International Journal of Economics and Management Sciences

E-ISSN: 3046-9279
P-ISSN: 3048-0965

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 the Indonesian economy. This study analyzes the effect of minimum wages, exports, foreign investment, and the human development index (HDI) on the unemployment raefrom 1990 to 2023. Using the Ordinary Least Square (OLS) multiple linear regression estimation method, to correct bias in the estimation, the Newey-West HAC standard errors approach is used. Minimum wages and foreign investment have a significant negative effect on the open unemployment rate, confirming that wage increases can boost productivity, foreign investment creates direct jobs through the construction of production facilities and economic multiplier effects in supporting sectors. The most surprising finding of the HDI which has a positive effect and exports which are proven to be insignificant on the unemployment rate, this shows that human capital formation is not in line with existing job opportunities due to rapid technological changes, as well as export-increasing policies which focus more on capital intensity. The study provides important implications for policymakers, maintaining and optimizing minimum wage increases and foreign investment in a measurable manner because they have proven effective in reducing unemployment rates. Reorienting export strategies policy from capital-intensive to labor-intensive, increasing the human development index adjusted to technological developments, especially in the business and industrial world.

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

Received: November 29, 2025
Revised: December 27, 2025
Accepted: January 15, 2026
Online Available: January 17, 2026
Curr. Ver.: January 17, 2026

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 national 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 [1].

Indonesia faces relatively more serious unemployment challenges compared to the majority of other ASEAN countries. Data from the International Labor Organization [2] reveals concerning facts that Indonesia's average unemployment raeconsistently reaches higher levels compared to Thailand, Vietnam, and Malaysia. More worryingly, youth unemployment in Indonesia among the productive age group reaches the second-highest level in ASEAN, after the Philippines, far exceeding the ASEAN regional average. This condition becomes ironic considering that Indonesia has a demographic bonus with seventy percent of its population at a 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 [3]. The target for reducing the unemployment raefaces 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 [4].

Table 1. Average Unemployment Rate in Indonesia, 1990-2023

Year	Average OUR (%)	Growth (%)
1990-1995	3,27%	-
1996-2001	5,92%	+0,81%
2002-2007	9,87%	+0,66%
2008-2013	7,20%	-0,27%
2014-2019	5,62%	-0,28%
2020-2023	6,2%	+0,09%

Source: Central Bureau of Statistics (2023), data processed.

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's unemployment rate was relatively low, indicating stability and relatively high economic activity in labor-intensive sectors during that period. However, the 1997-1998 Monetary Crisis became a turning point that fundamentally changed the employment landscape [5]. Slow economic recovery, coupled with industrial restructuring and the low capacity of labor-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 [6]. 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 [7]

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 [8]. 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 the construction of new production facilities, technology transfer, and economic multiplier effects that encourage production activities in various sectors [11]. The entry of foreign investment directed to productive sectors can create new job opportunities for the community [12].

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 [14].

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), the World Bank, and the United Nations Development

Programme (UNDP). Variables analyzed include Unemployment raeas the dependent variable, and Minimum Wage, International Trade proxied through Export percentage, Foreign Direct Investment, and Human Development Index as independent variables.

Table 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 used multiple linear regression with the Ordinary Least Squares (OLS) approach. Estimates were performed using Eviews-13 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 [15].

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:

$$OUR = \alpha + \beta_1 MW + \beta_2 EX + \beta_3 FDI + \beta_4 HDI + et$$

Where:
OUR = Unemployment rae(Percent).
MW = Minimum Wage (Rupiah).
EX = Export (Percent).
FDI = Foreign Direct Investment (Dollar).
HDI = Human Development Index (Persen).

3. Results and Discussion

3.1. Descriptive Statistics

Descriptive statistics provide a general overview of the characteristics of the 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

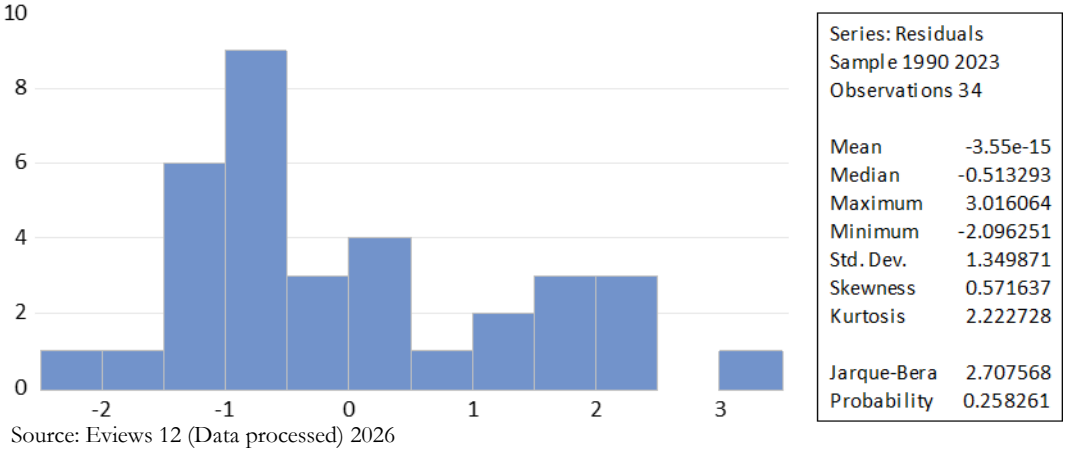
Source: Eviews 12 (Data processed) 2026.

The Unemployment rae(OUR) 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 IDR985,294.8 with a standard deviation of IDR981,463.0, 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 the data is normally distributed.



Source: Eviews 12 (Data processed) 2026

Figure 1. Normality Test Results.

Based on the 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

The results of the multicollinearity test show that the VIF value for the variables Minimum Wage, Export, Foreign Direct Investment, and Human Development Index is less than 10 (<10), so it is concluded that there is no multicollinearity problem in the research model.

3.2.3 Heteroscedasticity Test

The heteroscedasticity test aims to test whether there is a 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 the criteria: if the 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 the data in these research variables do not exhibit heteroscedasticity.

3.2.4 Autocorrelation Test

The autocorrelation test aims to test whether there is a correlation between the error variables in period t and period t-1 in the regression model. A good regression model is one that is free from autocorrelation. The test uses the Durbin-Watson method with the following criteria: if the d value is between dU and (4-dU), then there is no autocorrelation.

Table 6. Autocorrelation Test Results

Dependent Variable: TPT
Method: Least Squares
Date: 01/16/26 Time: 21:55
Sample: 1990 2023
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-30.25480	6.038629	-5.010210	0.0000
UM	-2.57E-06	7.61E-07	-3.383352	0.0021
EKS	0.000674	0.000470	1.432773	0.1626
PMA	-7.17E-05	3.14E-05	-2.282040	0.0300
IPM	60.86163	10.30837	5.904095	0.0000

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		

The test results show a Durbin-Watson value of 0.723563, which is lower than the dL value of 1.2078, thus concluding that there is an autocorrelation problem in the model. To address this, the study used the Newey-West HAC Standard Error method.

3.2.5 Autocorrelation Test with the Newey-West HAC Method

The Newey West method can transform biased OLS standard errors into unbiased ones, thus making statistical inferences reliable. The application of the HAC method ensures that research conclusions remain valid and can be used for policy decision-making.

Table 7. 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.

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
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

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 the 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 α = 5%. This indicates that simultaneously, Minimum Wage, Export, Foreign Direct Investment, and Human Development Index have a significant effect on the Unemployment raein 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 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 the Minimum Wage has a negative and significant effect with a probability of 0.0333, Export has a positive and insignificant effect with a probability of 0.3240,

foreign direct investment has a negative and significant effect with a probability of 0.0370, and the Human Development Index has a positive and significant effect with a probability of 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 other variables outside the model explain the remaining 42.31%.

3.5. Discussion of Research Results

3.5.1 Effect of Minimum Wage on Open Unemployment Rate

The results of the study indicate that the minimum wage has a negative and statistically significant effect on the unemployment rate in Indonesia. This finding confirms the effect of the Minimum Wage Theory that increasing the standard wage value can reduce unemployment by strengthening people's purchasing power and stimulating aggregate demand (Saputri & Sitorus, 2025). The success of the minimum wage policy is largely determined by the stability of inflation maintained through coordination with the Regional Inflation Control Team since 2014 (Habibie & Suman, 2025). The transmission mechanism occurs through increased household consumption that encourages production expansion and increases worker productivity (Andriany et al., 2025). The formulation of wage policy through consideration of inflation rate, economic growth, with an alpha index of 0.5 - 0.9, reflects efforts to achieve a balance between protecting worker welfare and business sustainability, although still facing challenges in not yet fully adopting the needs of a decent life. These results are in line with Martin (2008), who emphasized that a measured minimum wage policy can improve worker welfare without causing a significant increase in unemployment in the long term.

3.5.2 Effect of Export on Open Unemployment Rate

Research results show that export has a positive but insignificant effect on the 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 [16]. 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 [17]. Research by [9] and [10] 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 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 [12]. 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 significant effect on the open unemployment rate. This finding reveals a structural problem where investment in education actually increases unemployment because it is not balanced by the transformation of the economic structure (Qamariyah et al., 2022;Sulistiana et al., 2025). The gap occurs because the rapid technological change of the Industrial Revolution 4.0 is not matched by adjustments to the education system, which still focuses on theoretical knowledge (Ulla et al., 2025;Ardhana et al., 2025). Graduates produced have good basic knowledge but lack the practical skills and ability to adapt to new technologies required by modern industry. The geographic concentration of graduates in urban areas creates an oversupply of educated labor without a corresponding growth in job opportunities **[21]**. These results reinforce the findings of **[22]** that human development needs to be integrated with the transformation of the economic structure and the adjustment of the education system to technological developments.

4. Conclusion

Based on research results, it can be concluded that: (1) Minimum Wage has a negative and significant effect on unemployment, confirming the Minimum Wage Theory where increasing wage standards reduces unemployment by strengthening purchasing power and stimulating aggregate demand, with the success of the policy being largely determined by coordination with TPID in maintaining inflation stability so that wage increases are not eroded by price spikes. (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 significant impact on unemployment, revealing the paradox of Indonesian human development through the phenomenon of educated unemployment due to the gap between the speed of technological change and the education system that still focuses on theoretical knowledge, exacerbated by geographical inequality.

5. Recommendations

Based on research conclusions, recommendations that can be given are:
(1) Government needs to maintain coordination between minimum wage determination and inflation control through the TPID to ensure that wage increases increase workers' real purchasing power, with adjustments not only to inflation and economic growth but also to the productivity levels and industrial characteristics of each region.
(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) Education system reform is needed to be responsive to the dynamics of modern industry through curriculum updates that incorporate digital skills, strengthening vocational education, and transforming the economic structure towards a knowledge-based industry.
(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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