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Research article

Export Diversification and Economic Growth in Indonesia: An ARDL Model Analysis

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ABSTRACT

The anomalies in Indonesia's export data underpin this research, which examines the patterns of export diversification in Indonesia and its impact on economic growth using the ARDL model. This study investigates export diversification and its effects on economic growth, considering variables such as gross fixed capital formation and labor. The data used spans the period from 1989 to 2022. This study is the first to consider Indonesia as a case study with valid pre-estimation testing. This study found that export diversification has a significant impact on economic growth in Indonesia and provides valuable insights into the relationship between export diversification and economic growth, highlighting policy implications to encourage diversification and mitigate risks associated with dependence on a few key markets. This study emphasizes the need for better diversification strategies to ensure economic stability and long-run growth.

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1. INTRODUCTION

The idea of export diversification has emerged as a significant topic in international economic literature amid periods of rapid growth. Export diversification is the process of increasing the range of goods and export destinations to prevent becoming overly reliant on a small number of key commodities. Numerous studies have been carried out both domestically and internationally on the evolution of export diversification and its effects on economic growth. Reducing a country's export concentration in terms of particular products and regions tends to make export values more stable during external shocks. Because the export variable is one of several macroeconomic variables that exhibit anomalies in developing nations like Indonesia during times of crisis (Athukorala & Warr, 2002; and Siregar & Daryanto, 2005). A country's export destination and product concentration can be minimized by implementing effective export diversification policies, both vertically and horizontally. Previous studies have shown that export diversification plays a crucial role in driving economic growth (Lugeiyamu, 2016; Abreha et al., 2020; Espoir, 2020; Handoyo & Ibrahim, 2021; Lee & Zhang, 2022; and Haini et al. 2023).

Export diversification can be classified as either vertical or horizontal. Growing into new markets or launching new goods are examples of horizontal export diversification, which has a big effect on economic expansion. Expanding into more complex products and developing new markets can drive productivity improvements and economic growth. Diversification into new products allows firms to mitigate the risks associated with price volatility in existing markets. Furthermore, Agosin (2009) argued that a diversified export structure can reduce the negative effects of exchange rate fluctuations on economic growth. The overall literature indicates that by adopting horizontal export diversification, countries can enhance industrial efficiency and achieve more stable and sustainable

economic growth. Several studies have used index as a proxy for export diversification (Aditya & Acharyya, 2013; Espoir, 2020; and Jongwanich, 2020), however this study employs the number of products exported.

As the value-added of exported goods increases, the proportion of manufactured exports to total exports can be used to quantify vertical export diversification. The higher this percentage, the larger the share of manufactured goods in a nation's export portfolio, which suggests that the complexity and quality of exported goods have improved. This aligns with the findings of Mayer et al. (2014), who noted that firms tend to export their core products—often those with higher value-added—to larger and more distant markets, especially when trade costs and market competition are high. An increase in the percentage of manufactured exports relative to total exports also reflects a country's ability to adopt technology and improve production efficiency, thereby competing internationally with high-quality products. With high demand from countries with strong purchasing power (high GDP per capita) that prefer product variety, companies have a greater opportunity to offer a diverse range of high-value manufactured goods. Additionally, firms are encouraged to concentrate on their core manufactured products, which are more competitive, by supportive trade policies like regional trade agreements. Therefore, a rise in the proportion of manufactured exports signals innovation and technological advancement, which in turn boosts competitiveness in international markets. It also improves export performance.

To understand the mapping of research discussing export diversification in general, it can be seen based on (Sarin et al., 2022) review of 88 journals on export diversification. Of these, 94% of studies (62 out of 66 studies) show a positive impact of export diversification on economic growth, especially in developing countries. Export diversification has been shown to reduce dependence on specific commodities, increase economic stability, and accelerate economic growth by increasing the variety of exported products. However, 5% of studies (3 out of 66) found a negative impact such as study by Amin et al. (2000), found a negative impact in Colombia, where excessive diversification hindered productivity in key sectors. 1% of other studies found no significant effect. Moreover, only 11% (10 out of 88 journals) of the studies reviewed used a time-series data approach to analyze the relationship between export diversification and economic growth, while 89% of other studies used panel data methods to delve deeper into long-run effects and cross-country influences. This could present a novelty in this research. Sarin et al. (2022) also indicates that studies explaining the relationship between export diversification and economic growth often follow a U-shaped pattern, where diversification increases at the early stages of economic growth but decreases as countries transition to specialization at higher income levels. Diversification allows a country to reduce its dependence on international price fluctuations, especially for highly volatile commodities such as oil and gas. However, in the context of Indonesia, data shows an interesting anomaly related to the relationship between export diversification and economic growth.

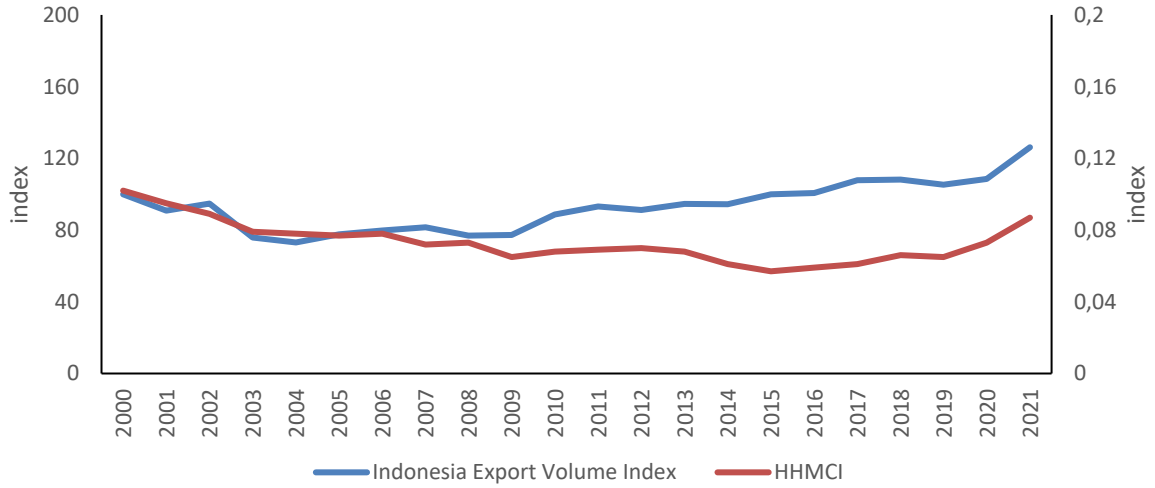

Figure 1. Export Volume Index and Herfindahl-Hirschman Market Concentration Index (HHMCI)
Source: World Integrated Trade Solution (2024)

Figure 1 illustrates this anomaly. The red line represents the Herfindahl-Hirschman Market Concentration Index (HHMCI) and the blue line shows the export volume index. The figure indicates that Indonesia actually has a fairly good level of export diversification, marked by an index value ranging from 0.05 to 0.06. This index shows that Indonesian exports are not entirely concentrated on a few specific commodities but are rather spread across various products. However, despite the theoretical appearance of diversification, the HHMCI also shows an increase in export concentration. What is interesting about this anomaly is that despite the increase in export concentration for certain commodities, Indonesia's export performance continues to show significant improvement. Data reveals that Indonesia's export value keeps rising even though the dependence on a few major commodities has increased. This is contrary to the general view that export diversification is generally necessary to drive economic growth. In other words, despite increasing export concentration, Indonesia's economy remains able to grow well. This phenomenon is inconsistent with most previous research findings. From this perspective, there is a need for research analyzing the impact of export diversification on economic growth with a focus on Indonesia.

To provide a more comprehensive understanding, this study will use time series data analysis methods to identify the relationship between export diversification and economic growth, ensuring that the results are not disrupted by cross-country parametric variables. This analysis will also include an evaluation of the patterns of export diversification in Indonesia. The findings from this study are expected to contribute new insights to the literature on export diversification and offer more precise policy recommendations for the Indonesian government to advance the export sector and maintain economic stability in the future. Overall, this study will serve as a critical foundation for understanding the anomaly observed in Indonesia, where an increase in export concentration coincides with improved economic performance. It aims to address whether export diversification remains relevant in the Indonesian context or if other factors, such as trade policies and infrastructure, are more decisive. The answers to these questions are anticipated to provide new insights into the most effective economic strategies for advancing Indonesia's exports and economic growth in the future. The study's remaining components are planned as follows: The material and techniques are explained in Section 2, and the empirical results are presented and discussed in Section 3. Section 4 brings the paper to a close with some recommendations for policy.

2. RESEARCH METHODS

2.1. Export Diversification Patterns

Indonesian trade is generally divided into two main sectors: oil and gas (*migas*) and non-oil and gas (*non-migas*). Export and import values in both sectors have fluctuated in response to global economic conditions. In 2020, both sectors experienced a sharp decline in export values due to the impact of the COVID-19 pandemic. However, by 2022, there was a significant increase in export values driven by the recovery of global demand. Additionally, the rise in oil prices, triggered by production restrictions by OPEC, contributed to the boost in oil and gas exports. These restrictions led to reduced oil stocks in the global market, which in turn increased commodity prices. Indonesia's reliance on global economic conditions and its trading partners heavily influences the stability of its exports. While trade with developed countries provides substantial benefits, this dependence also carries risks. If economic disruptions occur in partner countries, such as recessions or political instability, Indonesia's trade balance can be negatively affected. Dependence on specific markets poses a potential threat to export performance, especially if key partners face economic shocks that reduce export demand.

Figure 2 shows that over the past five years, Indonesia's exports have increasingly concentrated towards China, reaching 23 percent in 2022. This trend likely explains the anomalies in Indonesia's export data, where export diversification has decreased due to growing concentration in a few countries like China. While increasing export volumes to these countries may initially appear to improve export performance, maintaining this performance requires diversifying export markets. Diversification is crucial for sustaining economic growth, as it not only aims to boost export revenues

but also mitigates risks associated with global commodity price fluctuations and economic uncertainties.

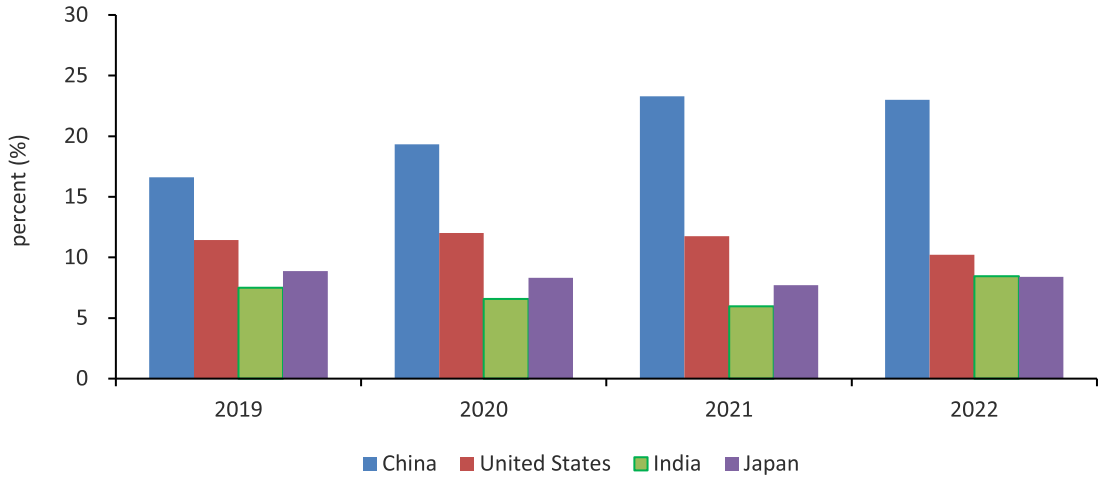

Figure 2: Percentage of Indonesia's Non-Oil and Gas Export Destinations in 2019 - 2022 (percent)
Source: Ministry of Trade of Indonesia

Table 1. Value of Indonesia's Non-Oil And Gas Exports By Partners Country (Millions USD)

Countries	2019	2020	2021	2022
China	25,894.30	29,936.40	51,088.90	63,461.70
United States	17,806.10	18,622.40	25,792.80	28,182.70
India	11,700.60	10,179.00	13,112.60	23,285.70
Japan	13,814.40	12,885.30	16,894.30	23,199.40
Kongo	12.60	8.00	34.90	31.40
Guinea	49.70	69.00	86.50	32.40
Ivory Coast	75.20	78.10	124.00	109.00
Ethiopia	44.00	39.50	42.30	47.50

Furthermore, Table 1 illustrates the value of Indonesia's non-oil and gas exports by destination country. In 2022, China was the top destination, with export values reaching USD 63.5 billion, showing consistent growth since 2019. Other countries such as the United States, India, and Japan also play significant roles in Indonesia's trade. In contrast, exports to African countries, despite their rapid economic growth, remain relatively low. Besides dependence on a few export destinations, Indonesia also faces challenges from concentration in certain commodities. Dependence on commodities such as mineral fuels and iron makes Indonesia's economy vulnerable to international price fluctuations. These price changes can directly impact export performance and the overall economy. Therefore, diversification in both destination countries and export products is crucial for strengthening Indonesia's economic resilience.

2.2. Data Collection

The data used in this research consists of secondary data. Through quantitative analysis, the observed data is time series in nature, covering 33 years of observation, from 1989 to 2022. This study is limited to the year 2022 due to the accessibility constraints of available data. Nevertheless, despite only extending up to 2022, this research remains highly relevant for the case study of Indonesia. Moreover, by including data from 2022, the study captures fluctuations beyond the global COVID-19 pandemic crisis, thus enhancing the interpretation of its findings. This study differs from several previous studies in terms of the country being the object of research, the time series studied, the research methods, and the explanatory variables used. This study focuses exclusively on Indonesia. There are two reasons for this: first, Indonesia was chosen because of the anomaly in related data, making it important to study the impact of export diversification on maintaining export stability. Second, this study only analyzes the case of Indonesia (time series) because significant parametric variations between countries suggest that cross-country aggregate analysis may lead to

misleading conclusions (Haini et al., 2023; and Herzer & Nowak-Lehnmann D, 2006). Furthermore, in terms of research methods, this study is the first to analyze the impact of export diversification on economic growth in Indonesia using pre-estimation testing. The only previous study with the same topic and subject, Amir et al. (2012), is not including pre-estimation testing, such as stationarity tests. Hence, the results might be bias.

2.3. Model Specification

This research uses a quantitative approach based on the theoretical framework of the Solow growth model, which allows for a deeper understanding of the relationship between export diversification and economic growth. The estimator model used is Autoregressive Distributed Lag (ARDL). This model is used because it provides reliable results even with small sample sizes (Haini et al., 2023). The analysis model used in this research refers to the model developed by (Herzer & Nowak-Lehnmann D, 2006). There are many indicators used to measure the level of export diversification. Some studies use index as proxy such as the Ogive Index, Theil Index, Entropy Index, and Herfindahl-Hirschman Index (Aditya & Acharyya, 2013; Espoir, 2020; and Jongwanich, 2020). Each index has its own strengths and weaknesses. Based on the research conducted by Amir et al. (2018), which found that the correlation between export diversification and economic growth in the ASEAN region does not have the expected negative sign but is positive. This suggests that export concentration, rather than diversification, influences economic growth. This finding contrasts with most studies on export diversification. Hence, this study will not use any index as proxy for export diversification. This study will use the number of exported products and the number of export partners as variables instead. Although panel data studies (in this case, ASEAN) do not account for parametric variables between countries in the region, to ensure greater validity, this research uses the number of exported products and the share of manufactured export (% of total exports) as proxies for export diversification. The share of manufactured exports (% of total exports) measures the extent to which a country is shifting from exporting primary commodities (such as raw materials) to manufactured goods, which have higher added value. This approach was also taken by Herzer & Nowak-Lehnmann D (2006) in a study on the same topic in Chile.

Based on the research model by Herzer & Nowak-Lehnmann (2006) on the same topic, the variables are expressed in a log-linear regression form to investigate the long-run relationship between export diversification and economic growth, along with capital and labor. The following is the research model:

$$lnGDP_t = \alpha_0 + \beta_1 lnGDP_{t-1} + \lambda_0 lnNPE_t + \lambda_1 lnNPE_{t-1} + \lambda_0 lnMAN_{t-1} + \lambda_1 lnMAN_{t-1} + \delta_0 lnGFCF_t + \delta_1 lnGFCF_{t-1} + \gamma_0 lnL_t + \gamma_1 lnL_{t-1} + +\epsilon_t \quad (1)$$

The variables for this study are defined as follows: $\ln GDP_t$ represents the real GDP as dependent variable which are from World Integrated Trade Solution; $\ln GFCF_t$ (% of GDP) is the Gross Fixed Capital Formation which are from World Bank; $\ln L_t$ stands for the labor force which are from the Indonesian Central Bureau of Statistics; the number of product exports at time is denoted as $\ln NPE_t$ accessed from WITS (World Integrated Trade Solution), and MAN_t refers to the share of manufactured exports (% of total exports) at time t also from the World Bank, and the time period covered in this study ranges from 1989 to 2022.

3. RESULTS AND DISCUSSION

3.1. Descriptive Statistics

For LNGDP, the mean of 27.02 reflects a consistent level of real GDP over the observation period. The median, at 26.96, is close to the mean, indicating a relatively symmetrical distribution, with no significant difference between the average and the middle value. The maximum of 27.75 and minimum of 26.25 show moderate variation in GDP growth during the period. With a standard deviation of 0.45, the fluctuations in real GDP are not very large. A skewness of 0.0969 suggests an

almost symmetrical distribution, while the kurtosis of 1.79 indicates a slightly flatter distribution than normal, meaning there are a few extreme values. For LNNPE (Number of Products Exported), the mean of 8.24 represents the average number of products exported during the period. The median, at 8.28, is close to the mean, showing a balanced distribution. However, the skewness of -1.70 suggests a left-skewed distribution, meaning there are more values above the mean. The kurtosis of 5.43 indicates a peaked distribution, suggesting the presence of some extreme or outlier values in the number of products exported.

Table 2. Descriptive statistics test result

Descriptive	lnGDP	lnNPE	lnMAN	lnGFCF	lnL
Mean	27.02348	8.242734	3.791189	3.314421	18.39948
Median	26.95990	8.278301	3.784190	3.360586	18.36627
Maximum	27.74639	8.386401	4.043051	3.490733	18.72298
Minimum	26.25289	7.833600	3.465736	2.966303	18.07008
Std. Deviation	0.446695	0.134980	0.150798	0.172274	0.189610
Skewness	0.096929	-1.698346	0.243453	-0.923128	0.006827
Kurtosis	1.787189	5.425253	2.265409	2.559852	1.890746

The percentage of Manufactured Exports to Total Exports (lnMAN) has a mean of 3.79, with a median of 3.78, indicating a balanced distribution. A skewness of -0.24 shows a slight leftward skew, while a kurtosis of 2.27 points to a distribution close to normal. The variation in manufactured exports is relatively small, with a standard deviation of 0.15. For Labor Force (lnL), the mean of 18.40 and median of 18.37 suggest that the labor force is stable and has a balanced distribution. The skewness of 0.0068 indicates an almost symmetrical distribution, while the kurtosis of 1.89 points to a flatter distribution, meaning the variation in labor force data is relatively low. Finally, for gross fixed capital formation (lnGFCF), the mean of 3.31 indicates a moderate level of fixed capital investment. The median of 3.36, close to the mean, shows a balanced distribution, but the skewness of -0.92 indicates a left-skewed distribution. The kurtosis of 2.56 suggests a slightly peaked distribution, indicating some extreme variation in fixed capital investment data. Overall, the data show mostly symmetrical distributions with slight variation in a few variables, especially in the number of products exported and fixed capital investment.

3.2. The Unit Root test

Before performing ARDL model estimation, the pre-estimation stage begins with a stationarity test, or unit root test. This study employs the Augmented Dickey-Fuller (ADF) test. The ADF test aims to determine whether the variables in the model have a unit root, which implies they are non-stationary. The results of this test will dictate whether the data require differencing or other transformations before proceeding with ARDL model estimation.

Table 3. Unit Root Test Results

Variables	t-statistic	Prob.*	Stationer
lnGDP	-4.259185	0.0021	First difference
lnNPE	-4.232678	0.0022	Level
lnMAN	-3.951760	0.0049	First difference
lnGFCF	-3.445471	0.0165	First difference
lnL	-8.951988	0.0000	First difference

Note: *MacKinnon (1996) one-sided p-values

Based on the unit root test using the ADF test, it was found that the variables used are stationary at first difference. This means there are no issues with the unit root test.

3.3. Results of ARDL Bound tests

The next pre-estimation phase is the cointegration test to determine the presence of a cointegration relationship. Cointegration indicates that short-run fluctuations in the variables will

be corrected towards long-run equilibrium. In the short term, the effects of economic variables may not align with the expectations of economic agents. The cointegration test in this study uses the bounds test. The results show that the F-statistic bounds test value is greater than the I(1) value at the 5% significance level, indicating that the variables are cointegrated and have a long-run relationship.

Table 4. The result of model estimation

Test Statistic	Stat.	Signif.	*I*(0)	*I*(1)
			Asymptotic: n = 1000	
F-statistic	11.56774	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Table 4 reports the F-statistic bounds test value is greater than the I(1) value at the 5% significance level. This indicates that the variables are cointegrated and have a long-run relationship. Therefore, in addition to using the ARDL model, this study will also employ the ECM (Error Correction Model) to examine the long-run effects of the variables. Both models can be selected as estimation tools to address one of the research objectives.

3.4. Estimation Results

The primary distinction between the coefficients in the Error Correction Model (ECM) and the ARDL model, as explained in this subsection, is how they depict the immediate and long-run impacts of independent variables on the dependent variable. The long-term and short-run relationships between the independent variables and the dependent variable are described by the ARDL (AutoRegressive Distributed Lag) coefficients. By using the ARDL model, we can observe how changes in independent variables, both past and present, impact the dependent variable both now and in the future. In ARDL without lags, the direct (short-run) influence of independent variables on the dependent variable is reflected in the coefficients of variables. The long-run or delayed effects of independent variables on the dependent variable are indicated by the coefficients of lagged variables in ARDL. We use the ratio of the variable coefficients to the error correction term's coefficient (CointEq.) to determine the pertinent total long-run coefficients. This study show that the variable lnGDP as the dependent variable has a lag of 4, lnNPE has a lag of 0, lnMAN and lnL have lags of 3, and variable lnGFCF has lag 1. This lagged was automatically determined by Akaike Information Criterion (AIC). The ECM model is then used to explain the short-run adjustments to the long-run equilibrium resulting from the ARDL model. The error correction term (CointEq.) shows the speed of adjustment towards long-run equilibrium after a disturbance. It indicates the proportion of the disequilibrium that is corrected in the subsequent period.

Table 5 shows the ARDL estimation output, the variable of lnGFCF also has positively and significant effect on lnGDP, this implies that 1% increase investment in fixed assets will increase GDP growth of 0.438% in the long run. This indicated that emphasizing the importance of ongoing investment in capital goods to support sustainable economic growth. The lnL has a positive and significant impact on lnGDP, this implies that 1% increase in labor will increase GDP growth of 1.467%. The lnNPE has a positive and significant effect on lnGDP, this means that a 1% increase in product exported will cause a 0.754% increase on GDP growth. The lnMAN has a positively and significant effect on GDP growth, this implies that 1% increase share of manufacturing exports will increase GDP growth by 0.286%. This suggests that while labor may initially decline, it strongly recovers over time. Significance in the F statistic indicates that the model is overall good and robust.

The estimation result of error correction form, lnGFCF has a positive and significant impact on GDP, this implies that 1% increase of gross fixed capital formation will improve lnGDP of 0.438%. The variable of lnL shows a strong positive and significant effect on lnGDP, this implies that 1% increase of labor on will decrease lnGDP of 0.987%, indicating some short-run volatility in labor's effect on GDP in the short term. The lnNPE has a positive and significant effect on lnGDP, suggesting

that an 1% increase in the product exports positively and significant impacts on GDP growth of 0.578% in the short run. The last, lnMAN also has a positive and significant effect on lnGDP, suggesting that an 1% increase in the share of manufacturing exports positively impacts GDP growth of 0.163% in the short run. The CointEq (error correction term) has a negative and significantly of -0.747 (p-value = 0.000), indicating that 74.7% of any deviation from the long-run equilibrium is corrected each year. A value closer to -1, means that any imbalance is quickly adjusted back to long-run equilibrium.

Table 5. The Estimastion Results of ARDL Model

Dependent variable = lnGDP				
Variables	**Coefficient**	**Std. error**	**t-stats**	**Prob.****
Long run (lag of 4,2,4,0,4)				
Constant	14.624	3.525	4.148	0.001
lnNPE	0.754	0.263	2.858	0.012
lnMAN	0.285	0.120	2.362	0.033
lnGFCF	0.438	0.090	4.866	0.000
lnL	1.467	0.261	5.620	0.000
Short run (lag of 1,3,3,0,3)				
Δ(lnNPE)	0.578	0.245	2.359	0.028
Δ(lnMAN)	0.163	0.048	3.396	0.004
Δ(lnGFCF)	0.438	0.065	6.738	0.000
Δ(lnL)	0.987	0.165	5.982	0.000
CointEq.	-0.747	0.077	-9.701	0.000
R^2	0.8995			
D-W Stat	2.3052			
Serial LM	0.4550			
Heteroscedasticity	0.2492			

Note: ** is significant level at 5% level

3.4. Discussions

3.4.1. The Export Diversification and Economic Growth

In the short and long run, export diversification, represented by the number of products exported (NPE) and the share of manufactured exports (MAN), plays a key role in shaping Indonesia's economic path. In the long run, the product exported and share of manufactured exports has a significant and positive impact on GDP growth. This supports earlier research in United Arab Emirates (Shadab & Tiwari, 2021) and also Haini et al. (2023) study in Brunei, which shows that export diversification has a positive and significant effect on export growth in the long term, although it is not significant in the short term. This suggests that the benefits of export diversification take time to appear, especially in promoting sustainable economic growth. Additionally, their study indicates that simpler exports with lower technology content provide fewer benefits compared to more advanced exports with higher technology content. This implies that the full benefits of export diversification may only be realized in the long term, helping to explain the mixed findings in previous research, especially in resource-dependent economies. Study by Espoir (2020) also confirms a long-run relationship between export diversification and GDP, where variables like NPE and MAN show significant long-run effects. Study by Lee & Zhang (2022) further document that export diversification, whether in products or industries, can promote economic growth and reduce economic volatility, particularly in smaller or lower-income countries. These findings are relevant for Indonesia, as achieving economic stability through a more diverse, higher-value manufacturing export sector reduces dependence on a few key commodities. By increasing the share of manufactured exports, Indonesia can reduce its vulnerability to global commodity price fluctuations, which in turn fosters more sustainable economic growth. The shift from raw material exports to higher value-added goods reflects a strategic focus on productivity and competitiveness in international markets, which is crucial for long-run development (Jongwanich, 2020).

On the other hand, the long-run impact of the number of products exported (NPE) shows a more complex framework. Study by Bajaj et al. (2022) highlight that the relationship between export diversification and economic growth is not straightforward and can vary depending on the diversification indicators used and the economic income levels. This aligns with the findings that increasing the variety of exported products without ensuring their value or competitiveness might not significantly contribute to GDP growth in the long run. Simply expanding the product base without focusing on quality or market differentiation can strain resources and lead to inefficiencies (Herzer & Nowak-Lehnmann D, 2006). In the short term, the effects of NPE and MAN differ. While the share of manufactured exports continues to positively affect GDP, its impact is smaller compared to the long-run effects, suggesting that the benefits of industrial diversification take time to fully develop. In contrast, the number of products exported (NPE) shows a short-run negative impact, possibly reflecting the initial costs and challenges of diversification. Azam (2020) also found that the relationship between industrial policy instruments and export diversification is strong in both the short and long term. This supports the argument that while diversification is beneficial in the long run, focusing on quality and innovation in export products is crucial to avoid inefficiencies in the short term. Interestingly, Siswana & Phiri (2021) suggest that for economies like the BRICS countries, export concentration may be a more suitable trade goal than diversification, although China would benefit most from switching to diversification. For larger and more influential countries like Brazil and South Africa, such a shift might be more challenging. For Indonesia, adopting policies that support technology-driven diversification remains a key step in ensuring stable and sustainable long-run economic growth.

3.4.2. The Gross Fixed Capital Formation and Economic Growth

The gross fixed capital formation (GFCF) has a significant positive impact on economic growth, both in the short and long run. The estimation results indicate that GFCF contributes strongly in the short term. This is consistent with the study by Espoir (2020) in SADC countries, which shows that there is a positive relationship between capital accumulation and GDP, along with export diversification, trade openness, and foreign direct investment. Gamariel et. al. (2022) also finds a positive export-diversifying effect of capital in SSA suggesting that capital has an influence on the composition of export in host economies. Why does this happen? Investment in fixed capital is one of the primary drivers of productivity and economic growth. When a country increases its fixed capital formation, such as physical infrastructure (roads, ports, airports) and capital equipment for production, the productive capacity of that country strengthens. Improved and expanded fixed capital allows industries to operate more efficiently, which in turn reduces production costs and increases output. This positively impacts GDP because a higher volume of output is produced by various economic sectors. In Indonesia, during the studied period, there was a significant increase in investments in infrastructure and manufacturing, primarily driven by government development policies and the influx of foreign direct investment (FDI).

Policies that support increased fixed capital and create a conducive investment climate significantly contribute to economic growth. Therefore, the success of investments in GFCF can be seen as a strategic step in promoting sustainable economic growth. By enhancing the country's productive capacity, increased GFCF allows industries to operate more efficiently, leading to reduced production costs and higher output. This increase in output not only contributes positively to GDP but also supports a more diverse range of export activities. A strong infrastructure base facilitates export diversification by providing the necessary support for various industries to thrive. For example, improved transport and logistics systems can help exporters reach international markets more effectively, allowing for a broader range of goods to be exported. This is particularly crucial for Indonesia, which aims to move away from an over-reliance on a limited number of commodities. By promoting a diverse export portfolio, the country can better withstand fluctuations in global commodity prices and reduce economic vulnerability. The GFCF emerges as a crucial factor in facilitating Indonesia's economic growth. Continued support for investment in fixed capital is expected to strengthen the foundations of the economy and promote long-run prosperity. These findings align with existing literature, which indicates that increased fixed capital investment not

only contributes to efficiency and productivity but also to broader economic growth.

3.4.3. The Labor and Economic Growth

The labor plays a critical role in driving economic growth, as it directly influences a country's production capacity. From the analysis, it is evident that labor (L) shows a significant and positive impact on GDP growth in both the short and long term. In the short term, labor's impact on GDP growth may be explained by the immediate boost in production capacity when more workers enter the labor market. In many labor-intensive sectors, such as manufacturing, agriculture, and services, the rapid increase in labor supply can directly enhance output, even if the productivity of this labor is not fully optimized. Sectors that are more labor-dependent respond quickly to workforce expansion, especially when demand is high, leading to short-run growth. However, these effects may still be somewhat limited by factors like skill mismatches and the time required for workers to become fully integrated into new roles. The initial impact of labor growth can be muted when workers lack the specific skills needed by industries, or when labor-intensive sectors do not have the necessary infrastructure to absorb the labor force efficiently.

The long-run significance of labor reflects Indonesia's progress in overcoming various barriers in its labor market. Over time, improvements in education, vocational training, and job placement have enabled workers to become more productive and better aligned with industry needs. The positive long-run relationship between labor and economic growth suggests that as the workforce becomes more skilled, its contribution to GDP continues to grow. This aligns with studies by Giri et al. (2019); and Handoyo & Ibrahim (2021), which argue that to achieve diversification, policymakers must prioritize the development of human resources and the reduction of trade barriers. These findings support theories suggesting that efficient and skilled labor is a key driver of long-run growth.Indonesia's gradual improvements in human capital, aided by policies focused on expanding access to quality education and training, are likely enhancing labor productivity. Furthermore, the long-run results are consistent with the work of researchers who emphasize that, while Indonesia faces challenges such as high educated unemployment and sectoral inefficiencies, targeted policy reforms can improve labor market outcomes. Addressing these issues—particularly through vocational training and educational reforms—can help align labor skills more closely with industry demands, cultivating a more productive workforce.In conclusion, while Indonesia continues to grapple with challenges related to labor productivity and skill mismatches, the significant short- and long-run impact of labor on GDP growth underscores its essential role in the economy. These long-run improvements suggest that investments in human capital and labor market reforms are enabling Indonesia to capitalize on its expanding workforce. As the country continues to address structural challenges in its labor market, labor's contribution to economic growth is expected to increase, supporting a more resilient and dynamic economy.

4. CONCLUSIONS

The conclusion in this study shows that export diversification, gross fixed capital formation, and labor play significant roles in driving Indonesia's economic growth. In the long term, the share of manufactured exports has a strong positive impact on GDP growth, while the number of products exported shows more complex results, as increasing product variety without improving competitiveness does not always lead to higher growth. GFCF positively influences growth in both the short and long term by enhancing productivity and reducing production costs through infrastructure investment. Labor also contributes significantly, with short-run gains from increased workforce participation and long-run benefits driven by improvements in skills and productivity. Therefore, Indonesia's economic growth is shaped by these key factors, but achieving sustainable growth requires focusing on the quality and competitiveness of exports as well as improving labor productivity. Based on the findings of this study, it is recommended that Indonesia prioritize policies aimed at diversifying its export base, particularly in manufactured goods. While increasing the variety of exported products can contribute to growth, it is essential to focus on improving the quality and competitiveness of these products. Additionally, sustained investment in gross fixed capital formation should be encouraged to enhance infrastructure and productivity. Lastly, policies

that promote labor market participation and skill development are crucial to harnessing the full potential of the workforce and driving long-term economic growth. By effectively addressing these key factors, Indonesia can achieve a more robust and sustainable economic trajectory.

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