

## Export-Import of Manufacturing Industry and Economic Growth In Indonesia: Approach to Causality and Cointegration Analysis

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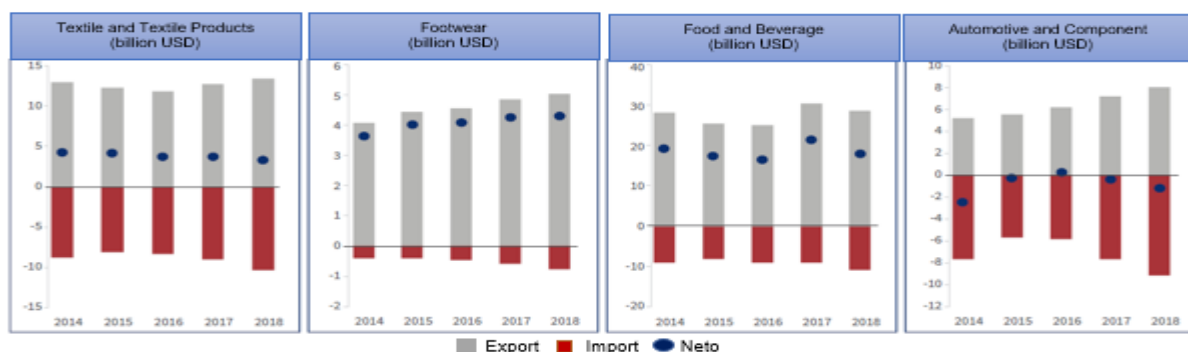
**ABSTRACT:** The development of the 4.0 industrial era characterized by improved connectivity and interaction based on information and communication technologies, increasingly opening opportunities for Indonesia in enhancing the competitiveness of the manufacturing industry to encourage Indonesia's productivity and economy. The objective of this study analyzes causality and relationships equilibrium in the short-term and long-term between manufacturing exports, manufacturing imports, the rupiah exchange rate against the US dollar, and economic growth in Indonesia over 50 Years (1969 – 2018). The results show that manufacturing exports and economic growth in Indonesia have a two-way causality. Meanwhile, manufacturing imports and economic growth in Indonesia have only a one-way causality relationship. From the results of the cointegration test, it turns out that during the research period, there was no long-term balance relationship between manufacturing exports and imports and Indonesia's economic growth.

**KEYWORDS:** *Export-Import of Manufacturing Industries, Economic Growth*

### I. INTRODUCTION

The manufacturing industry supports one of the main drivers of economic development in Indonesia. It is reflected in the considerable contribution to GDP ratio, the composition of national exports and labor absorption, and has a role in the formation of national competitiveness. Based on data from UNSD (United Nations Statistics Division) in 2016, Indonesia is ranked fourth in the world of 15 countries whose manufacturing industry contributes to GDP by more than 20 percent, which is 22 percent<sup>[1]</sup>.

The role of the manufacturing industry has also become essential in strengthening the structure of Indonesia's trade balance, which is currently still dominated by natural resource-based commodities. The strength of the manufacturing industry lies in the products of the industry itself, namely in the form of tradable goods<sup>[2]</sup>. Therefore, the development of manufacturing industries needs to be directed more towards export-oriented manufacturing industries, as is currently being done by the government. The revitalization of the manufacturing industry has gradually been carried out to increase the role of exports through technological change and innovation to encourage increased productivity and competitiveness. Also, the substantial contribution of exports will contribute to boosting economic growth, improving the labor market, and can improve the performance of the current account balance.



Source: Bank Indonesia<sup>[3]</sup>

Fig 1. Priority Sector of Export-Oriented Manufacturing Industries

Based on Figure 1 above, the priority sectors to encourage increased manufacturing exports in Indonesia derived from the textile and textile products industry, the footwear industry, the food and beverage industry, as well as the automotive and component industries. The proportion between exports and imports of the textile industry and textile products looks almost the same, as does the automotive and component industries. For the footwear industry and the food and beverage industry, it is seen that the proportion of exports is more significant when compared to imports. These four industries have become the government's priority targets in the 2015-2020 National Industrial Development Master Plan (RIPIN)<sup>[3]</sup>.

In international trade activities, the depreciation of the rupiah against the US dollar and the appreciation of the rupiah against the US dollar will significantly affect the value of Indonesia's exports and imports. One effort to increase the number of Indonesian exports in the world market is to maintain the stability of the value of the rupiah against the US dollar. This research is essential to know how the causality and relationship equilibrium in the short and long term between manufacturing exports, manufacturing imports, the exchange rate of the rupiah against the US dollar, and economic growth in Indonesia.

## II. LITERATURE REVIEW

### 1. Development Strategy of Manufacturing Industry in Indonesia

According to Bank Indonesia, efforts to encourage the increasing role of the manufacturing industry require a focused policy strategy. First, support improvements in production factors to overcome productivity gaps. It is closely related to efforts to increase the capacity of domestic industries to be on par with regional countries. This first strategy includes providing adequate infrastructure support for the development of the sector, as well as the availability of human resources in line with industry needs. Also, this strategy is directed to be able to encourage the development of upstream and intermediate industries to strengthen linkages between domestic sectors, thereby promoting an increase in the local value chain.

The second strategy is related to regulation and institutions to overcome regulatory deficiency, including incentives for exports. The implementation of this strategy aims to improve the business climate through deregulation and the application of incentive schemes to attract investment. The implementation of this strategy also includes providing incentive schemes for industries to enhance export orientation. The implementation of this strategy is also directed at ensuring institutional and regulatory support to gradually arrange industrial development to be competitive in the global market.

The third strategy emphasizes strengthening trade cooperation and promotion to expand market access. In its implementation, this strategy was pursued, among others, through the expansion of free trade agreements and bilateral cooperation. The application of this strategy is accompanied by efforts to increase the diversification of export products. Besides, an increase in market analysis, especially in the context of market intelligence, to improve the ability to understand the characteristics of global demand trends<sup>[3]</sup>.

### 2. Empirical Study

Research on the manufacturing industry and its relation to the economy has been done a lot before. Research results in Nigeria in 1990 - 2013 stated that output from the manufacturing sector contributed negatively and had an insignificant relationship to the growth of the real gross domestic product. Exchange rates and interest rates do not contribute to real total domestic product growth, which shows signs of macroeconomic instability<sup>[4]</sup>. While the results of research conducted in developing countries stated that an analysis that included variables such as exports of high and low-tech manufacturing industries, investment, and population, found that only two variables, commodities, and investment of high-tech manufacturing industries, were positive and a significant influence on growth<sup>[5]</sup>.

Besides, a similar study was also conducted in developing countries in the South African region. The results showed that there was a long-term equilibrium between manufacturing exports and economic growth from 1980 to 2012. The results showed that there was a positive impact on manufacturing exports on economic growth in the Southern African Development Community (SADC). Furthermore, this study applied a causality analysis and found that causality runs from economic growth to manufacturing exports<sup>[6]</sup>.

## III. METHOD

The research material uses quantitative material related to data describing international trade through the export and import activities of the manufacturing industry in Indonesia for a period of 50 years, starting from 1969 to 2018. The scope of this research focused on the causality and cointegration between manufacturing exports, import manufacturing, and the exchange rate for Indonesia's economic growth, whose data sourced from the World Bank.

### 1. Econometric Model

The econometric models in this study are:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + e_t \quad (1.1)$$

Where :

Y	=	Economic growth (%)
$\beta_0$	=	Intercept
$X_1$	=	Manufacturing Exports (% of merchandise exports)
$X_2$	=	Manufacturing Imports (% of Merchandise Imports)
$X_3$	=	Growth Rate of the Rupiah against the US Dollar (%)
$\beta_1 \beta_2 \beta_3$	=	Coefficient
e	=	Error term
t	=	time

**2. Research Stages**

**a. Unit Root Test**

The initial stage before conducting further analysis should be done by testing the stationarity of the data by performing a unit root test<sup>[7]</sup>. Augmented Dickey-Fuller test (ADF test) is a standard procedure for testing the null hypothesis (H0) of the unit root or series not being stationary to the alternative hypothesis (H1), namely the stationary series. If  $Y_t$  is a series with lag length  $p$ , then:

$$\Delta Y_t = \beta_0 + \delta Y_{t-1} + \sum_{i=2}^p \beta_i \Delta Y_{t-i+1} + e_t \tag{1.2}$$

$$e_t \sim IID(0, \sigma^2)$$

It is assumed  $e_t$  (error term) does not correlate and follows the white noise process,

$$\delta = -[1 - \sum_{j=1}^p \alpha_j]$$

$$\beta_i = \sum_{j=1}^p \alpha_j$$

**b. Causality Test**

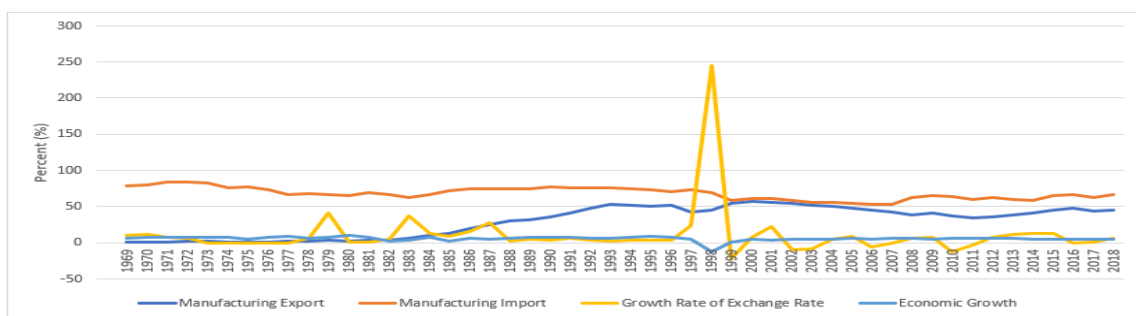
This test is intended to determine that of the two related variables, which variable causes the other variables to change. Granger causality test is the most popular method<sup>[8]</sup>. In the Granger causality test, it can be seen whether a variable has a two-way relationship or only one direction only.

**c. Cointegration Test**

A cointegration test is used to continue the analysis of non-stationary time series data. As a basis, cointegration is that several time series data can deviate from the average in the short term, but move together (co-movement or cointegration). For a long time and towards a state of equilibrium in the long run<sup>[7]</sup>. If a number of variables move together in the long term, it can be said that the variables in the model are cointegrated.

**IV. RESULTS AND DISCUSSION**

The manufacturing industry plays a vital role in Indonesia's economic growth, mainly export-oriented. The following developments in manufacturing exports, manufacturing imports, the rate of growth in rupiah against the US dollar, and the financial growth period from 1969 to 2018.



Source: World Bank<sup>[9]</sup>

**Fig 2. Developments in Manufacturing Exports, Manufacturing Imports, the Growth Rate of Rupiah Exchange Rate against the US Dollar, and Indonesia's Economic Growth, Years 1969 - 2018 (%)**

Based on Figure 2, over the past 50 years, the development of manufacturing exports and imports in Indonesia has fluctuated but continues to show a positive trend. The rate of growth of the rupiah exchange rate against the US dollar shifted quite sharply from year to year, especially in 1998, while the development of Indonesia's economic growth moved relatively stable except in 1998, which showed a negative trend.

To find out the relationship of equilibrium for the short term or long term between variables, the results of this study are as follows:

### 1. Unit Root Test

The unit root test results using the Augmented Dickey-Fuller (ADF) test of each variable data in this study are as follows:

**Table 1. Unit Root Tests with ADF Test (Level)**

Variable	ADF test statistic	Level	
		t-stats	Prob.
EKS_MNF	-1.352712	-2.923780	0.5974
IMP_MNF	-1.813673	-2.922449	0.3697
EXCHG_RATE	-7.170836	-2.922449	0.0000
ECO_GROWTH	-4.859849	-2.022449	0.0002

Source: Unit Root Test; Eviews v.10, 2019

Based on Table 1 above, the value of the ADF test statistic for manufacturing exports and manufacturing imports are both higher than the t statistic values with probabilities of 0.5974 and 0.3697, respectively. These results indicate that the two variables are not stationary at the level. While the ADF test value of the variable exchange rate and economic growth are both smaller than the value of the t statistic with a probability of 0.0000 and 0.0002, respectively. These results indicate that the exchange rate and economic growth are stationary at the level.

Because two variables are not stationary at the level, then it is tested again on the first difference.

**Table 2. Unit Root Tests with ADF Test (First Difference)**

Variable	ADF test statistic	1 <sup>st</sup> Difference	
		t-stats	Prob.
EKS_MNF	-4.312460	-2.923780	0.0012
IMP_MNF	-5.951077	-2.925169	0.0000
EXCHG_RATE	-8.668095	-2.925169	0.0000
ECO_GROWTH	-7.712272	-2.925169	0.0000

Source: Unit Root Test; Eviews v.10, 2019

Based on Table 2 above, the four stationary variables are the first difference. It can see from the value of the ADF test statistic, which is smaller than the value of the t statistic, and the probability is lower than  $\alpha = 0.05$ .

### 2. Causality Test

Causality test results using the Granger Causality Test method in this study are as follows:

**Table 3. Granger Causality Test (Lag 2 & 4)**

Pairwise Granger Causality Tests			
Sample: 1969 2018			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
IMP_MNF does not Granger Cause EKS_MNF	48	0.24407	0.7845
EKS_MNF does not Granger Cause IMP_MNF		1.40638	0.2561
EXCHG_RATE does not Granger Cause EKS_MNF	48	5.59727	0.0069
EKS_MNF does not Granger Cause EXCHG_RATE		3.89972	0.0278
ECO_GROWTH does not Granger Cause EKS_MNF	48	6.14544	0.0045
EKS_MNF does not Granger Cause ECO_GROWTH		4.82506	0.0129
EXCHG_RATE does not Granger Cause IMP_MNF	48	4.09261	0.0236
IMP_MNF does not Granger Cause EXCHG_RATE		0.32581	0.7237
ECO_GROWTH does not Granger Cause IMP_MNF	48	7.44492	0.0017
IMP_MNF does not Granger Cause ECO_GROWTH		0.89279	0.417
ECO_GROWTH does not Granger Cause EXCHG_RATE	48	0.43318	0.6512
EXCHG_RATE does not Granger Cause ECO_GROWTH		0.28655	0.7523

Source: Granger Causality Test; Eviews v.10, 2019

Pairwise Granger Causality Tests			
Sample: 1969 2018			
Lags: 4			
Null Hypothesis:	Obs	F-Statistic	Prob.
IMP_MNF does not Granger Cause EKS_MNF	46	0.18299	0.9458
EKS_MNF does not Granger Cause IMP_MNF		2.04719	0.1077
EXCHG_RATE does not Granger Cause EKS_MNF	46	3.28083	0.0213
EKS_MNF does not Granger Cause EXCHG_RATE		4.30879	0.0058
ECO_GROWTH does not Granger Cause EKS_MNF	46	3.94051	0.0092
EKS_MNF does not Granger Cause ECO_GROWTH		3.99069	0.0086
EXCHG_RATE does not Granger Cause IMP_MNF	46	1.47720	0.2289
IMP_MNF does not Granger Cause EXCHG_RATE		0.51395	0.7259
ECO_GROWTH does not Granger Cause IMP_MNF	46	2.63636	0.0493
IMP_MNF does not Granger Cause ECO_GROWTH		0.52958	0.7147
ECO_GROWTH does not Granger Cause EXCHG_RATE	46	0.75256	0.5627
EXCHG_RATE does not Granger Cause ECO_GROWTH		0.39434	0.8114

Source: Granger Causality Test; Eviews v.10, 2019

Based on Table 3 in the lag 2 test above, manufacturing exports and manufacturing imports, the two do not have a causal relationship. The same thing happened to economic growth and exchange rates. There was no causality. Between the exchange rate and manufacturing exports has a two-way causality relationship. Manufacturing exports and economic growth also have a two-causality relationship, characterized by the value  $\text{Prob.} < \alpha = 0.05$ . In contrast to manufacturing imports and the exchange rate has a one-way causality relationship. Namely, the exchange rate affects manufacturing imports, while manufacturing imports do not affect the exchange rate. The same thing happens with economic growth, and manufacturing imports have a one-way causality relationship, namely economic growth affects manufacturing imports while manufacturing imports do not affect economic growth.

In lag 4, manufacturing exports and manufacturing imports do not have a causality relationship. The same thing happens between the exchange rate and manufacturing exports, and between economic growth and the exchange rate, that is, it does not have a causal relationship. Between the exchange rate and manufacturing exports, and between manufacturing exports and economic growth, they have a two-way causality relationship, which is characterized by the value of  $\text{Prob.} < \alpha = 0.05$ . While the variables that have a one-way causality relationship between economic growth and manufacturing imports. Economic growth affects manufacturing imports, but manufacturing imports do not affect economic growth.

### 3. Cointegration Test

Cointegration test results using the Johansen Cointegration Test method in this study are as follows:

**Table 4. Johansen Cointegration Test**

Unrestricted Cointegration Rank Test (Trace)			
Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Prob.**
None*	57.61562	47.85613	0.0047
At most 1	28.71471	29.79707	0.0663
At most 2	11.61719	15.49471	0.1762
At most 3	1.398378	3.841466	0.2370
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)			
Hypothesized No. of CE(s)	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	28.90091	27.58434	0.0337
At most 1	17.09752	21.13162	0.1674
At most 2	10.21881	14.26460	0.1979
At most 3	1.398378	3.841466	0.2370

Source: Johansen Cointegration Test; Eviews v.10, 2019

Based on Table 4 above, most of the trace statistic values and max-eigen statistical values are smaller than critical value. So it can be concluded that manufacturing exports, manufacturing imports, the exchange rate of the rupiah against the US dollar, and economic growth, do not have a cointegration or equilibrium relationship in the long-term.

## V.CONCLUSION

Based on research results, manufacturing exports and economic growth have a two-way causality relationship, meaning that manufacturing exports affect economic growth in Indonesia, as well as economic growth affecting manufacturing exports in Indonesia for 50 years from 1969 to 2018. As with manufacturing imports and economic growth has only one-way causality, namely economic growth affects manufacturing imports in Indonesia while manufacturing imports does not affect economic growth in Indonesia. It means that Indonesia has an excellent opportunity to continue to strive to increase exports of manufacturing industries, which in turn can increase economic productivity. Also, during the study period, between exports and manufactured imports, the exchange rate and Indonesia's economic growth did not have a long-term equilibrium relationship. It means that an increase will follow the increase in changes in exports and manufactured imports in changes in Indonesia's economic growth in the short-term.

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