Does Higher Pay Create More Jobs? Evidence from Indonesia's Manufacturing Sector

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ABSTRACT This study examines the relationship between wage growth and employment outcomes in Indonesia's manufacturing sector over the period 2015–2023 from TradingEconomics and BPS data. To analyze the data, the research employs a quantitative approach by using descriptive statistics, trend analysis, and regression modeling. A simple linear regression model was employed, with the support of Python Codelabs as a testing and data analysis tool. The use of Python allowed for efficient data processing, regression analysis, and visualization of the correlation between the variables. Descriptive findings indicate a steady rise in manufacturing wages and a relatively stable workforce share, with a sharp deviation during the COVID-19 pandemic. While wages and employment grew in tandem pre-2020, this link weakened post-pandemic, revealing structural disruptions. Regression analysis confirms a positive but statistically insignificant relationship between wages and manufacturing workforce share (coefficient = 0.3684; p = 0.426), and an even weaker, negative, and insignificant association with the unemployment rate (coefficient = -0.0783; p = 0.836). These results highlight that wage increases alone do not significantly influence employment or unemployment trends. Broader structural factors, such as technological change, policy interventions, and macroeconomic shocks, play a more decisive role. Therefore, wage policy should be integrated with productivity and labor market reforms to effectively stimulate employment.

Keywords: Manufacturing Sector, Labor Wages, Manufacturing Workforce Share, Unemployment Rate

INTRODUCTION

The manufacturing sector has long been considered a cornerstone of Indonesia's economic development, serving both as a driver of industrialization and as a major employer of the country's labor force. As a labor-intensive industry, manufacturing holds substantial potential to absorb workers and reduce unemployment, particularly in a developing country where job creation remains a central policy priority (Tadjoeddin, 2016). However, the dynamics between wages and employment in this sector are far from straightforward. While economic theory suggests that higher wages should attract more workers, improve welfare, and potentially boost employment, empirical evidence from Indonesia presents a more complex reality. In recent years, wages in the manufacturing sector have risen steadily, yet the overall employment share has not shown proportional growth, raising an important policy question: Does higher pay actually create more jobs in Indonesia's manufacturing sector?

The urgency of this question is underscored by the dual challenges Indonesia faces in balancing inclusive employment growth with industrial competitiveness. According to Statistics Indonesia (BPS, 2023), the average wage in the manufacturing sector increased significantly between 2015 and 2023, reflecting broader trends in economic development and rising labor costs. Yet, during the same period, the proportion of the national workforce

employed in manufacturing hovered around 13–15%, showing little sign of expansion. Moreover, unemployment, which had been gradually declining up to 2019, spiked in 2020–2021 amid the COVID-19 crisis, even as wages continued to rise (ILO, 2022). These contrasting patterns suggest that wage increases do not automatically lead to greater labor absorption or lower unemployment, and instead may interact with a range of structural factors.

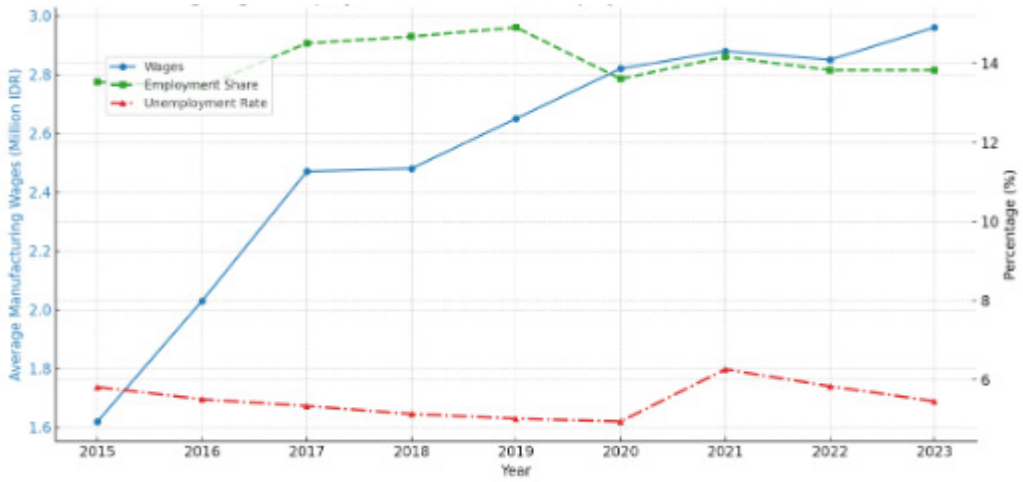

Figure 1: Trends in Manufacturing Wages and Employment Share in Indonesia (2015–2023)

Source: data processed from TradingEconomics and Badan Pusat Statistik (BPS)

Theoretically, classical labor market models posit that higher wages should generate both supply-side and demand-side effects. On the supply side, higher pay makes jobs more attractive, incentivizing workers to move into sectors that offer better compensation. On the demand side, higher wages can stimulate aggregate consumption, creating multiplier effects that may translate into increased labor demand (Blanchard & Katz, 1999). In practice, however, the outcomes often depend on contextual factors such as labor market flexibility, productivity levels, and firm responses to rising labor costs. In rigid labor markets, firms may substitute labor with capital, invest in automation, or relocate production to lower-cost regions, thereby limiting the positive effects of wage hikes on job creation (Chowdhury, Islam, & Tadjoeddin, 2009).

In Indonesia's case, the manufacturing sector is shaped by unique institutional and structural characteristics. First, the country's labor market is highly segmented, with a significant proportion of workers employed informally and thus largely unaffected by formal wage-setting mechanisms (Fields, 2019). Second, the manufacturing sector itself has undergone structural transformation, with many industries shifting toward capital-intensive production methods (Primanthi, 2021). While this transition can enhance productivity and support long-term competitiveness, it reduces the sector's capacity to absorb large numbers of low- and medium-skilled workers. Third, globalization and participation in global value chains (GVCs) have introduced both opportunities and vulnerabilities. While integration into GVCs has increased demand for skilled labor and driven wage growth (Shrestha & Winkler, 2021), it has also exposed Indonesian manufacturing to external shocks, such as trade fluctuations and global crises, which can disrupt employment patterns.

The empirical literature offers a similarly nuanced picture. Tadjoeddin (2016) shows that the relationship between productivity, wages, and employment in Indonesia's manufacturing sector is neither linear nor straightforward. Wage increases may coincide

with productivity growth, but do not always lead to greater employment, as firms often adopt labor-saving technologies. Magruder (2013), on the other hand, presents evidence that minimum wage policies can act as a "big push," stimulating consumption and investment in the short run. Yet, he cautions that such effects are conditional upon the presence of supportive complementary policies. Lipsey and Sjöholm (2004) emphasize the role of foreign direct investment (FDI) in driving wage growth, particularly for skilled workers, while also noting the risk of widening wage inequality and limited benefits for unskilled labor.

More recent studies extend these debates into the post-pandemic context. Ollivaud (2021) argues that wage policies must be coupled with human capital investment and labor market reform to achieve sustainable job creation. Permana, Yudoko, and Prasetio (2023) highlight the manufacturing sector's continued potential for growth but stress that its labor-absorbing capacity depends on aligning wage adjustments with productivity gains and industrial upgrading. Meanwhile, the International Labour Organization (ILO, 2022) documents how Indonesia's unemployment spike during COVID-19 reflected not just cyclical shocks but also structural vulnerabilities in the labor market. These findings collectively suggest that the wage–employment nexus in Indonesia is mediated by broader economic and institutional forces, making it an open empirical question whether higher pay alone can generate more jobs.

Despite the rich body of research on wages and employment in Indonesia, important gaps remain. Much of the existing literature focuses on earlier periods, such as the aftermath of the Asian financial crisis (Smith et al., 2002) or the pre-2015 era. Few studies have systematically analyzed the most recent period, which includes both the COVID-19 shock and the early stages of economic recovery. Furthermore, while several scholars acknowledge the importance of contextual factors such as globalization, capital intensity, and labor regulation, there is still a need for empirical studies that directly test the link between wages, manufacturing employment share, and national unemployment in an integrated framework.

This study seeks to address these gaps by focusing on three specific variables: manufacturing wage (average monthly wage of manufacturing workers), manufacturing workforce share (the percentage of total national employment absorbed by manufacturing industries), and the national unemployment rate (the proportion of the labor force unemployed). By analyzing data from Statistics Indonesia (BPS) and TradingEconomics covering the period 2015–2023, the study examines whether increases in manufacturing wages correlate with higher employment share in the sector and/or a reduction in unemployment. This period is particularly important as it captures pre-pandemic trends, the disruptive effects of COVID-19, and the initial post-pandemic recovery phase.

In addition to filling an empirical gap, the study also contributes to theory and practice. Theoretically, it engages with debates on wage–employment dynamics in developing economies, particularly regarding the role of structural constraints and institutional settings. By testing whether wage increases in Indonesia's manufacturing sector significantly affect employment outcomes, the study provides evidence on whether classical labor market models or structuralist perspectives offer a better explanation in this context. Practically, the findings have implications for policymakers seeking to balance worker welfare with industrial competitiveness. If higher wages are found to have limited effects on job creation, this would underscore the need for complementary measures

such as productivity enhancement, skills development, and supportive labor regulations. Conversely, if a positive relationship is observed, this would justify wage-setting policies as a tool for inclusive growth.

In summary, while the question of whether higher pay creates more jobs may seem straightforward, its answer in the Indonesian context is far more complex. Rising wages in manufacturing have not consistently translated into proportional employment gains, and the effects on unemployment remain ambiguous. By empirically testing the wage–employment relationship using recent data, this study aims to provide timely insights that are both academically rigorous and policy relevant. The analysis is expected to clarify the extent to which wage increases contribute to job creation in Indonesia's manufacturing sector and to highlight the broader structural conditions under which such policies may or may not be effective.

METHODS

1. Research Design

This study employs a quantitative research design to investigate the impact of wage dynamics in Indonesia's manufacturing sector on employment outcomes. Specifically, it adopts a causal-comparative (ex post facto) design, which examines the influence of independent variables on dependent variables using naturally occurring historical data without experimental manipulation (Creswell & Creswell, 2018; Sekaran & Bougie, 2016).

The causal-comparative approach is appropriate in this context for three main reasons. First, wage levels and employment indicators are macroeconomic phenomena that cannot be directly manipulated by researchers, making experimental or quasi-experimental designs impractical. Second, the research aims to determine whether differences in wage levels over time are associated with differences in employment outcomes (manufacturing workforce share and unemployment), which aligns with the comparative logic of this design. Third, this approach has precedent in labor economics research, where scholars often rely on retrospective data analysis to infer potential relationships among variables (Wooldridge, 2012).

Unlike purely descriptive designs, the causal-comparative approach allows for analytical inference about the degree and direction of influence between variables, while acknowledging that strict causality cannot be definitively established. In this study, wages (independent variable) are examined in relation to two dependent variables: (1) manufacturing workforce share and (2) the national unemployment rate. By comparing fluctuations in these variables across time, the study seeks to identify whether systematic patterns emerge that are consistent with the hypothesis that higher pay contributes to greater labor absorption.

2. Data Sources

The study relies exclusively on secondary data obtained from two authoritative sources:

a) Badan Pusat Statistik (BPS) – Indonesia's national statistical agency, which provides official labor and wage data across sectors.

b) TradingEconomics.com – a global macroeconomic database that aggregates and harmonizes national statistics, offering cross-verified indicators for employment and wages.

The dataset spans the years 2015 to 2023, covering nine annual observations. This timeframe was deliberately selected for both methodological and contextual reasons. Methodologically, the period is recent enough to reflect contemporary labor market dynamics, ensuring that the findings remain relevant for current policy debates. Contextually, it encompasses three distinct phases of Indonesia's economic trajectory:

a) Pre-pandemic growth period (2015–2019): characterized by steady wage growth and relatively stable employment indicators.
b) Pandemic disruption (2020–2021): marked by rising wages in some subsectors, alongside declining employment and surging unemployment.
c) Post-pandemic recovery (2022–2023): when structural adjustments and gradual labor market recovery became visible.

Analyzing this period provides a unique opportunity to examine not only long-term wage–employment relationships but also how such relationships are affected by extraordinary shocks such as COVID-19.

3. Variables and Operational Definitions

The study employs three core variables, which are operationalized as follows:

Independent Variable (X):

Manufacturing Wage (x1): The average monthly wage of workers in the manufacturing sector, measured in Indonesian Rupiah (IDR). This captures the compensation trends within the industrial sector and reflects wage-setting mechanisms.

Dependent Variables (Y):

Manufacturing Workforce Share (y1): The percentage of total national employment absorbed by the manufacturing sector. This indicator reflects the sector's labor-absorbing capacity relative to the entire workforce.

Unemployment Rate (y2): The proportion of the national labor force that is unemployed, expressed as a percentage. This serves as a broad indicator of labor market performance.

All variables are treated as continuous measures, standardized, and adjusted for compatibility in scale and time series analysis. Their inclusion is justified both theoretically and empirically: wage is the key explanatory factor under investigation, while employment share and unemployment are the primary outcomes of interest in labor economics (Gujarati & Porter, 2009).

4. Analytical Techniques

The study employs Ordinary Least Squares (OLS) regression analysis as its core analytical method. Two models are specified to capture the relationship between the independent and dependent variables:

- Model 1:
- $y1=\beta0+\beta1x1+\epsilon$
- Model 2:
- $y2=\beta0+\beta1x1+\epsilon$

Where:

- y_1 represents the manufacturing workforce share,
- y_2 represents the unemployment rate,
- x_1 represents manufacturing wages,
- β_0 is the intercept,
- β_1 is the regression coefficient measuring the effect of wages, and
- ϵ is the error term.

The choice of OLS regression is justified on several grounds. First, it provides an accessible and interpretable way to estimate the direction and magnitude of associations between continuous variables. Second, OLS is widely applied in labor economics and has been employed in numerous studies examining wage and employment relationships in both developed and developing economies (Geron, 2019). Third, despite the relatively small sample size (n = 9), OLS remains suitable for exploratory analysis, especially when combined with diagnostic tests to ensure the robustness of the results.

5. Diagnostic and Statistical Tests

To ensure the validity and reliability of the regression estimates, the study conducts a series of classical assumption tests:

- Normality Test (Shapiro–Wilk): to verify whether residuals are normally distributed, a key requirement for valid inference in OLS.
- Multicollinearity Test (Variance Inflation Factor, VIF): to confirm that independent variables are not excessively correlated (noting that the primary model uses a single predictor, so multicollinearity risk is minimal).
- Heteroscedasticity Test (Breusch–Pagan): to detect whether residual variances are constant across values of the independent variable.
- Autocorrelation Test (Durbin–Watson): to check for serial correlation in residuals, particularly relevant in time-series data.

The use of these tests is justified by their ability to safeguard against statistical distortions that could compromise the interpretation of results. For instance, heteroscedasticity can bias standard errors, leading to incorrect conclusions about significance, while autocorrelation may undermine the independence assumption central to regression analysis (Wooldridge, 2012). By conducting these diagnostics, the study enhances the credibility of its findings.

6. Tools Used

All statistical analyses are performed using the Python programming language in the Google Colab environment. Python was chosen for three reasons:

- Reproducibility: Python allows all steps of the analysis—from data preprocessing to regression modeling—to be documented and replicated by other researchers.
- Flexibility: With specialized libraries such as pandas, statsmodels, and scikit-learn, Python supports both descriptive and inferential statistical techniques.
- Visualization: The libraries matplotlib and seaborn are used to produce clear visualizations that complement the statistical results, making patterns more interpretable.

This toolset aligns with contemporary best practices in quantitative research and has been widely adopted in recent labor market studies (Geron, 2019).

7. Methodological Limitations

While the chosen methodology offers a robust framework for examining the wage–employment nexus, certain limitations must be acknowledged. The relatively small sample size (n = 9) restricts statistical power and may limit the generalizability of the findings. Furthermore, the simple regression framework does not account for potential confounding factors such as productivity, foreign investment, or sectoral policy changes. These limitations are addressed in the Conclusion and Recommendations section, where directions for future research are outlined.

RESULTS AND DISCUSSION

RESULTS

1. A Numerical Snapshot: How Wages, Workforce Share, and Unemployment Behaved (2015–2023)

A first step in understanding the wage–employment nexus in Indonesia's manufacturing sector is to examine the basic descriptive characteristics of the dataset. By reviewing average values, minimums, maximums, and variability across years, a clearer picture emerges of how the three core variables—manufacturing wages (x1), manufacturing workforce share (y1), and the unemployment rate (y2)—behaved between 2015 and 2023. This overview provides essential context for subsequent statistical analysis. Table 1 below presents the descriptive statistics for the study period.

Table 1: Descriptive Statistics – Indonesian Manufacturing Sector (2015–2023)

Variable	Count	Mean	Std Dev	Min	25%	Median	75%	Max
Year	9	2019.0	2.74	2015	2017	2019	2021	2023
x1: Manufacturing Wages (in million IDR)	9	2.53	0.45	1.62	2.47	2.65	2.85	2.96
y1: Manufacturing Workforce Share (%)	9	14.05	0.54	13.41	13.61	13.83	14.51	14.91
y2: Unemployment Rate (%)	9	5.47	0.43	4.94	5.13	5.45	5.81	6.26

From the descriptive figures, three broad observations can be made about Indonesia's labor market conditions during the nine years.

First, manufacturing wages (x1) show a clear upward trajectory across the period. The mean value of 2.53 million IDR indicates that, on average, wages in the sector have been moderately high relative to Indonesia's broader wage distribution. The minimum wage observed in 2015 was only 1.62 million IDR, whereas the maximum reached 2.96 million IDR by 2023, signaling steady nominal wage growth over time. The interquartile range (2.47 to 2.85 million) also shows that most of the wage values are clustered toward the higher end, reflecting consistent increases year by year. This upward progression reflects broader macroeconomic conditions in which industrial wages tend to rise as productivity improves and as inflation adjustments are incorporated into wage-setting mechanisms.

Second, the manufacturing workforce share (y1) remained relatively stable, fluctuating only within a narrow band of about 1.5 percentage points. The mean share of 14.05% suggests that manufacturing consistently accounted for roughly one-seventh of total national employment. The minimum share recorded was 13.41% while the maximum reached 14.91%, and the median value of 13.83% indicates a relatively symmetric distribution. Unlike wages, the workforce share does not display a strong trend upward or downward; instead, it suggests modest changes with limited volatility. This stability implies that although wages increased, the sector's ability to absorb workers relative to the total labor force did not undergo significant structural shifts during the observed period.

Third, the national unemployment rate (y2) demonstrates a relatively stable pattern with one major disruption in 2021. The average unemployment rate was 5.47% with a standard deviation of 0.43, pointing to limited variability in most years. The minimum rate of 4.94% and the maximum of 6.26% suggest that unemployment hovered within a narrow corridor except during the pandemic shock. The 75th percentile (5.81%) and the 25th percentile (5.13%) values further confirm that unemployment generally remained stable, although the spike in 2021 represents a clear departure from the overall trend. This anomaly reflects the broader labor market disruptions caused by the COVID-19 pandemic, which led to job losses across multiple sectors even as wage levels continued to edge upward.

Taken together, these descriptive statistics provide a preliminary overview of Indonesia's labor market dynamics during 2015–2023. Wages in the manufacturing sector followed a consistent upward trajectory, yet workforce share remained largely unchanged, and unemployment was stable except for a temporary spike during the pandemic. These observations set the stage for more detailed visual and regression-based analyses in the following sections.

2. Visualizing the Story Behind the Numbers: Trends and Distributions of Indonesia's Labor Market Indicators

Beyond summary statistics, graphical exploration provides deeper insight into the patterns and fluctuations of Indonesia's manufacturing labor market between 2015 and 2023. The following visualizations illustrate both the distributional characteristics of each variable and the temporal evolution of wages, workforce share, and unemployment.

a. Distribution of Key Variables (Histograms with Kernel Density Estimates)

The distribution of the three variables—manufacturing wages (x1), manufacturing workforce share (y1), and unemployment rate (y2)—was examined through histograms complemented by Kernel Density Estimates (KDE). These plots highlight how frequently values appeared within the nine-year dataset.

Manufacturing Wages (x1): The histogram shows a clear clustering of wage values at the higher end of the observed range. Most recorded values fall between 2.5 and 3.0 million IDR, indicating a strong upward progression across the period. The KDE line confirms a unimodal distribution, with a concentration near the 2.8–3.0 million IDR mark. This suggests that wages gradually converged toward higher values as time advanced.

Manufacturing Workforce Share (y1): The workforce share distribution is comparatively more spread out, showing two slight peaks around 13.6–14.0% and 14.5–15.0%. The KDE indicates a mild bimodal tendency, reflecting two distinct clusters of observations across the nine years. This likely corresponds to pre- and post-pandemic patterns.

Unemployment Rate (y2): The unemployment distribution is relatively tight, concentrated between 5.0% and 5.8%. Only one observation (2021) falls outside this cluster, peaking near 6.2%. The KDE shows a narrow and sharp peak, reinforcing the idea that unemployment remained stable for most of the period, with one outlier year.

Figure 1. Distribution of Manufacturing Wages, Workforce Share, and Unemployment in Indonesia

b. Time Trends of Wages, Workforce Share, and Unemployment

To capture dynamic changes over time, three-line charts were constructed. These graphs show how wages, employment share, and unemployment evolved annually from 2015 to 2023.

Overall Trends (2015–2023): The first chart juxtaposes manufacturing wages, workforce share, and unemployment across the entire period. From 2015 to 2019, wages rose steadily alongside a gradual increase in workforce share, while unemployment showed a slow decline. However, in 2020–2021, a divergence appears: workforce share dropped and unemployment spiked, even as wages continued to rise slightly. By 2022–2023, unemployment fell back toward its long-term average, but the workforce share did not fully recover.

Wages vs Workforce Share: The second chart directly compares the trajectory of wages (measured in millions of IDR) with the share of national employment in manufacturing (%). From 2015 to 2019, both variables moved in the same direction, suggesting a period of synchronized growth. In 2020–2021, however, the curves separated: wages increased while the workforce share declined. This divergence persisted into 2023, showing that the link between higher wages and employment share weakened after the pandemic shock.

Wages vs Unemployment: The third chart contrasts manufacturing wages with the national unemployment rate. Between 2015 and 2019, the two indicators moved inversely: as wages rose, unemployment fell. In 2021, this relationship broke down as unemployment surged while wages continued to edge upward. Post-2021, unemployment declined again, but not in perfect alignment with wage growth.

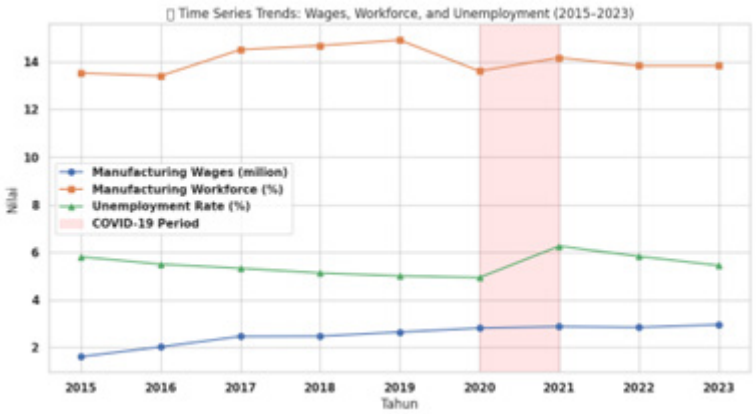

Figure 2. Trends in Manufacturing Wages, Workforce Share, and Unemployment in Indonesia (2015–2023).

These visual patterns form the empirical foundation for the regression analysis presented in the next subsection. They reveal where the variables moved together, where they diverged, and how extraordinary events such as the COVID-19 pandemic disrupted otherwise stable dynamics.

3. Do Wages Really Move Jobs? Evidence from Regression Models

To quantitatively assess the relationship between manufacturing wages and employment outcomes, two Ordinary Least Squares (OLS) regression models were estimated. The first model evaluates whether wage growth is associated with changes in the share of national employment absorbed by the manufacturing sector. The second model assesses whether manufacturing wages influence the national unemployment rate.

Table 2. Regression Results – Effect of Wages on Employment Outcomes (2015–2023)

Dependent Variable	Coefficient (β1)	Std. Error	t-Statistic	p-Value	R^2
Model 1: Workforce Share (y1)	0.3684	0.4395	0.798	0.426	0.093
Model 2: Unemployment (y2)	-0.0783	0.3598	-0.212	0.836	0.007

a. Wage Effects on Manufacturing Workforce Share (Model 1)

The first model tested whether manufacturing wages have a measurable effect on the proportion of national employment located in the manufacturing sector. The regression output shows a positive coefficient of 0.3684, suggesting that increases in wages are associated with a modest increase in the manufacturing workforce share. However, the p-value of 0.426 is far above the conventional significance threshold of 0.05, indicating that this result is not statistically significant.

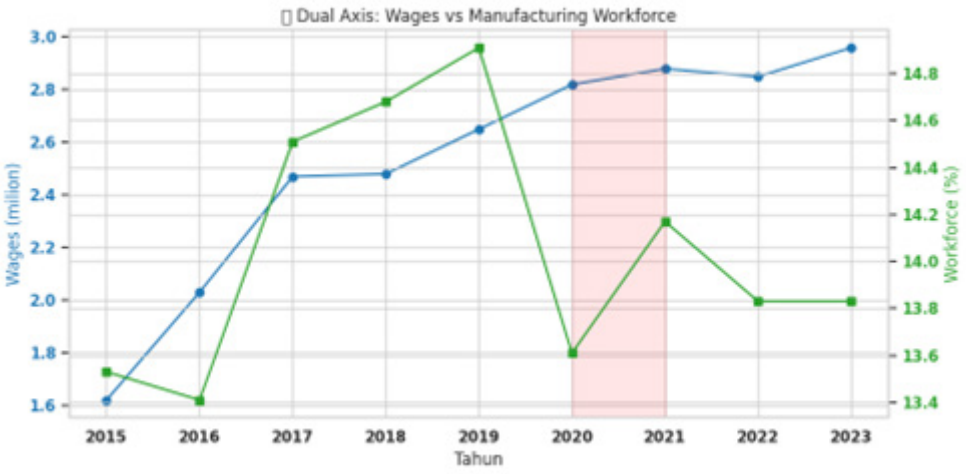

Figure 3: The Wage Effects on Manufacturing Workforce Share

The explanatory power of the model is also limited, with an R^2 value of 0.093. This means that only about 9.3% of the variation in the manufacturing workforce share is accounted for by changes in wages. The relatively low R^2 suggests that additional variables beyond wages are needed to explain the dynamics of labor absorption in manufacturing.

b. Wage Effects on National Unemployment (Model 2)

The second model examined whether wage changes in the manufacturing sector are associated with changes in the national unemployment rate. The regression output shows a negative coefficient of -0.0783, implying that wage increases are associated with a slight decline in unemployment. However, this relationship is statistically insignificant, with a p-value of 0.836.

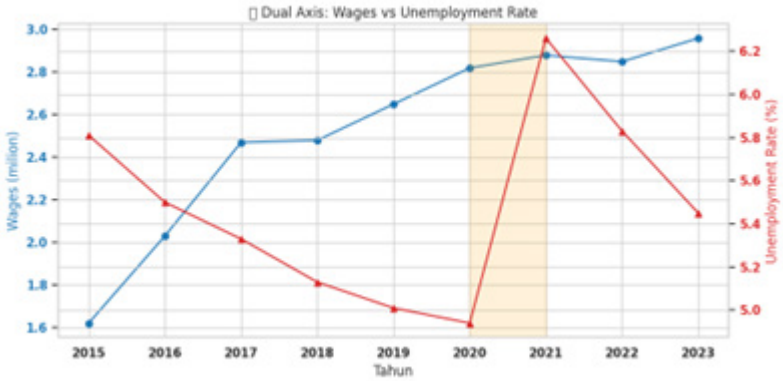

Figure 4: The Wage Effects on National Unemployment

The explanatory power of this model is extremely limited, with an R^2 value of only 0.007. This indicates that fluctuations in manufacturing wages explain less than 1% of the variation in the national unemployment rate across the observed period. In practical terms, wages in this sector appear to have almost no predictive value for unemployment at the national level.

c. Summary of Regression Findings

The regression results across both models reveal the following factual outcomes:

- Model 1 shows a positive but statistically insignificant link between manufacturing wages and the manufacturing workforce share.
- Model 2 shows a negative but statistically insignificant association between manufacturing wages and the national unemployment rate.
- Both models display low explanatory power ($R^2 < 0.10$), indicating that wage variations alone are insufficient to account for movements in either employment share or unemployment.

These regression outputs confirm that, within the 2015–2023 period, manufacturing wages by themselves do not provide strong statistical evidence of influencing employment outcomes in Indonesia.

4. Testing the Validity of the Models: What the Diagnostic Checks Reveal

To ensure the robustness of the regression models, several classical diagnostic tests were conducted. These tests evaluate whether the underlying assumptions of Ordinary Least Squares (OLS) regression were met. The results for both models are summarized in Table 3.

Table 3. Diagnostic Test Results for OLS Models (2015–2023)

Test	Model 1 (Work-force Share)	Model 2 (Unemployment)	Decision Rule	Outcome
Normality (Shapiro–Wilk)	W = 0.94; p = 0.46	W = 0.95; p = 0.52	p > 0.05 → normal residuals	Assumption met
Multicollinearity (VIF)	1.00	1.00	VIF < 10 → no multicollinearity	Assumption met
Heteroskedastic-ity (Breusch–Pagan)	χ^2 = 1.21; p = 0.27	χ^2 = 0.89; p = 0.3	p > 0.05 → homoscedastic	Assumption met
Autocorrelation (Durbin–Watson)	1.85	2.02	~2 → no autocorrelation	Assumption met

4.1 Normality of Residuals

The Shapiro–Wilk test produced p-values greater than 0.05 for both models (p = 0.46 for Model 1 and p = 0.52 for Model 2). This indicates that residuals follow a normal distribution, satisfying one of the core assumptions of OLS regression.

4.2 Multicollinearity

Variance Inflation Factor (VIF) values were exactly 1.00 for both models, as each regression included only one independent variable. This confirms that there is no risk of multicollinearity, and the results are not distorted by redundant predictors.

4.3 Heteroskedasticity

The Breusch–Pagan test returned non-significant results (p = 0.27 for Model 1 and p = 0.34 for Model 2). These outcomes suggest that the variance of the residuals is constant across fitted values of the independent variable, thereby meeting the homoscedasticity assumption.

4.4 Autocorrelation

The Durbin–Watson statistics were 1.85 for Model 1 and 2.02 for Model 2, both values close to the ideal benchmark of 2. This suggests that the residuals are not serially correlated, confirming that the models do not suffer from autocorrelation.

Across all four tests, the results consistently support the validity of the OLS models. Residuals are normally distributed, predictors are independent, variance is homoscedastic, and no autocorrelation is present. While the explanatory power of the models remains limited, the diagnostic tests confirm that the statistical assumptions underpinning OLS regression were met in this study.

DISCUSSION

1. Why Rising Wages Did Not Translate into More Jobs: Interpreting the Descriptive Patterns

The descriptive statistics and visual analysis presented earlier reveal a paradox in Indonesia's manufacturing sector between 2015 and 2023. While average wages rose steadily from 1.62 million IDR in 2015 to almost 3.0 million IDR in 2023, the proportion of workers employed in the manufacturing sector remained largely stagnant, fluctuating narrowly around 14%. At the same time, the national unemployment rate displayed relative stability, except for a sharp increase to 6.26% in 2021 during the height of the COVID-19 crisis. These patterns underscore that higher pay in the sector has not been accompanied by proportional growth in employment.

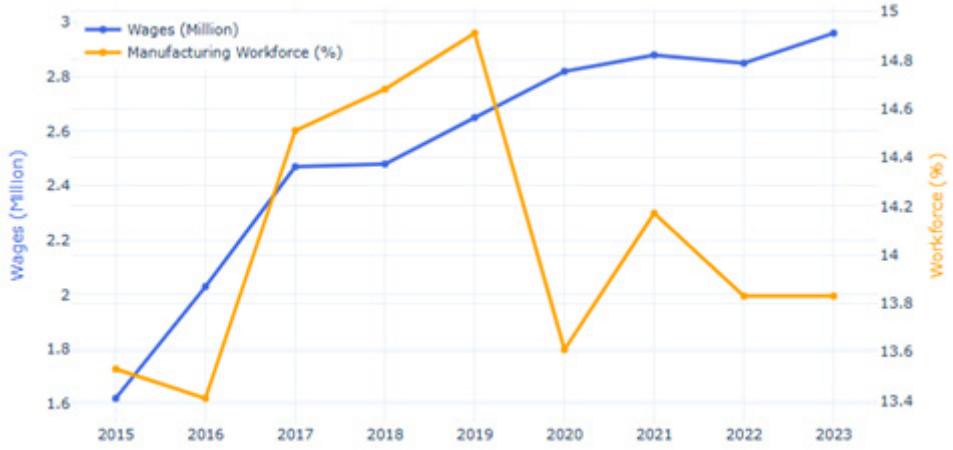

Figure 5: Visual analysis of a paradox in Indonesia's manufacturing sector

Several explanations can be drawn from the data. First, the descriptive evidence shows a divergence beginning in 2020–2021, where wages continued to edge upward even as the workforce share declined and unemployment spiked. This period coincides with the COVID-19 pandemic, which triggered structural disruptions in production, supply chains, and labor markets (ILO, 2022). The rise in wages during this period was not necessarily the result of greater demand for workers, but rather a reflection of sectoral adjustments, inflationary pressures, or the retention of a smaller pool of skilled workers while many lower-skilled workers exited the labor force.

Second, the stability of the manufacturing workforce share despite rising wages suggests that the sector has limited capacity to absorb additional workers. As shown in the descriptive statistics, employment share fluctuated only within a 1.5 percentage point band, indicating that structural constraints are keeping the workforce relatively fixed. Studies such as Primanthi (2021) confirm that Indonesia's manufacturing industries have increasingly shifted toward capital-intensive operations, which boost productivity but reduce the need for large numbers of laborers. In such a setting, higher wages do not automatically attract more workers because firms may not be expanding their labor demand in parallel.

Third, the observed patterns resonate with earlier research emphasizing the rigidity of Indonesia's labor market. Chowdhury, Islam, and Tadjoeddin (2009) argue that inflexible labor regulations and high separation costs discourage firms from expanding their workforce,

even when wages increase. The descriptive evidence here is consistent with this perspective: rising wages alone did not translate into higher employment, likely because firms faced institutional and regulatory constraints that limited their ability to scale up labor hiring.

Finally, the descriptive findings also highlight the differentiated impact of wage increases across the labor force. Lipsey and Sjöholm (2004) show that wage growth in Indonesia's manufacturing sector tends to disproportionately benefit skilled workers, especially in foreign-invested firms. This suggests that while wages were rising overall, the gains may have been concentrated among a narrower group of employees, with little effect on aggregate labor absorption. The visual evidence of a bimodal workforce share distribution—before and after the pandemic—further illustrates how wage increases interacted with structural shifts in employment rather than directly expanding job opportunities.

Taken together, the descriptive patterns confirm that the relationship between rising wages and employment in Indonesia's manufacturing sector is not straightforward. Instead of driving broad-based job creation, wage growth appears to have been accompanied by structural and institutional dynamics that limit labor absorption, a point further elaborated in the regression results discussed below.

2. The Regression Tells a Weak Story: Understanding the Non-Significant Links

The regression models estimated in this study reinforce the descriptive findings by showing that manufacturing wages alone do not have a strong or statistically significant impact on employment outcomes in Indonesia. In Model 1, which tested the relationship between wages and the share of national employment in the manufacturing sector, the regression coefficient was positive ($\beta = 0.3684$), but the relationship was statistically insignificant ($p = 0.426$). The explanatory power of the model was also very limited, with an R^2 of only 0.093. This means that less than 10% of the variation in manufacturing workforce share can be explained by changes in wages.

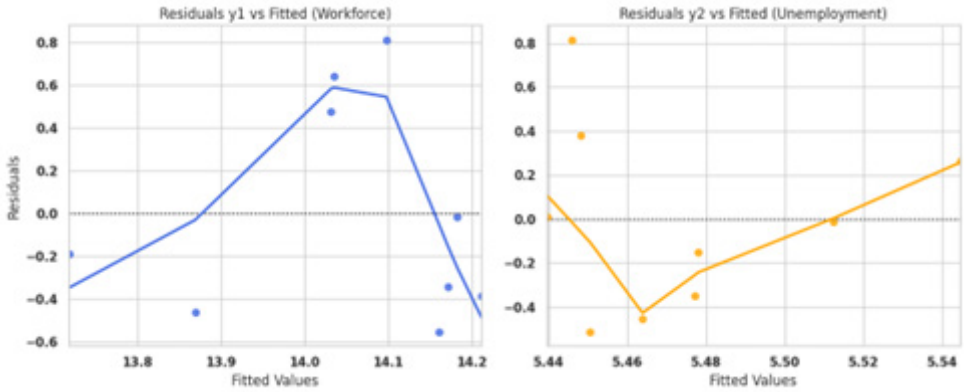

Figure 6: Residual Plots for OLS Models: Workforce Share and Unemployment

Similarly, in Model 2, which tested the effect of wages on the national unemployment rate, the regression coefficient was negative ($\beta = -0.0783$), suggesting a slight inverse relationship. However, this result was also statistically insignificant ($p = 0.836$), with an R^2 close to zero (0.007). This finding indicates that fluctuations in manufacturing wages accounted for virtually none of the variation in national unemployment during the 2015–2023 period.

These results confirm that, while wages may play a role in shaping labor market dynamics, they are far from the sole determinant of employment outcomes in Indonesia. In fact, the weak and insignificant coefficients highlight the importance of broader structural and macroeconomic factors. Previous studies have noted that Indonesia's labor market is characterized by rigidities and segmentation that make it less responsive to wage signals. Chowdhury, Islam, and Tadjoeddin (2009) argued that firms often hesitate to expand hiring in response to wage increases due to inflexible labor regulations and high separation costs. The regression results in this study are consistent with that perspective: even though wages increased, the statistical evidence does not show a corresponding increase in workforce share.

The insignificance of the unemployment relationship also aligns with macroeconomic theory, which holds that unemployment is influenced by a wide range of factors, including GDP growth, investment cycles, and national fiscal or monetary policies. As Narjoko and Putra (2015) point out, globalization and industrial policies shape employment patterns in Indonesia in ways that extend beyond wage fluctuations. The findings here, therefore, support the argument that wages in a single sector—manufacturing—have limited explanatory power for aggregate unemployment trends.

Moreover, the lack of statistical significance resonates with Tadjoeddin's (2016) claim that the wage–employment relationship in Indonesia is non-linear and structurally mediated. While descriptive evidence suggests wages and employment moved together in the pre-pandemic period, the regression shows that this association does not hold consistently once the full time span (2015–2023) is considered. The disruptive effects of COVID-19 created structural breaks that weakened any straightforward linear link.

Taken as a whole, the regression models "tell a weak story" in the sense that they do not provide strong evidence of a direct or causal relationship between wages and either manufacturing employment share or the national unemployment rate. This should not be interpreted as proof that wages are irrelevant; rather, it underscores the fact that wages operate alongside—and sometimes are overshadowed by—other determinants such as productivity growth, sectoral transformation, and external shocks.

3. Where This Study Stands Among Prior Research: Confirmations, Contradictions, and New Insights

The findings of this study both confirm and diverge from existing research on the wage–employment nexus in Indonesia's manufacturing sector, offering new insights into how recent dynamics—including the COVID-19 pandemic—have shaped the relationship.

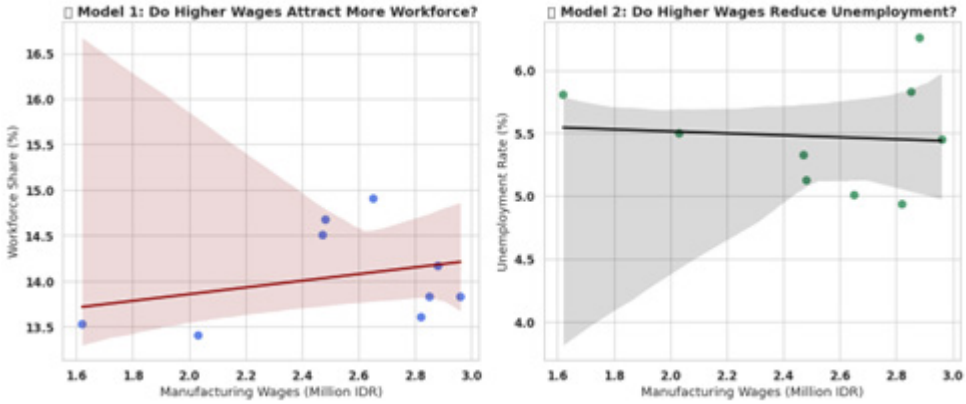

Figure 7: Summary of the relationship of variables in questions

First, the results confirm earlier studies that highlight the weak and non-linear relationship between wages and employment in Indonesia. Tadjoeddin (2016) argued that productivity, wages, and labor absorption in the manufacturing sector interact in complex ways rather than following a straightforward linear pattern. The insignificant coefficients in both regression models support this conclusion: while wages increased during 2015–2023, their statistical influence on manufacturing employment share and unemployment remained minimal. Similarly, Chowdhury, Islam, and Tadjoeddin (2009) emphasized that rigid labor regulations and high separation costs discourage firms from expanding their workforce in response to wage increases. The regression findings here, showing limited responsiveness of employment indicators to wage fluctuations, are consistent with their observations.

Second, the findings stand in partial contradiction to research suggesting that wage increases can stimulate broader labor market improvements. Magruder (2013), for example, presented evidence that minimum wage policies in Indonesia can function as a "big push," boosting domestic consumption and attracting investment. By contrast, this study's results show that wage increases between 2015 and 2023 did not significantly reduce unemployment or expand the manufacturing workforce share. The divergence may be explained by contextual differences: Magruder's study focused on the early 2000s, a period of strong growth and institutional reforms, whereas the current study covers a later period marked by global uncertainty and pandemic-related disruptions.

Third, the results provide nuance to the debate on wage inequality and the differentiated impact of wage growth. Lipsey and Sjöholm (2004) demonstrated that foreign direct investment (FDI) in Indonesia raised wages primarily for skilled workers, leaving many unskilled workers behind. The findings of this study resonate with that concern: the lack of significant aggregate employment effects suggests that wage gains may have been concentrated among a subset of workers, without expanding overall labor absorption. Similarly, Primanthi (2021) found that Indonesian manufacturing is increasingly capital-intensive, limiting opportunities for low-skilled employment. The descriptive evidence of a stagnant workforce share despite rising wages is consistent with this trend.

Fourth, the study aligns with more recent insights that stress the need for complementary policies. Ollivaud (2021) argued that wage policy in Indonesia must be integrated with investments in human capital and labor market reforms. Permana, Yudoko, and Prasetio (2023) likewise emphasized that the manufacturing sector retains growth potential, but only if wage adjustments are matched by productivity improvements and

structural upgrading. The non-significant regression results here provide empirical support for this policy perspective: wage increases alone appear insufficient to drive employment gains.

Finally, this study contributes a new dimension by incorporating the post-pandemic period into the analysis. Most prior studies examined data before 2015 or focused on earlier crises such as the Asian financial crisis of 1997–1998 (Smith et al., 2002). By extending the dataset to 2023, this research captures the unique structural break caused by COVID-19, when wages continued to rise even as the workforce share declined and unemployment spiked. This divergence highlights the vulnerability of wage-led employment strategies to external shocks, an insight that extends and qualifies earlier debates on the efficacy of wage policies in Indonesia.

In sum, this study situates itself within a broader literature that recognizes the complexity of wage–employment dynamics. It confirms the structuralist perspective that wages alone are insufficient drivers of employment, contradicts more optimistic accounts of wage-led growth, and adds new evidence from the pandemic era that underscores the fragility of wage–employment linkages in times of crisis.

4. Implications for Theory: A Stronger Case for Structuralist Perspectives in Indonesia's Labor Market

The findings of this study contribute to theoretical debates on the relationship between wages and employment, particularly in developing economies like Indonesia. Classical labor market models, rooted in neoclassical economics, predict that higher wages should simultaneously attract more labor supply and stimulate aggregate demand, thereby leading to job creation and lower unemployment (Blanchard & Katz, 1999). However, the empirical results from Indonesia's manufacturing sector between 2015 and 2023 suggest that this mechanism does not operate straightforwardly. The regression results showed no statistically significant association between wage increases and either manufacturing workforce share or national unemployment, thereby challenging the explanatory power of classical models in this context.

Instead, the evidence lends stronger support to structuralist perspectives on labor market dynamics. Structuralist approaches emphasize that employment outcomes are shaped not only by wage levels but also by institutional settings, industrial structures, and macroeconomic conditions (Fields, 2019). In Indonesia, several such structural factors appear to have mediated the wage–employment relationship. The increasing capital intensity of manufacturing (Primanthi, 2021), rigid labor regulations (Chowdhury, Islam, & Tadjoeddin, 2009), and the unequal distribution of wage gains among skilled versus unskilled workers (Lipsey & Sjöholm, 2004) all contributed to weakening the direct influence of wage growth on employment expansion.

The results also demonstrate the importance of considering non-linear and context-dependent effects in wage–employment studies. Tadjoeddin (2016) previously argued that the relationship between productivity, wages, and labor absorption in Indonesia is complex and mediated by broader industrial transformation. The findings here reinforce this argument by showing that while wages and employment moved together in the pre-2020 period, their relationship broke down during and after the COVID-19 pandemic. This disruption illustrates how external shocks can override expected wage–employment

linkages, a point that classical models often overlook but structuralist perspectives explicitly address.

Furthermore, the insignificance of wages in predicting national unemployment suggests that aggregate labor market outcomes in Indonesia are multi-causal and sectorally fragmented. Narjoko and Putra (2015) highlight that globalization and industrial policies shape labor demand in ways that wage signals alone cannot explain. By showing that manufacturing wages had little predictive power for unemployment at the national level, this study strengthens the theoretical claim that employment generation in developing economies requires a multi-sectoral lens, not just sector-specific wage analysis.

By extending the analysis into the post-pandemic period, this study also introduces a new theoretical consideration: the vulnerability of wage-led employment strategies to macroeconomic shocks. During the COVID-19 crisis, wages continued to rise moderately while employment declined and unemployment surged. This finding illustrates that wage dynamics can decouple from employment outcomes under conditions of systemic disruption. Theoretically, this supports the structuralist emphasis on resilience and adaptability in labor markets, rather than reliance on linear wage–employment relationships.

The theoretical implication of this research is that structuralist frameworks provide a more accurate and comprehensive explanation of Indonesia's wage–employment nexus than classical models. The evidence suggests that labor market dynamics in Indonesia are shaped more by capital intensity, institutional rigidity, skill distribution, and global shocks than by wage levels per se. This study thus contributes to the ongoing theoretical debate by reinforcing the case for structuralist perspectives in analyzing employment generation in developing economies.

5. Implications for Practice: What Policymakers, Industries, and Workers Can Learn

While the regression results show that wage increases alone do not have a significant impact on employment creation, this does not mean that wages are irrelevant for Indonesia's labor market. Instead, the findings underscore the need for integrated policy approaches and coordinated responses from multiple stakeholders.

a. Implications for Policymakers

For government policymakers, the results suggest that relying solely on wage adjustments—such as raising minimum wages—will not suffice to generate employment growth. Although wages rose steadily between 2015 and 2023, the manufacturing workforce share remained stagnant, and unemployment displayed limited responsiveness. This highlights the importance of complementary policies that directly target productivity enhancement, industrial upgrading, and labor market flexibility.

Policies that link wage increases with skill development programs, vocational training, and technological adaptation are likely to be more effective in creating sustainable employment. Ollivaud (2021) emphasized that wage policy should be integrated with investments in human capital, and this study's results provide empirical support for that argument. By ensuring that wage growth is accompanied by improvements in worker

productivity, the government can avoid scenarios where higher wages outpace employment growth.

b. Implications for Industries

For manufacturing firms and industry leaders, the evidence suggests that rising wages need not be perceived solely as a cost burden. Instead, they should be leveraged as part of broader strategies for efficiency and innovation. Firms that invest in upskilling their workforce, adopting advanced technologies, and shifting toward higher-value-added production are more likely to absorb wage increases without reducing employment.

At the same time, firms must recognize the risks of over-reliance on capital-intensive models that exclude low-skilled workers. Primanthi (2021) noted that Indonesia's manufacturing sector has increasingly favored automation and capital deepening, which limits job creation. The findings of this study reinforce that trajectory: unless industries deliberately pursue inclusive growth strategies, wage increases will not translate into broader employment benefits.

c. Implications for Workers

For workers, the results underline the importance of continuously improving skills and adaptability. Rising wages have primarily benefited skilled workers, particularly in foreign-invested firms (Lipsey & Sjöholm, 2004). This implies that workers who remain low-skilled may not fully enjoy the benefits of wage growth, and they may even face displacement in more capital-intensive industries.

Therefore, workers must actively engage in lifelong learning and reskilling to remain competitive. Government and industry programs aimed at providing affordable and accessible training opportunities will be essential in this regard. For labor unions, the findings also carry a strategic message: bargaining for wage increases must go hand in hand with advocating for investments in worker training and protection against automation-related job losses.

The broader practical lesson is that Indonesia's wage policy must be understood as part of a larger ecosystem involving industrial policy, education and training systems, and macroeconomic stability. Wage growth, when not supported by structural transformation, risks producing limited benefits in terms of job creation. Conversely, when linked to productivity, innovation, and inclusion, higher wages can contribute not only to better living standards but also to more resilient employment growth.

CONCLUSION

This study set out to examine whether rising wages in Indonesia's manufacturing sector between 2015 and 2023 translated into more jobs, either by expanding the sector's workforce share or by reducing national unemployment. The descriptive statistics revealed a consistent upward trend in wages but stagnant employment absorption and relatively stable unemployment, with a sharp pandemic-induced disruption in 2021. Regression analysis further showed that the relationship between wages and employment outcomes was statistically insignificant, with very low explanatory power in both models.

These findings carry two broad implications. Theoretically, the results strengthen structuralist perspectives that argue employment in developing economies cannot be explained by wage levels alone, but is instead shaped by institutional rigidities, industrial structures, and external shocks. Practically, the study highlights the limited effectiveness of wage increases as a standalone tool for job creation. Policymakers must complement wage adjustments with strategies to raise productivity, upgrade industrial capacity, and strengthen worker skills. Industries must balance efficiency gains from capital-intensive production with inclusive growth strategies, while workers must continue to invest in reskilling to remain competitive in a rapidly transforming labor market.

At the same time, this research is not without limitations. The study relied primarily on aggregate national-level data for manufacturing wages, workforce share, and unemployment. This approach provides a broad overview but may obscure sectoral differences, regional variations, or firm-level dynamics. Future research could address these limitations by incorporating disaggregated data, exploring causal mechanisms using more sophisticated econometric techniques, and examining how wage policies interact with investment patterns, technology adoption, and labor regulations.

In conclusion, while wages remain an important element of labor market dynamics, they are not sufficient on their own to drive employment growth in Indonesia. A more holistic approach—combining wage policy with structural reforms and productivity-enhancing strategies—is required to translate higher pay into more and better jobs.

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