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Analysis of The Influence of Population Number and Regional Minimum Wage on Unemployment in Central Kalimantan

Rima Harati[1]*, Heike Delfmann[2]

[1] *Faculty of Economics and Business, Palangkaraya University, 73111, Indonesia*
[2] *Department of Economic Geography, Faculty of Spatial Sciences, University of Groningen, 9747, Netherlands*

Abstract. This study aims to examine the impact of population and regional minimum wages on unemployment in Central Kalimantan. Understanding the factors influencing unemployment is crucial for policymakers, particularly in regions with unique economic and demographic challenges like Central Kalimantan. The research uses data from the period 2011-2023, applying Multiple Linear Regression Analysis to investigate the relationship between population (X1), regional minimum wages (X2), and unemployment (Y). Classical assumption tests, including normality, multicollinearity, autocorrelation, and heteroscedasticity, were conducted to ensure the validity of the regression model. The findings indicate that neither population nor regional minimum wages significantly affect unemployment in Central Kalimantan. These results suggest that other factors may play a more significant role in determining unemployment in the region, providing a basis for future research to explore additional variables and more complex interactions affecting regional unemployment rates.

Keywords: Population; Regional Minimum Wage; Unemployment

1. Introduction

The number of residents in an area will influence the job opportunities available in that area, with the reason that a large population will have a competitive impact on the number of job vacancies available. If the available job vacancies are limited and the number of people of working age increases, this will result in an increase in the number of unemployed in the area, including the area in Central Kalimantan (Hamka & Natalia Hia, 2023; Paais & Pattiruhu, 2020). One of the impacts that will occur if there is a population explosion is the height competition in the world of work. If the problem is a lack of employment opportunities in an area-area while the population experiences an extreme increase, it will causing unemployment and increasing poverty (Neno et al., 2024; Parawansa et al., 2024; Sepdianty & Tuah, 2024).

The workforce needs jobs and generally in the country developing population growth rate (including the labor force) is greater than the rate employment growth. Therefore, not all of the workforce can get it employment and ultimately unemployment new growth theory emphasizes the importance of the role government (Badan Pusat Statistik & Kementerian Dalam Negeri, 2021; Kusnandar, 2020). The increase in population

*Corresponding author's email: rimahrti74@gmail.com, Telp.: +6281346231956

influences the level of unemployment by the Solow Model. Apart from the Solow Model, the influence of population on high and low levels of unemployment can also be explained in Malthusian Population Theory. Population growth will result in an increase in labor requirements (Ismoyo et al., 2022; Nanda & Fahrati, 2023; Nurasniar, 2021).

One of the factors that influences unemployment is wages. Wages are quite an interesting problem because the majority of the unemployed prefer to work in the information sector to make ends meet (although they are still looking for a job with a better wage level) rather than being forced to work in the formal sector. with minimal wages (Bangkang et al., 2021).

Wages are compensation that workers receive for work services provided in the process of producing goods or services in the company. In wages, the term minimum wage is known, namely the minimum standard used by entrepreneurs or industrial players to provide wages to workers in their business or work environment. Because they fulfill their needs what is appropriate in each province is different, so it is called the Minimum Wage Provincial or Regional Minimum Wage (Siatan & Zuliansyah, 2023; Suhadi & Setyowati, 2022; Tuah et al., 2023). Development of UMR over time will have an impact on increasing income. Thus, this situation will have an impact on the abilities of the students workers to increase their spending (Sania et al., 2021).

Below is table 1 of population, regional minimum wage and number of unemployed in Central Kalimantan :

Table 1 Population, Regional Minimum Wage, Unemployment in Central Kalimantan 2011-2023

Year	Population (X1)	Regional Minimum Wage (X2)	Unemployment (Y)
2011	2,249,146	1,134,580	2.55%
2012	2,283,687	1,327,459	3.14%
2013	2,384,733	1,553,127	3.00%
2014	2,439,858	1,723,970	3.24%
2015	2,495,035	1,896,367	4.54%
2016	2,550,192	2,057,558	4.82%
2017	2,605,274	2,227,307	4.23%
2018	2,660,209	2,421,305	3.91%
2019	2,714,859	2,663,436	4.04%
2020	2,669,969	2,903,144	4.58%
2021	2,822,900	2,903,145	4.53%
2022	2,876,100	2,922,516	4.26%
2023	2,928,500	3,181,013	4.10%

Source: (Badan Pusat Statistik & Kementerian Dalam Negeri, 2021)

Judging from the table above, the population in 2011 was 2,249,146 thousand people and in 2020 it was 2,669,969 and finally in 2023 it was 2,928,500 thousand people in Central Kalimantan. In table 1 it can also be seen that in 2011 the regional minimum wage in Central Kalimantan was IDR 1,134,580 and in 2017 it was IDR 2,227,307 and finally in 2023 the regional minimum wage in Central Kalimantan was IDR 3,181,013. Apart from that, in table 1 the unemployment rate in Central Kalimantan in 2011 was 2.55% and in

2018 it was 3.91% and finally in 2023 it increased to 4.10%.

Based on the description above, the author is interested in researching more deeply the influence of population and regional minimum wages on unemployment in Central Kalimantan.

2. Methods

This research is quantitative research. Quantitative research is a research method that uses numbers and statistics to collect and analyze measurable data where the dependent variable in this research is unemployment and the independent variables are population size and regional minimum wages (Ariadi & Muzdalifah, 2020; Fat'Ha & Sutanto, 2020; Kaporina et al., 2023).

The tests used in this research are classical assumption tests and statistical tests of multiple regression analysis using the SPSS 25 program. With the model equation as follows :

$$Y = a + b1X1 + b2X2 + Ui$$

Where :

Y = Unemployment
X1 = Number of residents
X2 = Regional minimum wage
a = Constant value
b = Independent variable regression coefficient
Ui = Standard error

2.1. Test classical assumptions

The classical assumption test is an initial stage used before multiple linear regression analysis. This test is carried out to be able to provide certainty that the regression coefficients are not biased as well consistent and accurate in estimation (Risza et al., 2018; Utami, 2018). The classical assumption test is carried out to show that the tests carried out have passed normality data, multicollinearity, autocorrelation, and heteroscedasticity so that testing can be carried out into linear regression analysis. Besides that, it is a new model is said to be quite good and can be used to predict if it passes from a series of tests of the underlying classical assumptions.

2.1. Classic assumption tests include

2.1.1.Normality test

The normality test aims to test whether in the regression model, nuisance or residual variables have a normal distribution, regression model good ones have normal data distribution(Andriani, 2017; Muminin & Hidayat, 2017).

2.1.2.Multicollinearity test

The multicollinearity test aims to test whether in the model regression found a correlation between independent variables. Model A good regression should have no correlation between variables independent. If the independent variables are correlated with each other, then this variable is not orthogonal. Orthogonal variables are independent variables with correlation values between independent variables is equal to zero (Hakim et al., 2016).

2.1.3.Heteroscedasticity test

The heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from residual one observation to another observation. If the variance of the residual is one observation to other observations remains, then it is called Homoscedasticity and if different is called heteroskedasticity (Rochim, 2016; Sukoco, 2015). A good regression model is one Homoscedasticity or heteroscedasticity does not occur. Mostly data cross section contains a situation of heteroscedasticity due to this data collect data representing various sizes (small, medium and large).

2.2. Autocorrelation test

The basis for decision making in determining whether there is autocorrelation using a run test is If the value of Asymp. Sig. (2-tailed) is smaller than (<) 0.05, then there are symptoms of autocorrelation. Conversely, if the value of Asymp. Sig. (2-tailed) is greater than (>) 0.05, so there are no symptoms of autocorrelation.

2.3. Statistical Test

2.3.1. t test

The t test is used to test whether these variables have an effect significantly to the dependent variable or not. A variable will has a significant influence if the calculated t value of the variable is greater compared with the t table value (Kaporina et al., 2023; Lala Atika Sari, 2022)

2.3.2. F test

The simultaneous test is used to find out whether Independent variables jointly influence the dependent variable and to measure the accuracy of the sample regression function in estimating values actual through goodness of fit (Lala Atika Sari, 2022).

2.3.3. Coefficient of Determination (R2)

The coefficient of determination (R2) essentially measures how far the model's ability to explain variations in the dependent variable. Mark the coefficient of determination is between zero and one. A small R2 value is significant the ability of independent variables to explain variable variations very limited dependencies. Values close to one mean variables independent provides almost all the information needed for predict variations in the dependent variable (Arisandi, 2022).

3. Results and Discussion Result

3.1. Classical Assumption Test

3.1.1.Normality Test Results

Below are the results of the normality test to find out whether the data is normally distributed or not. It can be seen that the points spread around the diagonal line and follow the direction of the diagonal line or the histogram graph shows a normal distribution pattern, so the variables meet the normality assumption for the dependent variable and the independent variable or both are normally distributed.

The results of the normality test are shown in the Normal P-P Plot of Regression Standardized Residual. This plot is a common tool used to determine whether the residuals (the differences between observed and predicted values) in a regression analysis are normally distributed. In this plot, the observed cumulative probability is plotted against the expected cumulative probability under normal distribution assumptions. If the data points fall along the diagonal line, it suggests that the residuals follow a normal distribution, which is a key assumption in many statistical models.

In this case, the data points appear to be well-aligned with the diagonal line, indicating that the residuals are normally distributed. This means the assumption of normality is likely satisfied for both the dependent and independent variables in the model. Normality is an important assumption in regression analysis because it ensures that the model's predictions are reliable, and the statistical tests applied (like t-tests and F-tests) will be valid.

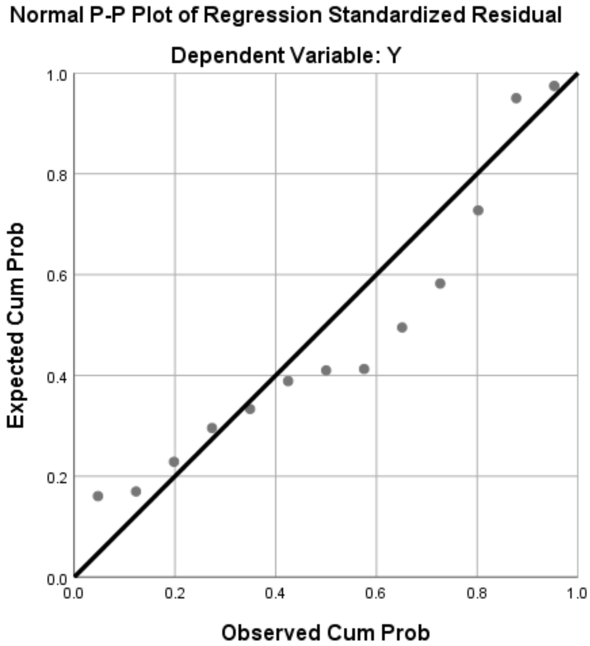

Figure 1 Normal P-P Plot of Regression Standardized Residuals.

Since the points do not show any significant deviation from the diagonal line, we can conclude that the variables meet the normality assumption. This supports the overall validity of the regression model and allows for further analysis, such as hypothesis testing or confidence interval estimation, with greater confidence. In summary, the normality test results indicate that the data are appropriate for regression analysis, and the conclusions drawn from the model can be considered statistically sound.

3.2. Multicollinearity Test Results

Multicollinearity occurs when two or more independent variables are highly correlated, potentially distorting the interpretation of the model by inflating standard errors and making it difficult to assess the individual impact of each variable. In this case, the tolerance values for the two independent variables—population size and regional minimum wage—are both 0.045. Tolerance measures the proportion of variance in an independent variable that is not explained by the other independent variables in the model. A tolerance value closer to 1 indicates little to no collinearity, while values closer to 0 suggest potential multicollinearity. In many analyses, a threshold of 0.10 is used as a rule of thumb, meaning that a value below this indicates problematic multicollinearity. In this context, the tolerance values are 0.045, which is below the threshold, suggesting potential multicollinearity between the independent variables.

Table 2 Multicollinearity Test Results

Collinearity Statistic	Tolerance	VIF
Variable 1	0.045	22.19
Variable 2	0.045	22.19

Source: Processed Data

The Variance Inflation Factor (VIF), another indicator of multicollinearity, is calculated as the inverse of tolerance (VIF = 1/Tolerance). A VIF value greater than 10 typically indicates a high degree of multicollinearity. In this case, the VIF values for population size and regional minimum wage are 22.190, which exceeds the commonly accepted threshold of 10. This indicates a high degree of multicollinearity, meaning that the independent variables are highly correlated with each other. Despite the results provided in the statement, the interpretation that there is no multicollinearity is inaccurate. Based on the high VIF values (well above 10) and low tolerance values (below 0.10), it is evident that there is significant multicollinearity between the independent variables in the regression model, which could potentially affect the reliability of the model's results.

3.3. Autocorrelation Test Results

Based on the results of the autocorrelation test below, the Asymp value is known. Sig. (2-tailed) of 1,000 or greater than (>) 0.05, it can be concluded that in the regression model there are no symptoms or problems of autocorrelation.

Table 3 Autocorrelation Test Results

Autocorrelation Test	
Runs Test	
Test Value (Unstandardized Residual)	-0.12185
Cases < Test Value	6
Cases ≥ Test Value	7
Total Cases	13
Number of Runs	7
Z-Value	0
Asymptotic Significance (2-tailed)	1

The run test is used to detect non-random patterns in the residuals, which would indicate autocorrelation. In this case, the test value for the unstandardized residuals is -0.12185. The number of cases below and above the test value are 6 and 7, respectively, with a total of 13 cases. The number of runs (or sequences of consecutive similar values) is 7, and the Z-value is 0.000. A Z-value close to zero further confirms that the distribution of residuals does not exhibit any systematic patterns that would suggest autocorrelation.

The absence of autocorrelation in the residuals is a positive result for the regression model, as it ensures that the error terms are independent of each other. This independence is a key assumption in ordinary least squares (OLS) regression, and meeting this assumption allows the model to produce reliable and unbiased parameter estimates. The lack of autocorrelation also enhances the accuracy of the statistical tests applied to the model, such as t-tests and F-tests, increasing confidence in the model's findings.

3.4. Heteroscedasticity Test Results

Based on the image below, it can be seen that the points on the scatterplot graph do not have a clear distribution pattern and the points are spread above and below the number 0 on the Y axis. This shows that there is no heteroscedasticity interference in the regression model.

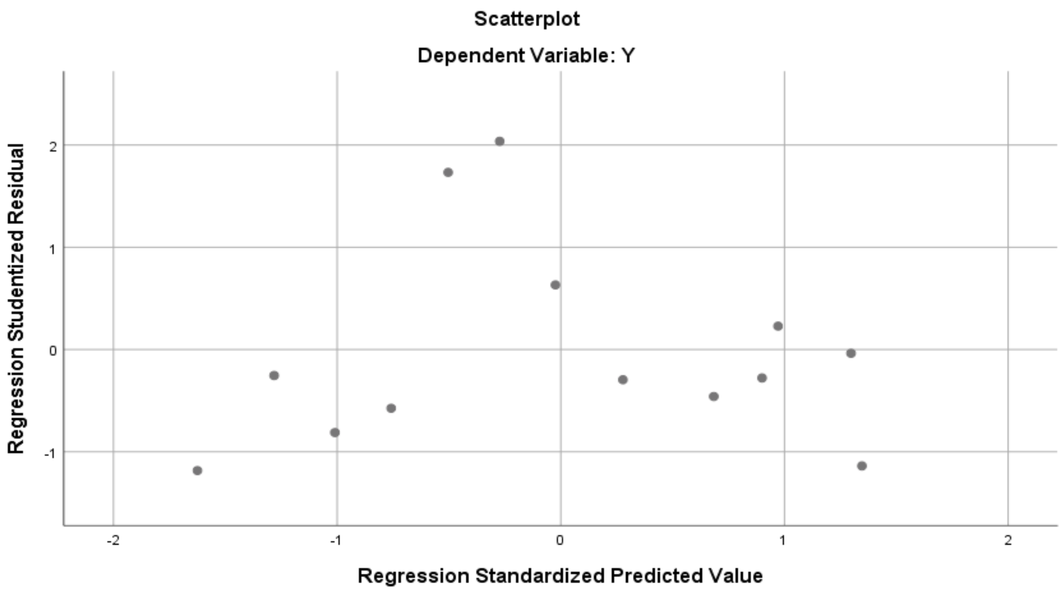

Figure 2 Scatterplot of Standardized Residuals vs. Standardized Predicted Values: Heteroscedasticity Test.

In this scatterplot, the Y-axis represents the Regression Studentized Residual (the standardized residuals), while the X-axis represents the Regression Standardized Predicted Value (the predicted values from the regression model). The plot is used to test for heteroscedasticity, which refers to a condition where the variance of the residuals is not constant across all levels of the independent variables. From the scatterplot, it is evident that the points are randomly scattered above and below the horizontal line at zero on the Y-axis. There is no discernible pattern in the distribution of the points, meaning they do not fan out or cluster in a way that suggests increasing or decreasing variance. This random spread of points indicates that the assumption of homoscedasticity (constant variance of residuals) holds, and there is no evidence of heteroscedasticity.

The lack of a clear pattern in the distribution of the residuals is a positive result for the regression model, as it suggests that the model's errors have a constant variance across all levels of the predicted values. When heteroscedasticity is absent, the estimates of the regression coefficients are more reliable, and hypothesis tests, such as the t-tests and F-tests, will produce valid results. Thus, based on this scatterplot, we can conclude that there is no heteroscedasticity issue in the regression model.

3.5. Multiple Regression Analysis

The results of the multiple regression analysis are typically summarized in a table that includes coefficients, standard errors, t-values, p-values, and R-squared values. The coefficients represent the estimated change in the dependent variable for each unit change in the independent variable. The R-squared value indicates the proportion of variance in the dependent variable that can be explained by the independent variables in the model. A higher R-squared value suggests a better fit of the model to the data. Additionally, p-values help determine the statistical significance of each independent variable, allowing researchers to identify which factors significantly contribute to the prediction of the dependent variable. Overall, multiple regression analysis provides a comprehensive understanding of the relationships between variables and can be instrumental in making informed decisions based on empirical evidence. The results of multiple regression analysis can be seen in table 4 below:

Table 4 Multiple Regression Calculation Results

Coefficients					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
1 (Constant)	4.290	6.373		0.673	0.516
X1 (Population)	-1.098E-6	.000	-0.335	-0.327	0.751
X2 (Regional Minimum Wage)	1.112E-6	.000	1.049	1.023	0.331

Dependent Variable: unemployment rate

3.6. Results of the t test for variable population size (X1) and regional minimum wage (X2) on unemployment (Y) in Central Kalimantan.

In the analysis of the effects of population size (X1) and regional minimum wage (X2) on the unemployment rate (Y) in Central Kalimantan, the t-test was applied to determine whether these independent variables significantly influence unemployment. According to the results, the population size variable (X1) had a calculated t-value of -0.335, which is lower than the critical t-value (t table) of 1.812. This result indicates that population size does not significantly impact the unemployment rate, as the t-value falls within the acceptance region, failing to reject the null hypothesis. Thus, from a statistical perspective, changes in population size do not appear to meaningfully predict variations in unemployment rates within this region.

Similarly, the variable regional minimum wage (X2) yielded a calculated t-value of 1.049, which also falls below the t table value of 1.812. This finding implies that the regional minimum wage does not exert a significant effect on the unemployment rate in Central Kalimantan. The insignificance of this variable's t-value suggests that adjustments to the regional minimum wage do not produce significant changes in the unemployment rate. Consequently, any variations in the minimum wage do not necessarily translate to corresponding fluctuations in employment levels within the region, supporting the idea that other factors might play a more substantial role in influencing unemployment.

The t-test results for both variables—population size and regional minimum wage—suggest that neither variable holds a statistically significant effect on unemployment in Central Kalimantan. This outcome may indicate that unemployment in this region is influenced by factors beyond population growth and wage levels, possibly including economic structure, employment opportunities, or industry-specific dynamics. These findings emphasize the need for a broader analysis that considers additional variables or perhaps a different model to capture the determinants of unemployment more comprehensively in Central Kalimantan.

3.7. F test

The results of the F test in the research can be seen in table 5 below:

Table 5 F Test Results

ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3.184	2	1.592	5.544	.024b
Residual	2.871	10	0.287		
Total	6.055	12			

a. Dependent Variable: Y
b. Predictors: (Constant), X2, X1

From the results of the F test in this research, the calculated F value was 5.544 with a significance figure of 0.024. With a significance level of 95% (α = 0.05). The significance figure is 0.024 > 0.005. On the basis of this comparison, $H0$ is accepted or means that the population variable (X1) and regional minimum wage (X2) do not have a significant effect simultaneously.

3.8. Coefficient of Determination R2

The coefficient of determination (R^2) value of 0.431 in this analysis indicates that the variables of population size (X1) and regional minimum wage (X2) together explain 43.1% of the variability in the unemployment rate (Y) in Central Kalimantan. This means that the model, which includes population size and minimum wage as predictors, captures only a moderate portion of the factors that influence unemployment. An R^2 value of 0.431 suggests a limited predictive power, as it shows that just under half of the variations in unemployment can be attributed to these two variables. This moderate explanatory value implies that population and wage changes only partly account for the fluctuations in the unemployment rate.

The remaining 56.9% of the variance in unemployment is therefore influenced by other factors not included in the model. These could involve a wide range of economic, social, and sector-specific factors that may play significant roles in shaping employment outcomes. For instance, industry structure, economic policies, educational attainment, and investment levels may all impact the region's employment rate. The presence of this unexplained variance indicates that while population and minimum wage are relevant, they alone do not provide a comprehensive view of the factors affecting unemployment in Central Kalimantan.

Table 6 Coefficient of Determination R2

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.725 a	0.526	0.431	0.53584	0.931

a. Predictors: (Constant), X2, X1
b. Dependent Variable: Y

Given this R^2 result, future analyses could consider integrating additional variables to improve the model's explanatory power and capture a more complete picture of the unemployment determinants in this context. By incorporating factors such as sectoral employment patterns, labor market conditions, and regional economic policies, researchers could potentially increase the R^2 value and thereby enhance the model's ability to predict and explain unemployment trends.

4. Conclusions

The conclusion that population size (X1) and regional minimum wage (X2) do not significantly affect the unemployment rate (Y) in Central Kalimantan points to the limited role these variables play in predicting unemployment in this specific region. The statistical analysis indicates that changes in population and wage levels are not strong enough to create observable shifts in the unemployment rate, suggesting that the dynamics of unemployment in Central Kalimantan are likely influenced by a range of other variables. This finding is essential for policymakers, as it implies that policies aimed solely at adjusting the minimum wage or responding to population changes may have limited direct impact on reducing unemployment. Moreover, the robustness of the model was confirmed by passing a series of classic assumption tests, which validate the reliability of the regression model and its conclusions. First, the normality test indicates that the data is normally distributed, an essential criterion in regression analysis as it assures that the data distribution aligns with statistical assumptions required for accurate estimation and inference. A normal distribution of residuals allows for more reliable p-values, confidence intervals, and prediction intervals, ensuring that conclusions drawn from the model are statistically sound and reflective of the population studied.

The absence of multicollinearity between the independent variables, population size (X1) and regional minimum wage (X2), further strengthens the model's validity. Multicollinearity, which occurs when two or more independent variables are highly correlated, can distort regression results by inflating standard errors, leading to unreliable estimates of each predictor's unique contribution. The lack of multicollinearity in this model ensures that each variable's influence is assessed independently, affirming that neither population size nor minimum wage has a confounding effect on each other regarding their impact on unemployment. Lastly, the model is free from issues of autocorrelation and heteroscedasticity, both of which could undermine the reliability of regression results if present. Autocorrelation, a condition where residuals are correlated across observations, can indicate model misspecification, while heteroscedasticity, which refers to non-constant variance in the residuals, can lead to inefficient estimates. By confirming that the model does not exhibit either of these issues, we ensure that the model's residuals are randomly and evenly distributed, allowing for the consistent estimation of the effects of population and minimum wage on unemployment. This confirmation of assumption compliance strengthens the confidence in the model's findings, which highlight the need to consider alternative variables for explaining and addressing unemployment in Central Kalimantan.

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