transportation and logistics services become more expensive with greater distance. This study demonstrates that economic distance has a notable, unfavorable impact, indicating that transportation and logistics expenses reduce the export worth of cocoa beans [44]. Prior research [45] indicated that the demand for these commodities will reduce as the economic distance between exporting and importing countries increases.

The study's export volume indicates a significant and optimistic impact. The results of this research are consistent with the assumption that export volume has a significant positive impact. The export quota policy will affect the volume of exported cocoa beans. Knowing the volume of cocoa beans exported will allow the demand for cocoa beans in exporting countries to be estimated. Studies [41] and [42] have shown that the export volume of cocoa beans has a positive effect on the demand for the commodity in the markets to which it is exported.

The research results demonstrate a significant negative effect on the population of exporting countries. The study's findings contradict the opposing hypothesis. With an increase in population exporting countries,

there is a surge in the labor force, leading to an increase in the total domestic product, and thereby a decrease in the export supply [43]. This discovery aligns with the previous research [46].

The estimation results show that the GDP variable of the export destination country, cocoa bean productivity, the world cocoa bean price variable, and export tax has no significant and negative effect on the export growth of cocoa beans. The previous description aligns with research by [47], [48], [49]. Cocoa bean production, exchange rate, harvested area, domestic cocoa bean price showed no significant and was positive effect.

4. CONCLUSION

This paper examines the determinants of growth in the export value of cocoa beans from Indonesia. Using the Pooled Least Squares (POLS) model, it is evident that the export volume of cocoa beans exhibits a positive and significant effect, while variables such as Indonesia's GDP, economic distance and Indonesia's population exhibit a negative and significant effect. Other variables fail to have a significant effect on the growth of the export value of Indonesian cocoa beans in the period 2000-2020. The GDP variable of the export destination country, cocoa bean productivity, the world cocoa bean price variable, and export tax has no significant and negative effect on the export growth of cocoa beans. Cocoa bean production, exchange rate, harvested area, domestic cocoa bean price showed no significant and was positive effect. The limitations of the data in the research design are the data collection period from 2000-2020, and several independent variables that are only used as research objects. Other variables outside the study are considered constant.

The findings of the study indicate that it would be prudent for the government to introduce measures about the requirement for an export strategy for cocoa beans originating from Indonesia, given the number of cocoa beans exported, the GDP of Indonesia, its economic distance, and its population. Measures for cocoa bean export strategy in Indonesia or specific policy recommendations based on the findings of this study are to consider the close economic proximity to ASEAN countries, which will potentially open up new markets, if there is serious standardisation by the government on quality. Then the potential population of exporting countries, should be utilised by the Government in creating wider consumer opportunities. The government should introduce measures related to cocoa bean export strategies with recommendations for targeted export incentives, investments to improve cocoa bean quality, or policies aimed at reducing economic distance factors.

The government should strive to enhance cocoa bean production centers by furnishing them with better quality seeds, offering counseling services to cocoa farmers, and providing incentives or capital assistance, particularly to small export-oriented enterprises, to attain economies of scale and curtail production expenses. The results of this study can provide information to policy makers and stakeholders in the cocoa bean industry in Indonesia by implementing the recommended measures. In addition to government action, stakeholders in the cocoa bean industry, including farmers, exporters, and international buyers need to improve quality, such as conducting quality taste tests, and fermenting cocoa beans before export or processing. To guide future research, it is recommended to probe Indonesia's post-COVID-19 exports. This is important because whether the condition of cocoa bean export growth has returned to show a positive trend, such as before Covid 19.

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