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Research Article

Determinants Of Indonesia's Pineapple Exports In 2013-2023

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Abstract: Pineapple is one of Indonesia's top three fruit commodities in terms of production volume. In 2022, Indonesia became the world's largest pineapple producer. Pineapple production in Indonesia has fluctuated but has generally shown an increasing and stable trend from 2013 to 2023, with expectations of continued growth. This study aims to analyze the influence of production, the wholesale price index, exchange rates, and export prices on Indonesia's pineapple export volume from 2013 to 2023. This research utilizes secondary time-series data on a quarterly basis, analyzed using multiple linear regression and classical assumption tests. The results indicate that production, the wholesale price index, exchange rates, and export prices simultaneously influence Indonesia's pineapple export volume. Partially, production and exchange rates have a positive but statistically insignificant effect on export volume, while the wholesale price index and export prices have a negative yet statistically significant impact. These findings highlight the importance of policies that can reduce production costs to enhance the competitiveness of Indonesian pineapples in the international market. Through synergy between the government, exporters, and farmers, it is expected that Indonesia's pineapple exports will continue to grow sustainably.

Keywords: Exchange Rate; Export Price; Indonesia's Pineapple Export Volume; Production; Wholesale Price Index.

1. Introduction

One of the reasons for economic relations between countries is the difference in the level of scarcity. If a country has more limited resources compared to another, there will be a flow of goods or services from the country with lower scarcity levels to the country with higher scarcity levels (Hasyim, 2020:5-6). This also applies to Indonesia, which distributes its surplus natural resources by trading with other countries. This surplus production drives Indonesia to engage in economic relations with other nations through international trade (Segarani & Dewi, 2015).

Indonesia is an agrarian country, as evidenced by its vast agricultural land and abundant natural resources. From 2019 to 2022, the broad agricultural sector (including forestry and fisheries) ranked second after the manufacturing industry sector, contributing an average of 13.02% to Indonesia's GDP, with the narrow agricultural sector (excluding forestry and fisheries) contributing 9.67%. Within the existing agricultural sector groups, Indonesia holds significant potential in one of its subsectors—horticulture.

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Table 1. Indonesia's Annual Fruit Production 2019-2023

No	Commodity	Weight (Ton)					
		2019	2020	2021	2022	2023	Average (Tons)
1	Avocado	461613	609049	669260	865780	874046	3.20%
2	Apple	481373	516531	509544	523596	392563	2.23%
3	Durian	1169802	1133195	1353037	1582172	1852045	6.51%
4	Siamese Orange	2444516	2593384	2401064	2551999	2831099	11.78%
5	Mango	2808936	2898588	2835442	3308895	3302620	13.92%
6	Jackfruit	779859	824068	906514	813756	789200	3.78%
7	Pineapple	2196456	2447243	2886417	3203775	3156576	12.76%
8	Pawpaw	986991	1016388	1168266	1089578	1238692	5.05%
9	Banana	7280659	8182756	8741147	9245427	9335232	39.30%
10	Mangosteen	246476	322414	303934	343663	397175	1.48%

Source: Central Bureau of Statistics, processed data, 2024

Fruits are a horticultural commodity that is very well developed every year, especially Indonesian tropical fruits. These fruit commodities not only exist domestically but are also exported abroad. This good trade activity is accompanied by production developments that continue to increase every year. Pineapple is one of the fruits in the top 5, with the highest production in Indonesia. Pineapple is a tropical fruit that is rich in benefits and originated in Brazil and South America. This fruit from the Bromeliaceae family is known by the Latin name Ananas comosus and can live and bear fruit throughout the season. Pineapple has a high nutritional content, not only for consumption, pineapple can also be processed into other food products and functions as a medicinal plant. Pineapple cultivation is significant and recommended because it is classified as easy cultivation and the results are quite large (Ardiansyah, 2010).

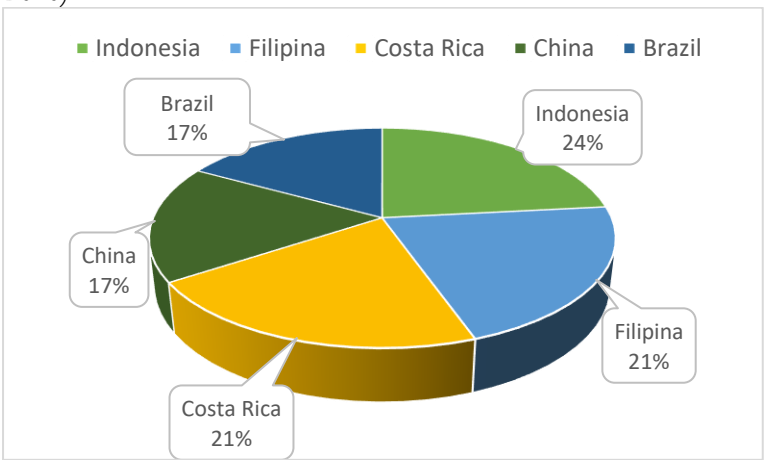

Figure 1. The Largest Pineapple Producers in the World in 2022

Source: Central Bureau of Statistics, processed data, 2024

In 2022, Indonesia became one of the world's largest pineapple producers, ranking first by producing 3,203.78 tons of pineapples, followed by the Philippines with 2,914.42 tons and Costa Rica in third place with 2,909.75 tons (FAO, 2024). On the other hand, global pineapple demand is also experiencing a positive trend, especially in non-tropical countries that do not have local production. This is evident from the global pineapple consumption level, which reached 22 million tons (FAO, 2022). A significant portion of Indonesia's pineapple production is allocated for export, in the form of both fresh and processed products. One of Indonesia's most exported processed pineapple commodities is canned pineapple. In 2020, canned pineapple was the largest contributor to Indonesia's processed pineapple exports, accounting for 86.19% of total exports (Ministry of Agriculture, 2020). This is supported by the fact that Indonesian canned pineapples contributed 17.89% to the total US demand for canned pineapples, placing Indonesia third after Thailand (45.12%) and the Philippines (32.20%).

Indonesia's pineapple exports currently span multiple continents, with the ten largest export destinations spread across four continents, accounting for a total export share of 74.66%. The US holds the highest export share, with an average annual export volume of 68.25 thousand tons, followed by the Netherlands with 31.62 thousand tons, Spain with 22.08 thousand tons, and Germany with 14.13 thousand tons. As of now, domestic pineapple production remains abundant, as indicated by Indonesia's fresh pineapple Import Dependency Ratio (IDR), reaching its lowest point at 0% per year over the past five years. Conversely, the Self-Sufficiency Ratio (SSR) stands at 100%, indicating that Indonesia is entirely self-sufficient in fresh pineapple production without requiring imports (Ministry of Agriculture Data Center, 2023).

Despite abundant production, Indonesia ranks 22nd among the world's fresh pineapple-exporting countries, accounting for only 0.20% of global exports, with an annual export volume of 7.49 thousand tons. The leading exporter is Costa Rica, which dominates more than half of the global fresh pineapple market, with an export share of 56.00% or 2.06 million tons annually, followed by the Philippines with a 15.36% share or 564.54 thousand tons (FAO, 2023). Although Indonesia's pineapple production is increasing, along with its canned pineapple exports growth, the proportion of export growth does not match the overall production volume.

Soekartawi (2005) stated that production factors can be classified into two categories: (1) biological factors, such as agricultural land with various fertility levels, seed varieties, fertilizers, pesticides, weeds, and so on, and (2) socio-economic factors, such as production costs, prices, labor costs, education levels, income levels, the availability of credit institutions, and more.

Salvatore (1997) mentioned that production capacity is one-factor influencing exports. A country's production capacity determines the volume of goods it can export. When domestic production capacity increases to surplus after meeting local consumption, the excess supply will be allocated for export. Therefore, increased production will lead to increased exports (Erawan & Setiawina, 2021). In addition to production capacity, Salvatore (1997) highlighted that price influences exports from both demand and supply perspectives. A price increase may lead to a decline in export volume in the destination country, as buyers will seek more affordable alternatives. According to the law of demand, the higher the commodity price, the lower the quantity exported (Mankiw, 2016:7). Pineapple demand is considered elastic because pineapples are not necessary and have substitute products.

International trade transactions, including export activities, involve multiple foreign currencies. Due to this, exchange rate fluctuations arise (Boediono, 1994). In export theory, the exchange rate is a critical factor affecting the growth of a commodity's exports (Hidayati et al., 2017:39). The exchange rate determines whether a country's goods are relatively more expensive or cheaper abroad. If a country's domestic currency appreciates relative to other currencies, its goods become more expensive overseas. Conversely, if the domestic currency depreciates, the country's goods become cheaper internationally (Mishkin, 2009:111 in Langi et al., 2014:48).

Price developments, particularly at the wholesale level, can be indicated by the Wholesale Price Index (WPI). WPI measures wholesale or bulk trading price changes for commodities traded within a country or region (Winanti et al., 2023). WPI often indicates production costs and export competitiveness (BPS, 2024). Suppose WPI increases due to rising production costs. In that case, producers face higher expenses, which may force them to raise prices, making Indonesian pineapples more expensive in global markets and potentially reducing competitiveness. Conversely, exporters can offer more competitive prices if WPI declines due to lower production costs (Anandari et al., 2015). Export volumes will likely increase if demand is elastic as lower prices attract more international buyers.

Based on this background, this study aims to analyze the simultaneous effects of production, wholesale price index, exchange rate, and export prices on Indonesia's pineapple export volume and examine the partial effects of these factors on it. Unlike previous studies, this research focuses on fresh pineapples rather than processed products such as canned ones.

2. Research Methods

1. Research Methodology: This study employs a quantitative approach with an associative research method. The associative method analyzes the influence of independent variables (X), namely production volume, wholesale price index, exchange rate, and international prices, on the dependent variable (Y), which is the export volume of pineapples in Indonesia from 2013 to 2023. The analysis is conducted using multiple linear regression.
2. Research Location and Object: The research is conducted in Indonesia using data published by the Central Statistics Agency (BPS), the Indonesian Ministry of Agriculture and Forestry, Bank Indonesia, and UN Comtrade. This study focuses on Indonesia's pineapple export activities, which are influenced by production volume, wholesale price index, exchange rate, and export prices.
3. Research Variables
   - Independent Variables: Variables that influence changes in the dependent variable, which include production volume (X1), wholesale price index (X2), exchange rate (X3), and export prices (X4).
   - Dependent Variable: A variable affected by the independent variables, which is the export volume of pineapples (Y) in this study.
4. Data Type and Sources: This study utilizes quantitative data, which consists of numerical values that can be expressed and measured using numerical units (Sugiyono, 2013). The data source used is secondary data, comprising a quarterly time series dataset collected from relevant institutions covering the period from 2013 to 2023, totaling 44 observations.
   - **Secondary data for:**
     - Export volume of pineapples (Y), production volume (X1), and wholesale price index (X2) were obtained from the Central Statistics Agency (BPS) and the Indonesian Ministry of Agriculture and Forestry.
     - The exchange rate (X3) was obtained from Bank Indonesia.
     - Export prices (X4) were obtained from the UN Comtrade.

5. Data Analysis Techniques

1. Descriptive Statistical Analysis: Descriptive analysis examines and summarizes the collected data. Once the data is gathered, it undergoes processing, analysis, and description of the related variables.
2. Multiple Linear Regression Analysis: Multiple linear regression analysis studies the relationship between two or more variables and determines the extent to which the independent variables influence the dependent variable (Noer, 2011).
3. Classical Assumption Tests: Classical assumption tests are conducted to ensure that the regression model used in this study provides accurate, unbiased, and consistent estimates. The classical assumption tests applied in this research include:
   - Normality test
   - Multicollinearity test
   - Autocorrelation test
   - Heteroscedasticity test

3. Results And Discussion

Descriptive statistical analysis is presented to provide general information about the characteristics of the sample in the form of the highest value, the lowest value, the average, and the standard deviation. The results of descriptive statistics can be seen in Table 2. as follows:

Table 2. Descriptive Statistical Analysis Results

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Export Volume (Tons)	44	20340.00	62740.00	45538.18	9298.169

Production (Tons)	44	225420.0	676600.0	449509.3	101808.7
Wholesale Price Index (%)	44	93.68000	607.7400	311.3548	213.1964
Rupiah exchange rate)	44	9768.000	16448.00	13834.80	1409.001
Export Price (US$)	44	1298.090	5643.500	2356.655	973.2347

Source: Processed Data, 2024

The following is an explanation of the descriptive statistical analysis of each variable based on Table 2.

1) Export Volume

Based on the descriptive calculations carried out, the average export volume per quarter is 45,538.18 tons, with a minimum volume of 20,340.00 tons in the first quarter of 2016 and a maximum volume of 62,740.00 tons in the fourth quarter of 2021, with a standard deviation of 9,298.169 tons.

2) Production

Based on the descriptive calculations carried out, the average production of Indonesian pineapple per quarter is 449,509.3 tons, with a minimum volume of 225,420 tons in the third quarter of 2017 and a maximum volume of 676,600 tons in the fourth quarter of 2018, with a standard deviation of 101,808.7 tons.

3) Wholesale Price Index

Based on the descriptive calculations carried out, the average Indonesian wholesale price index per quarter is 311.3 percent. The lowest index was 93.6 percent in the second quarter of 2022, while the highest index was 607.7 percent in the third quarter of 2017, with a standard deviation of 213.1 percent.

4) Exchange Rate

The average quarterly value of the Rupiah exchange rate against the US Dollar from 2013 to 2023 was recorded at Rp. 13,834.80. The minimum exchange rate occurred in the first quarter of 2013 at Rp. 9,768.00, and the maximum exchange rate of Rp. 16,448.00 occurred in the first quarter of 2020, with a standard deviation of 1,409.001. From this calculation, the development of the fluctuating exchange rate tends to increase, which means that the Rupiah has decreased in value (depreciation) against the US Dollar.

5) Export Prices

The average price per ton was recorded at US$2,356,655, the median price was US$1,912,310, the minimum price of US$1,298,090 occurred in the third quarter of 2013, and the maximum price of US$5,643,500 occurred in the first quarter of 2013, with a standard deviation of US$973.2347.

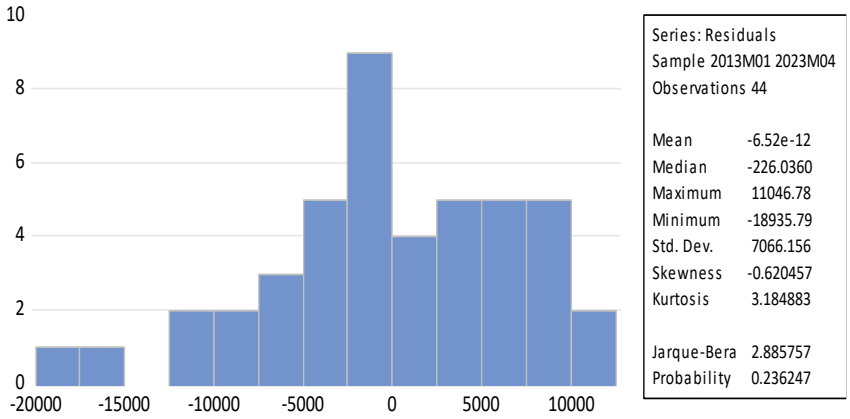

Figure 2. Normality Test Results

Source: Eviews Output, 2024

The normality test is normally distributed or not by looking at the JB (Jarque-Bera) probability with an alpha of 5 percent (0.05). If the Jarque-Bera probability is greater than 5 percent, it is normally distributed and vice versa. If the value is less than 5 percent, then the data is not normally distributed. Based on the results of the Normality Test obtained, it can be seen that the probability shows a figure of 0.236> α (0.05), so it can be concluded that the residual is normally distributed.

Table 3. Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	4.93E+08	394.2153	NA
PRODUCTION	0.000161	27.25649	1.301171
IHPB	36.08114	4.076559	1.280968
EXCHANGE RATE	1.737371	268.4730	2.694098
EXPORT_PRICE	3.559940	18.43595	2.633759

Source: Eviews Output, 2024

Examining the Variance Inflation Factor (VIF) values is one way to test for multicollinearity. If the Centered VIF value is less than 10, the regression model is considered free from multicollinearity issues. As shown in Table 1, the Centered VIF values for production (X_1) is 1.301, wholesale price index (X_2) is 1.280, exchange rate (X_3) is 2.694, and export price (X_4) is 2.633—all of which are below 10. Thus, it can be concluded that there is no indication of multicollinearity among the variables in the model.

Table 4. Heteroscedasticity Test

F-statistic	0.985672	Prob. F(4,39)	0.4267
Obs*R-squared	4.039764	Chi-Square Prob.(4)	0.4007
Scaled explained SS	3.467194	Chi-Square Prob.(4)	0.4829

Source: Eviews Output, 2024

The heteroscedasticity test aims to test whether there is inequality in the variance of the residuals of one observation to another in the regression model. One way to detect heteroscedasticity is by the Breusch-Pagan-Godfrey test which is used to see whether the regression model is homoscedastic or heteroscedastic. If the Chi Square Prob. from the Heteroscedasticity Test results is more than 0.5, the regression model is homoscedastic or there are no symptoms of heteroscedasticity. Based on Table 4. The Chi Square Prob. shown is 0.482 which is more significant than α (0.05). From these results, it can be concluded that there are no symptoms of heteroscedasticity in the regression model used.

Table 5. Autocorrelation Test

F-statistic	**2.395629**	**Prob. F(3,36)**	**0.0843**
Obs*R-squared	**7.322200**	**Chi-Square Prob.(3)**	**0.0623**

Source: Eviews Output, 2024

One way to see whether or not there is an autocorrelation problem in a model is by using the Breusch Pagan-Godfrey Serial Correlation LM Test method. Through the Breusch Pagan-Godfrey Serial Correlation LM Test, researchers can see whether the data experiences autocorrelation symptoms if there are no autocorrelation symptoms, the Prob. Chi-Square (2) number from the test results of the data is more than α (0.05). From the results of the Autocorrelation Test that has been carried out, the Prob. Chi-Square (3) shown is 0.062, meaning the number is more than α (0.05). This indicates that the regression model in this study does not experience autocorrelation symptoms.

Based on the classical assumption test that has been carried out, the regression model in this study is suitable for use because it is free from classical assumption test problems, so multiple linear regression analysis and hypothesis testing can be continued.

Table 6. Multiple Linear Regression Analysis

Variables	Coefficient	Std. Error	T-count value	Prob.
C	**50186.76**	**22208.83**	**2.259766**	**0.0295**
PRODUCTION	**0.015993**	**0.012677**	**1.261515**	**0.2146**
IHPB	**-13.56854**	**6.006758**	**-2.258879**	**0.0296**
EXCHANGE RATE	**0.236223**	**1.318094**	**0.179216**	**0.8587**
EXPORT_PRICE	**-4.617127**	**1.886780**	**-2.447093**	**0.0190**

R-squared	**0.422474**	**Mean dependent variable**	**45538.18**
Adjusted R-squared	**0.363240**	**SD dependent var**	**9298.169**
F-statistic	**7.132355**	**Prob(F-statistic)**	**0.000207**

Source: Eviews Output, 2024

The simultaneous influence test is used to determine whether all independent variables collectively influence the dependent variable. This test also serves as a model feasibility test for the regression model in this study. Based on the number of observations (n) of 44, k = 5, and degrees of freedom (df) = n – k = 44 – 5 = 39, with a significance level (α) of 0.05, the F-table value obtained is 1.68. From Table 6, the F-calculated value is 7.13 with a probability of 0.00. Since F-calculated (7.13) > F-table (1.68) and the probability value 0.00 < 0.05 (α), H0 is rejected, and H1 is accepted. This indicates that production, wholesale price index, exchange rate, and export prices collectively significantly influence Indonesia's pineapple export volume from 2013 to 2023.

The coefficient of determination (R-Square) is 0.422 or 42.2%, meaning that 42.2% of the variations in Indonesia's pineapple export volume from 2013 to 2023 can be explained by production, wholesale price index, exchange rate, and export prices, while other variables outside the model influence the remaining 57.8%.

The partial influence test using the t-test is employed to determine the individual effect of each independent variable—production, wholesale price index, exchange rate, and export prices—on the dependent variable, export volume.

- Production and export volume: With 44 observations, k = 5, df = 39, and α = 0.05, the t-table value is 1.68. From Table 6, the t-calculated value is 1.261, with a probability of 0.214. Since t-calculated (1.261) < t-table (1.68) and the probability value 0.214 > α (0.05), H1 is rejected, and H0 is accepted, meaning that production does not have a significant influence on pineapple export volume.
- Wholesale price index and export volume: Since t-calculated (2.258) > t-table (1.68) and the probability value 0.029 < α (0.05), H0 is rejected, and H1 is accepted, indicating that the wholesale price index has a significant influence on pineapple export volume.

- Exchange rate and export volume: Since t-calculated (0.179) < t-table (1.68) and the probability value 0.858 > α (0.05), H1 is rejected, and H0 is accepted, meaning that the exchange rate does not have a significant influence on pineapple export volume.
- Export price and export volume: Since t-calculated (2.447) > t-table (1.68) and the probability value 0.019 < α (0.05), H0 is rejected, and H1 is accepted, indicating that export prices have a significant influence on pineapple export volume.

This analysis concludes that while the wholesale price index and export prices significantly affect pineapple export volume, production and exchange rate do not have a significant impact.

4. Conclusion And Suggestions

Based on the data processing results, analysis, and discussion in the previous chapters, it can be concluded that production, wholesale price index, exchange rate, and export prices simultaneously significantly influence Indonesia's pineapple export volume. However, production and exchange rates do not have a significant partial effect on Indonesia's pineapple export volume, whereas the wholesale price index and export prices have a significant effect.

From these conclusions, the following recommendations are proposed for stakeholders involved in pineapple exports. The wholesale price index and export prices have a negative but significant impact on Indonesia's pineapple export volume, meaning that an increase in these two variables leads to a decrease in pineapple export volume. Since the wholesale price index and export prices are influenced by production costs, the government, and relevant stakeholders should develop strategies to reduce production costs, ensuring that the selling price of pineapples remains competitive in the international market.

Furthermore, the independent variables in this study explain 42.2% of the variation in Indonesia's pineapple export volume, while other variables influence the remaining 57.8%. Therefore, future researchers are encouraged to expand on the findings of this study by incorporating additional variables beyond those examined here.

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