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Research Article

Analysis of Unemployment in Indonesia: The Impact of Minimum Wage, Exports, Foreign Direct Investment, and Human Development Index from 1990-2023

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Abstract: Unemployment is a socio-economic problem that can threaten the stability of Indonesia's economy. This study analyzes the impact of minimum wage, export, foreign direct investment, and human development index on the open unemployment rate from 1990 to 2023. Using the Ordinary Least Square (OLS) multiple linear regression method with the Newey-West HAC standard errors approach, the estimation results reveal findings that contradict conventional theory. Minimum wage is proven to have a significant negative effect, confirming the applicability of Wage Theory in Indonesia where wage increases can enhance productivity and purchasing power. Export has a positive but insignificant effect, indicating structural transformation with proven exports toward capital-intensive sectors. Foreign direct investment has a significant negative effect, demonstrating that increased foreign investment can create new employment opportunities that reduce unemployment rates. The most surprising finding is from the human development index which has a significant positive effect, indicating the phenomenon of educated unemployment due to the mismatch between the education system and labor market needs. This research provides important implications for policymakers to conduct curriculum reform or adjustment of the education system with business or industrial needs, structural transformation in export activities with export institutions, and management of foreign investment to address structural unemployment in Indonesia.

Keywords: Foreign Direct Investment, Human Development Index, Export, Minimum Wage, Unemployment.

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1. Introduction

Unemployment is a socio-economic problem that remains a serious challenge for Indonesia as a developing country with high complexity. This phenomenon not only reflects the imbalance between labor supply and demand but also demonstrates the intricate interaction of various macroeconomic factors in the na-tional economic system. The unemployment rate becomes a crucial indicator for assessing a country's socio-economic condition, where a lower unemployment rate indicates a healthier and more productive economic condition (Mankiw, 2019).

Indonesia faces relatively more serious unemployment challenges compared to the majority of other ASEAN countries. Data from the International Labour Organization (ILO, 2023) reveals concerning facts that Indonesia's average open unemployment rate consistently reaches higher levels compared to Thai-land, Vietnam, and Malaysia. More worryingly, youth unemployment in Indonesia at productive age reaches the second highest level in ASEAN after the Philippines, far exceeding the regional average. This condition becomes ironic considering that Indonesia has a demographic bonus with seventy percent of its population at productive age, which should be a strategic asset for economic development.

The Indonesian government has set ambitious targets to address unemployment problems through the National Medium-Term Development Plan (Bappenas, 2020). The target for reducing the open unem-ployment rate faces significant challenges due to the COVID-19 pandemic which triggered a drastic surge in unemployment rates in 2020. Although there has been improvement post-pandemic, achievements remain at the upper limit of the target, indicating structural persistence of unemployment (BPS, 2023).

Tabel 1. Average Percentage of Unemployment Rate in Indonesia 1990-2023.

Tahun	Rata-Rata TPT (%)
1990-1995	3,27%
1996-2001	5,92%
2002-2007	9,87%
2008-2013	7,20%
2014-2019	5,62%
2020-2023	6,2%

Source: Badan Pusat Statistika (2023)

The development of Indonesia's unemployment rate has fluctuated, showing dynamics closely related to both national and global economic conditions. During the New Order era, Indonesia achieved very low unemployment rates, reflecting economic stability and high activity in labor-intensive sectors during that period. However, the 1997-1998 Monetary Crisis became a turning point that fundamentally changed the employment landscape (Rasyida, 2021). Slow economic recovery, coupled with industrial restructuring and low capacity of la-bor-intensive sectors to absorb workers, prolonged the structural impact of the crisis on employment opportunities in Indonesia.

According to macroeconomic theory, unemployment rates are influenced by various interrelated economic variables. Minimum wage is a government policy that sets the lowest limit for wage payments to workers in a particular region or sector (Saputri & Sitorus, 2025). Wage Theory explains that wage levels not only function as compensation for labor but also affect labor market equilibrium. Minimum wage increases can enhance people's purchasing power and encourage domestic consumption, which in turn stimulates aggregate demand and creates new employment opportunities (Pasuria & Triwahyuningtyas, 2022)

Export is a trade activity that reflects the level of economic openness of a country in the global market. Countries with advantages in labor production factors such as Indonesia should be able to utilize labor-intensive product exports to create employment opportunities (Susanti, 2019). Increased export volume is expected to expand employment opportunities through production expansion in export-oriented sectors (Sahrul et al., 2023;Pramesti, 2023).

Foreign Direct Investment plays a strategic role in economic development through direct and indirect job creation. Foreign investment is expected to reduce unemployment through construction of new production facilities, technology transfer, and economic multiplier effects that encourage production activities in various sectors (Firmansyah et al., 2023). The entry of foreign investment directed to productive sectors can create new job opportunities for the community (Tanaya & Suyanto, 2023).

The Human Development Index measures the quality of human resources from three main aspects: health, education, and decent living standards. Improving the quality of human resources is expected to increase labor productivity and competitiveness, thereby expanding opportunities to obtain employment (Qamariyah et al., 2022). However, the relationship between HDI and unemployment can vary depending on the balance between improving labor quality and the availability of suitable employment opportunities (Sulistiana et al., 2025).

Novelty of this research lies in the integration of four macroeconomic variables in one comprehensive analytical model over thirty-four years covering various phases of Indonesia's economy, supported by strong macroeconomic theoretical perspectives and contextual focus on Indonesia that provides new contributions to economic literature as well as practical implications for policymakers.

2. Method

This research uses a quantitative method with a time series approach for the period 1990-2023. Secondary data for several variables were obtained from official publications of Statistics Indonesia (BPS), World Bank, and United Nations Development Programme (UNDP). Variables analyzed include Open Unemployment Rate as the dependent variable,

and Minimum Wage, International Trade proxied through Export percentage, Foreign Direct Investment, and Human Development Index as independent variables.

Tabel 2. Variables, Symbols, Units and Data Sources.

No.	Variable	Symbol	Unit	Data Source
1.	Open Unemployment Rate	OUR	Percent (%)	BPS
2.	Minimum Wage	MW	Rupiah (Rp)	BPS
3.	Export	EX	Percent (%)	*World Bank*
4.	Foreign Direct Investment	FDI	Billion Dollar	BPS
5.	Human Development Index	HDI	Percent (%)	UNDP

The data analysis method uses multiple linear regression with the Ordinary Least Square (OLS) approach through Eviews-12 software. OLS was chosen because it is the most efficient estimation technique and provides the Best Linear Unbiased Estimation (BLUE) results when classical assumptions are met. To address autocorrelation problems commonly occurring in time series data, this study uses the Newey-West HAC (Heteroscedasticity and Autocorrelation Consistent) standard errors approach which allows estimation to remain valid despite violations of autocorrelation and heteroscedasticity assumptions (Widarjono, 2013).

Analysis stages include: (1) Descriptive statistical analysis to provide an overview of research data; (2) Classical assumption tests including normality test using Jarque-Bera test, multicollinearity test with Variance Inflation Factor (VIF), heteroscedasticity test with Breusch-Pagan-Godfrey test, and autocorrelation test with Durbin-Watson test; (3) Estimation of OLS multiple linear regression model with HAC; (4) Hypothesis testing using F-test for simultaneous testing and t-test for partial testing; (5) Analysis of coefficient of determination (R^2) to measure model goodness of fit.

The regression equation model used: OUR= α + β_1 MW 〖+ β〗 _2 EX + β_3 FDI + β_4 HDI + e_t

Where:

OUR	= Open Unemployment Rate (Percent)
MW	= Minimum Wage (Rupiah)
EX	= Export (Percent)
FDI	= Foreign Direct Investment (Dollar)
HDI	= Indeks Pembangunan Manusia (Persen)
α	= Constant
β_1–β_4	= Regression coefficients of each variable
e_t	= Error term.

3. Results and Discussion

3.1. Descriptive Statistics

Descriptive statistics provide a general overview of the characteristics of data used in this research during the period 1990-2023.

Table 3. Descriptive Statistics Results.

	OUR	MW	EX	FDI	HDI
Mean	6.356471	985294.8	2763.412	21270.64	0.637706
Median	6.105000	637591.0	2641.500	15936.95	0.641000
Maximum	11.24000	3125999.	5297.000	50267.50	0.750000
Minimum	2.550000	15430.00	1733.000	8144.200	0.526000
Std. Dev.	2.213809	981463.0	715.6494	11472.72	0.062555
Skewness	0.253255	0.781875	1.432602	0.711791	-0.133238
Kurtosis	2.603579	2.217513	5.964741	2.630451	1.898463
Jarque-Bera	0.586078	4.331601	24.08204	3.064463	1.819558
Probability	0.745993	0.114658	0.000006	0.216053	0.402613
Sum	216.1200	33500022	93956.00	723201.9	21.68200
Sum Sq. Dev.	161.7314	3.18E+13	16901082	4.34E+09	0.129133
Observations	34	34	34	34	34

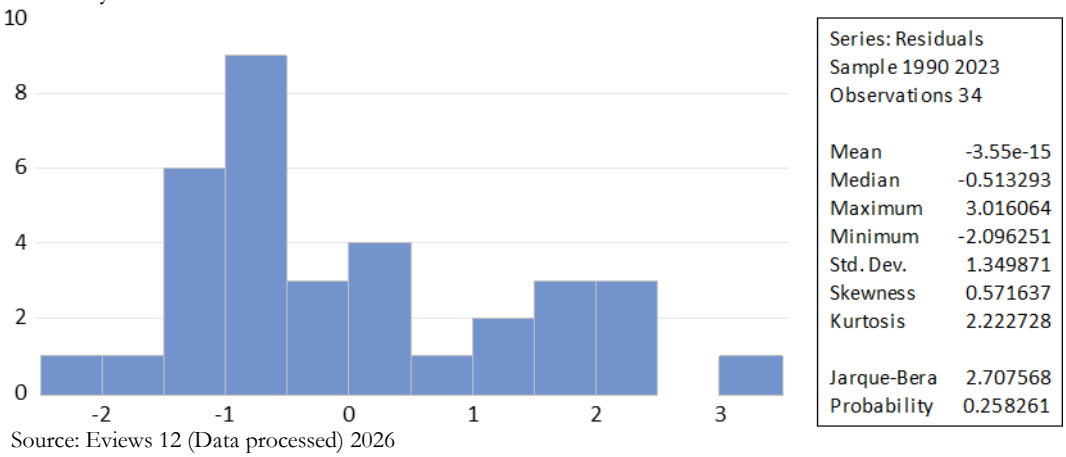
Source: Eviews 12 (Data processed) 2026

The Open Unemployment Rate has an average of 6.36% with a standard deviation of 2.21%, indicating considerable fluctuation during the research period. Minimum Wage shows an average of 985,294.8 with a standard deviation of 981,463.0, reflecting the government's efforts to improve worker welfare. Export has an average of 2763.412 of GDP. Foreign Direct Investment shows an increasing trend with an average of 21,270.64. The Human Development Index shows consistent improvement, reflecting the success of Indonesia's human development.

3.2. Classical Assumption Testing

3.2.1 Normality Test

The normality test is used to determine whether model residuals are normally distributed or not. A good regression model has normally distributed residual values. Testing is conducted using the Jarque-Bera test with testing criteria: if significance > 0.05, then data is normally distributed.



Source: Eviews 12 (Data processed) 2026

Figure 1. Normality Test Results.

Based on normality test results, the probability generated is 0.258261, which is greater than α = 5%, meaning residuals are normally distributed, indicating that classical assumption testing in the regression model has met the normality assumption.

3.2.2 Multicollinearity Test

The multicollinearity test aims to determine whether there is a linear relationship among independent variables in the regression model. A good regression model is one without linear relationships among its independent variables. Decision-making basis: if VIF value < 10.00, then multicollinearity does not occur.

Table 4: Multicollinearity Test Results

Variance Inflation Factors
Date: 01/18/26 Time: 22:53
Sample: 1990 2023
Included observations: 34

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	36.46503	597.9362	NA
MW	5.79E-13	18.08593	8.872771
EX	2.21E-07	29.48675	1.802118
FDI	9.89E-10	9.404669	2.070806
HDI	106.2626	715.2151	6.617853

Source: Eviews 12 (Data processed) 2026

Multicollinearity test results show VIF values for Minimum Wage variable 8.872771, Export 1.802118, Foreign Direct Investment 2.070806, and Human Development Index 6.617853. Since all VIF values < 10, there is no multicollinearity problem in the research model.

3.2.3 Heteroscedasticity Test

The heteroscedasticity test aims to test whether there is variance difference in residuals from one observation to another in the regression model. A good regression model is one

without heteroscedasticity. Testing uses the Breusch-Pagan-Godfrey method with criteria: if significance value > 0.05, then heteroscedasticity does not occur.

Table 5: Heteroscedasticity Test Results

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.148135	Prob. F(4,29)	0.3538
Obs*R-squared	4.648245	Prob. Chi-Square(4)	0.3253
Scaled explained SS	2.067413	Prob. Chi-Square(4)	0.7234

Source: Eviews 12 (Data processed) 2026

Test results show Obs*R-squared probability value of 0.3253, which is greater than 0.05, so it can be concluded that data in this research variables do not exhibit heteroscedasticity.

3.2.4 Uji Autokorelasi dengan Metode Newey-West HAC

The autocorrelation test aims to test whether there is correlation between error terms in period t and period t-1 in the regression model. A good regression model is free from autocorrelation. The testing method uses Durbin-Watson test, but because autocorrelation problems were found, the research uses the Newey-West HAC approach to overcome these problems.

Table 6: Autocorrelation Test Results with Newey-West HAC Method

Dependent Variable: OUR
Method: Least Squares
Date: 01/18/26 Time: 22:56
Sample: 1990 2023
Included observations: 34
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-30.25480	8.990150	-3.365328	0.0022
MW	-2.57E-06	1.15E-06	-2.234744	0.0333
EX	0.000674	0.000671	1.003330	0.3240
FDI	-7.17E-05	3.28E-05	-2.186499	0.0370
HDI	60.86163	16.06297	3.788939	0.0007

R-squared	0.628204	Mean dependent var	6.356471
Adjusted R-squared	0.576922	S.D. dependent var	2.213809
S.E. of regression	1.439960	Akaike info criterion	3.702160
Sum squared resid	60.13104	Schwarz criterion	3.926625
Log likelihood	-57.93673	Hannan-Quinn criter.	3.778709
F-statistic	12.24995	Durbin-Watson stat	0.723563
Prob(F-statistic)	0.000006	Wald F-statistic	7.374386
Prob(Wald F-statistic)	0.000317		

Source: Eviews 12 (Data processed) 2026

Results show changes in standard error values, t-statistics and probabilities, meaning disturbance errors in the research model can be addressed so autocorrelation does not occur, but does not change the Durbin-Watson value.

3.3 OLS Multiple Linear Regression Test with HAC or Newey-West Standard Error

The estimation results of the multiple linear regression model using the OLS method with the Newey-West HAC approach show the following regression equation:

Table 7: OLS Multiple Linear Regression Test Results with HAC or Newey-West Standard Error

Dependent Variable: OUR
Method: Least Squares
Date: 01/18/26 Time: 22:56
Sample: 1990 2023
Included observations: 34
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-30.25480	8.990150	-3.365328	0.0022
MW	-2.57E-06	1.15E-06	-2.234744	0.0333
EX	0.000674	0.000671	1.003330	0.3240
FDI	-7.17E-05	3.28E-05	-2.186499	0.0370
HDI	60.86163	16.06297	3.788939	0.0007

R-squared	0.628204	Mean dependent var	6.356471
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F-statistic	12.24995	Durbin-Watson stat	0.723563
Prob(F-statistic)	0.000006	Wald F-statistic	7.374386
Prob(Wald F-statistic)	0.000317		

Source: Eviews 12 (Data processed) 2026

OUR= -30.25480 -2.57E-06MW + 0.000674EX -7.17E-05FDI +60.86163HDI + ε

The interpretation of the regression equation is: A constant of -30.25480 shows the theoretical value of OUR when all variables are zero. The Minimum Wage coefficient of -2.57E-06 indicates that every increase in minimum wage of Rp1,000,000 will reduce unemployment rate by 2.57%. The Export coefficient of 0.000674 shows that every 1% increase in exports will increase unemployment by 0.000674%. The Foreign Direct Investment coefficient of -7.17E-05 shows that every increase of 1 Billion Dollars in FDI will reduce unemployment by 7.17%. The Human Development Index coefficient of 60.86163 shows that every increase of 1 index percent will increase unemployment by 60.86163%.

3.4 Hypothesis Testing

3.4.1 F-Test (Simultaneous Test)

The F-test is used to test the simultaneous effect of all independent variables on the dependent variable.

Table 8. F-Test (Simultaneous Test) Results.

R-squared	0.628204	Mean dependent var	6.356471
Adjusted R-squared	0.576922	S.D. dependent var	2.213809
S.E. of regression	1.439960	Akaike info criterion	3.702160
Sum squared resid	60.13104	Schwarz criterion	3.926625
Log likelihood	-57.93673	Hannan-Quinn criter.	3.778709
F-statistic	12.24995	Durbin-Watson stat	0.723563
Prob(F-statistic)	0.000006	Wald F-statistic	7.374386
Prob(Wald F-statistic)	0.000317		

Source: Eviews 12 (Data processed) 2026

F-test results show an F-statistic value of 12.24995 with a probability of 0.000006, which is far smaller than $\alpha = 5\%$. This indicates that simultaneously, Minimum Wage, Export, Foreign Direct Investment, and Human Development Index have a significant effect on the Open Unemployment Rate in Indonesia for the period 1990-2023.

3.4.2 t-Test (Partial Test)

The t-test is used to test the effect of each independent variable partially on the dependent variable.

Table 9. t-Test (Partial Test) Results.

Dependent Variable: OUR
Method: Least Squares
Date: 01/18/26 Time: 22:56
Sample: 1990 2023
Included observations: 34
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-30.25480	8.990150	-3.365328	0.0022
MW	-2.57E-06	1.15E-06	-2.234744	0.0333
EX	0.000674	0.000671	1.003330	0.3240
FDI	-7.17E-05	3.28E-05	-2.186499	0.0370
HDI	60.86163	16.06297	3.788939	0.0007

Source: Eviews 12 (Data processed) 2026

T-test results show that Minimum Wage has a negative and significant effect with probability 0.0333, Export has a positive and insignificant effect with probability 0.3240, Foreign Direct Investment has a negative and significant effect with probability 0.0370, and Human Development Index has a positive and significant effect with probability 0.0007.

3.4.3 Coefficient of Determination (R^2)

Table 10. Coefficient of Determination (R^2) Test Results

R-squared	0.628204
Adjusted R-squared	0.576922

The Adjusted R-squared value of 0.576922 indicates that independent variables jointly can explain 57.69% of the variation in Open Unemployment Rate, while the remaining 42.31% is explained by other variables outside the model.

3.5. Discussion of Research Results

3.5.1 Effect of Minimum Wage on Open Unemployment Rate

Research results show that minimum wage has a negative and significant effect on the open unemployment rate in Indonesia for the period 1990-2023. This finding supports Wage Theory which explains that wage levels not only function as compensation for labor but also affect labor market equilibrium. Minimum wage increases have dual impacts: from the workers' side, they can enhance purchasing power and welfare, but from the company side, they can increase production costs that potentially affect labor absorption decisions. In the Indonesian context, minimum wage increases have significant macroeconomic impacts because they can enhance people's purchasing power and encourage domestic consumption, which in turn stimulates aggregate demand and creates new employment opportunities (Saputri & Sitorus, 2025). When minimum wage rises, workers have higher income so they can consume more goods and services. This increase in consumption drives aggregate demand which makes companies need to increase production and absorb more labor. Research by (Pasuria & Triwahyuningtyas, 2022) shows that minimum wage increases can have positive impacts in the long run if followed by productivity improvements.

3.5.2 Effect of Export on Open Unemployment Rate

Research results show that export has a positive but insignificant effect on the open unemployment rate in Indonesia for the period 1990-2023. This condition can be explained by changes in Indonesia's export structure which has shifted from labor-intensive products such as textiles and garments to natural resource-based and capital-intensive products such as coal and palm oil. Sectors currently dominating Indonesia's exports tend to use machinery and advanced technology that only absorb minimal labor per unit of output (Apriliani, 2024). Consequently, although export values increase, jobs created are not proportional to the growth in export values. Indonesia's export composition increasingly dominated by capital-intensive sectors makes the impact of exports on labor absorption limited (Ginting et al., 2025). Research by (Sahrul et al., 2023) and (Pramesti, 2023) also shows that exports have positive

but insignificant effects on labor absorption because increased export values do not automatically create new jobs, especially when exports are dominated by capital-intensive sectors and primary commodities.

3.5.3 Effect of Foreign Direct Investment on Open Unemployment Rate

Research results show that Foreign Direct Investment has a negative and significant effect on the open unemployment rate in Indonesia for the period 1990-2023. The entry of FDI into Indonesia is usually followed by factory construction and production facilities that require substantial labor at various stages. During the construction phase, construction workers and technical experts are needed, while during the operational phase, labor is needed to operate production machinery and carry out administrative functions (Tanaya & Suyanto, 2023). Job creation is not limited to direct labor but also creates ripple effects through demand for supporting goods and services from local businesses. The significance of FDI's negative effect on unemployment shows that foreign investment entering Indonesia during the period 1990-2023 has been quite effective in absorbing labor because most of it was directed to labor-intensive sectors such as manufacturing, textiles, and garments (Firmansyah et al., 2023;Putri & Ash Shidiqie, 2023).

3.5.4 Effect of Human Development Index on Open Unemployment Rate

Research results show that the Human Development Index has a positive and highly significant effect on the open unemployment rate in Indonesia for the period 1990-2023. This phenomenon occurs because the increase in higher education graduates is not balanced with growth in job opportunities that match their qualifications. Indonesia's economic structure is still dominated by the informal sector and low-productivity services that do not require higher education (Qamariyah et al., 2022). Consequently, many graduates cannot be absorbed in the labor market because available jobs do not match their education level. This problem is exacerbated by the mismatch between skills taught in the education system and workforce needs. Indonesia's education curriculum still focuses on theoretical knowledge but provides insufficient practical skills needed by industry (Khoiruddin et al., 2024;Sulistiana et al., 2025). This condition causes graduates to prefer remaining unemployed while searching for jobs matching their qualifications rather than accepting jobs that do not match their educational background.

4. Conclusion

Based on research results, it can be concluded that: (1) Minimum Wage has a negative and significant effect on the open unemployment rate, confirming the applicability of Wage Theory in Indonesia where wage increases can enhance worker productivity, people's purchasing power, and drive economic growth through increased domestic consumption that stimulates aggregate demand and creates new employment opportunities. (2) Export has a positive but insignificant effect on unemployment, indicating structural transformation of Indonesia's exports from labor-intensive products to natural resource-based and capital-intensive products that creates the phenomenon of jobless growth because sectors dominating exports tend to use machinery and advanced technology that only absorb minimal labor. (3) Foreign Direct Investment has a negative and significant effect on unemployment, consistent with investment theory that emphasizes the role of investment in achieving full employment through direct job creation during construction and operational phases as well as indirect creation through economic multiplier effects that create demand for supporting goods and services from local businesses. (4) Human Development Index has a positive and highly significant effect on unemployment, revealing the paradox of Indonesia's human development through the phenomenon of educated unemployment due to mismatch between the education system and labor market needs where education curriculum still focuses on theoretical knowledge but provides insufficient practical skills, as well as limitations in creating productive employment opportunities matching graduate qualifications.

5. Recommendations

Based on research conclusions, recommendations that can be given are: (1) The government needs to implement measured minimum wage policies considering not only inflation and economic growth but also labor productivity levels and industrial competitiveness, and integrate with productivity improvement programs through

training and competency certification. (2) Export strategy needs to be reoriented from pursuing high export values toward inclusive exports based on job creation through acceleration of downstream programs, providing special incentives for labor-intensive export industries, and expanding export market diversification to reduce dependence on one or two main markets. (3) Foreign investment policy needs to be designed more selectively by providing priority for FDI oriented toward labor-intensive sectors, strengthening local content requirements and technology transfer obligations, and forming industrial clusters that integrate foreign companies with local small and medium enterprises. (4) Comprehensive reform of the education system is needed to be more oriented toward labor market needs through strengthening the link and match model, strengthening vocational education with modern facilities and structured internship programs, and integrating industry competency certification with formal education diplomas. (5) Future research is recommended to expand analysis by including other variables such as technology and automation as well as demographic structure, using provincial or district/city panel data for more detailed pictures, and using more advanced econometric methods to capture short-term and long-term dynamics.

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