

The Effect of Labor Force Participation Rate, Human Development Index, Minimum Wage, and Population on the Open Unemployment Rate in West Java Province

Aziza Siva'Ur Rochmah^{1*}, Lucky Rachmawati²

Economics, Faculty of Economics and Business, State University of Surabaya, Surabaya, Indonesia

Corresponding Author: Aziza Siva'Ur Rochmah aziza.22086@mhs.unesa.ac.id

ARTICLE INFO

Keywords: Labor Force Participation Rate, Human Development Index, Minimum Wage, Total Population, Open Unemployment Rate

Received : 25, June

Revised : 22, July

Accepted: 20, August

©2026 Rochmah, Rachmawati: This is an open-access article distributed under the terms of the [Creative Commons Atribusi 4.0 Internasional](https://creativecommons.org/licenses/by-sa/4.0/).



ABSTRACT

This study analyzes the effects of the Labor Force Participation Rate (LFPR), Human Development Index (HDI), Minimum Wage, and Total Population on TPT across 27 regencies/cities from 2019- 2024. The research applies panel data regression, selecting the FEM through rigorous diagnostic testing. Results show that all independent variables simultaneously affect TPT with a coefficient of determination of 83%. Partially, LFPR and HDI exhibit a significant negative effect on TPT. Increases in the minimum wage significantly increase TPT. Total population shows a negative but insignificant effect on TPT.

INTRODUCTION

Unemployment remains a critical issue in economic development because it affects labor productivity and public welfare. Labor productivity reflects a country's ability to achieve sustainable economic growth (Dirgantara & Santoso, 2024). Unemployment refers to a condition in which individuals who are willing and able to work have not yet obtained employment (Pandiangan et al., 2021). A mismatch between labor force growth and the availability of employment opportunities can contribute to higher unemployment. (Anggraini et al., 2023).

This condition can be assessed using the Open Unemployment Rate, which measures the proportion of the labor force that has not yet been absorbed into the labor market (Badan Pusat Statistik, 2025). Although Indonesia's open unemployment rate declined from 6.49% in 2021 to 4.91% in 2024, West Java Province still recorded an open unemployment rate of 6.75% the highest in Indonesia. This situation indicates that labor market issues in West Java still require serious attention. The high number of workers facing layoffs further exacerbates the challenges in maintaining labor market stability.

The open unemployment rate is influenced by various economic and social factors. The rising Labor Force Participation Rate (LFPR) indicates that more people of working age are entering the labor market; however, this increase has not been accompanied by sufficient job creation capacity, resulting in the unemployment rate remaining high (Adianita et al., 2024). The steadily rising Human Development Index (HDI) reflects improvements in the quality of education, health, and living standards, but the improvement in human capital has not been fully matched by the creation of jobs capable of optimally absorbing the labor force (Sanitra, 2021). The minimum wage also affects the unemployment rate because wage increases that are not matched by productivity gains can reduce companies' ability to hire workers (Marire, 2022). The growing population also increases the size of the labor force, thereby placing greater pressure on the labor market if job growth proceeds at a slower pace (Permadi & Chrystanto, 2021).

Existing research has explored various factors associated with the Open Unemployment Rate across different regions and periods. The findings suggest that the relationship between socioeconomic conditions and unemployment may differ across regions. However, limited attention has been given to the combined effects of the Labor Force Participation Rate, Human Development Index (HDI), Minimum Wage, and Population Size at the regency/city level in West Java. This regional perspective is important because the 27 regencies/cities in West Java have distinct socioeconomic and labor market conditions, which may contribute to differences in unemployment outcomes. To address this gap, this study examines these four factors simultaneously using panel data covering 27 regencies/cities in West Java from 2019 to 2024. By combining cross-regional and time-based observations, the analysis considers differences between regions as well as changes over time in explaining the Open Unemployment Rate. The study therefore seeks to provide more specific empirical evidence on unemployment in West Java, which recorded the highest Open Unemployment Rate among Indonesian provinces in 2024.

This study examines how the Labor Force Participation Rate, Human Development Index (HDI), Minimum Wage, and Population Size influence the Open Unemployment Rate in West Java Province, both individually and collectively. The findings are expected to contribute empirical evidence to labor market research and provide useful input for local policymakers in developing measures to expand employment opportunities and reduce unemployment in West Java Province.

LITERATURE REVIEW

Two-Sector Model Theory

Lewis's Two-Sector Model explains the process of economic transformation in developing countries through the transfer of surplus labor from the traditional sector, characterized by low productivity, to the modern sector, which is supported by higher productivity and capital accumulation (Lewis, 1954, as cited in Hubbansyah et al., 2023). This labor reallocation expands employment opportunities without initially increasing wages, provided that the modern sector is capable of absorbing the additional workforce. In this context, LFPR reflects the level of participation of the working-age population in economic activities, and higher labor force participation is expected to reduce the open unemployment rate when labor demand grows accordingly. This theoretical argument is supported by previous empirical studies. Wati et al. (2024) found that the labor force participation rate has a significant negative effect on the open unemployment rate. Similarly, Filiasari and Setiawan (2021) reported that greater labor force participation increases labor supply and intensifies competition among job seekers, encouraging workers to adapt to labor market demands and ultimately contributing to lower unemployment.

Human Capital Theory

Human Capital Theory proposed by Becker, views human resources as a form of capital that generates returns through higher productivity. Becker (1964, as cited in Arifin, 2023) explains that investment in education, training, and health improves the quality of human resources. In addition, Todaro and Smith (2015, as cited in Umamah & Syafitri, 2025) state that these investments enhance workforce competitiveness and increase employment opportunities. Accordingly, a higher HDI, which reflects the quality of human resources, is expected to reduce the open unemployment rate by improving workers' competencies and employability. This theoretical argument is supported by previous studies. Sanitra (2021) study showed that HDI has a negative impact on the open unemployment rate, meaning that when HDI improves, unemployment tends to decrease. Similarly, Mahihody et al. (2018) found that improvements in the HDI areas like education, health, and a good standard of living help more people get jobs and lower the number of people who are unemployed.

Neoclassical Theory

Neoclassical Theory explains that wages represent the equilibrium price determined by the interaction between labor demand and labor supply. Mankiw

(2015), as cited in Aziziah dan Ekawaty (2023), says that the labor market is in balance when the amount of labor that workers are willing to provide matches the amount of labor that employers are willing to hire. However, when wages are set above the equilibrium level, such as through minimum wage policies, labor costs increase, prompting firms to reduce labor demand and potentially leading to higher open unemployment. Therefore, the minimum wage is not only a source of workers' income but also an important factor influencing firms' hiring decisions. This theoretical perspective is supported by previous studies. Latifah et al. (2025) found that an increase in the minimum wage leads to a higher Open Unemployment Rate. This suggests that when minimum wages rise, employers may reduce hiring because higher labor costs limit their ability to employ more workers, while more individuals may enter the labor market in search of employment, resulting in higher unemployment. Similarly, Simbolon et al. (2023) reported that higher minimum wages increase production costs, encouraging firms to adjust labor utilization to maintain efficiency and competitiveness, which ultimately reduces labor absorption and increases unemployment.

Malthusian Theory

Malthusian Theory says that population grows faster than the economy can supply enough resources and jobs. Malthus (1798) as cited in S. Sari dan Pangestuty (2022) says that quick population growth puts pressure on the economy and lowers social welfare. Also, Malthus says that population keeps growing, which makes more workers available, but there aren't enough jobs for everyone (Wati et al., 2024). Because of this, some people who are able to work can't find jobs, which means more people are unemployed and looking for work. This idea is back-up by past research studies. Permadi and Chrystanto in 2021 discovered that total population has a positive impact on the open unemployment rate. This means that when the population grows quickly, it leads to a higher level of unemployment. Likewise, S. Sari and Pangestuty (2022) said that as the population keeps growing, there needs to be more jobs created to employ the new people entering the workforce; if not, not enough jobs will lead to higher unemployment.

METHODOLOGY

This study uses a quantitative approach and an associative design to examine how factors like the Labor Force Participation Rate, Human Development Index, minimum wage, and total population influence the Open Unemployment Rate in West Java Province. Data from 27 regencies and cities between 2019 and 2024 is used, which includes both cross-sectional and time-series information collected at the regional level. Secondary data were collected from publications by the West Java Provincial Central Statistics Agency and the Open Data Jabar platform. The Open Unemployment Rate is the main outcome being studied, and the Labor Force Participation Rate, HDI, minimum wage, and population size are the factors that are being looked at to see how they relate to it. To adjust for differences in how measurements are scaled, the minimum wage and total population were changed into logarithmic form, which also helps create

more reliable and consistent results.. The data were analyzed using panel data regression with EViews 12. The regression model is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 \text{LOG}(X_{3it}) + \beta_4 \text{LOG}(X_{4it}) + u_{it}$$

Where:

Y_{it} = Open Unemployment Rate

β_0 = Constant

β_1 - β_4 = Regression coefficients

X_{1it} = Labor Force Participation Rate

X_{2it} = Human Development Index

$\text{LOG}(X_{3it})$ = Logarithm of the Minimum Wage

$\text{LOG}(X_{4it})$ = Logarithm of Population

u_{it} = Error term

i = Regency/City (27 regencies/cities)

t = Observation period (2019-2024)

To choose the best model between Pooled Ordinary Least Squares, Fixed Effects Model, and Random Effects Model, the Chow test, Hausman test, and Lagrange Multiplier test were used. FEM takes into account traits that are not measured but vary between different areas like regencies or cities, yet stay the same over time. This makes it a good choice for handling differences between regions in panel data. This approach fits the study because the 27 regencies and cities in West Java each have different economic and job market situations.

Classical assumption testing involved checking for heteroscedasticity and multicollinearity. To check how each independent variable and their overall effect influence the Open Unemployment Rate, hypothesis testing was done using the t-test, F-test, and R squared value.

RESEARCH RESULT

Chow Test

Table 1. Chow Test

Effects Test	Prob
Cross-section Chi-Square	0.00

The Chow test produced a cross-section probability of 0.00, which is below the 5% significance level. This result leads to the rejection of H_0 , indicating that the Fixed Effects Model (FEM) provides a better fit than the Pooled OLS model.

Hausman Test

Table 2. Hausman Test

Effects Test	Prob
Cross-section Chi-Square	0.00

The Hausman test yielded a random cross-section probability of 0.00, which is below the 5% significance level. This result leads to the rejection of H_0

and supports the use of the FEM. Taken together with the preceding model selection test, the results identify FEM as the most suitable specification for the panel data analysis.

Multicollinearity

Table 3. Multicollinearity

	X1	X2	LOGX3	LOGX4
X1	1	-0,23	-0,29	-0,08
X2	-0,23	1	0,55	-0,11
LOGX3	-0,29	0,55	1	0,47
LOGX4	-0,08	-0,11	0,47	1

These results show a correlation coefficient of -0.23 between independent variables X1 and X2, -0.29 between X1 and LOGX3, and -0.08 between X1 and LOGX4. The correlation between X2 and LOGX3 is 0.55, between X2 and LOGX4 is -0.11, and between LOGX3 and LOGX4 is 0.47. It can be concluded that the correlations between the variables are below 0.80, so the data is free from multicollinearity issues.

Heteroscedasticity Test

Table 4. Heteroscedasticity Test

Var	Coef	Std.Error	t-Statistic	Prob
C	13,82	23,73	0,58	0,56
X1	0,03	0,02	1,80	0,07
X2	-0,23	0,13	-1,75	0,08
LOGX3	1,33	1,83	0,72	0,46
LOGX4	-2,46	1,46	-1,69	0,09

The results of the heteroscedasticity test show that X1 is $0.07 > 0.05$, X2 is $0.08 > 0.05$, LOGX3 is $0.46 > 0.05$, and LOGX4 is $0.09 > 0.05$, which indicates that the data is free from heteroscedasticity.

Partial Test (T-Test)

Table 5. Partial Test

Var	Coef	Std. Error	t-Statistic	Prob
C	-128,24	53,34	-2,40	0,01
X1	-0,15	0,04	-3,30	0,00
X2	-1,81	0,30	-5,91	0,00
LOGX3	19,55	4,12	4,74	0,00
LOGX4	-1,51	3,28	-0,46	0,64

The estimated constant is -128.24, indicating that the predicted Open Unemployment Rate would be -128.24% when all explanatory variables are held constant.

For LFPR (X1), the estimated coefficient is -0.15. The variable is statistically significant, as indicated by a t-statistic of 3.30, which exceeds the critical value of

1.975, and a p-value of 0.00, below the 0.05 significance level. The negative coefficient suggests that a 1% increase in LFPR is associated with a 0.15% decrease in the Open Unemployment Rate.

HDI (X2) has an estimated coefficient of -1.81, with a t-statistic of 5.91 exceeding 1.975 and a p-value of 0.00 below 0.05. This result confirms a statistically significant relationship between HDI and the Open Unemployment Rate. The coefficient implies that a 1% increase in HDI is associated with a 1.81% reduction in the Open Unemployment Rate.

The estimated coefficient of the minimum wage (LOGX3) is 19.55. Its t-statistic of 4.74 is greater than the critical value of 1.975, while the p-value of 0.00 is below 0.05, indicating a statistically significant effect on the Open Unemployment Rate. The positive coefficient suggests that a 1% increase in the minimum wage is associated with a 19.55% increase in the Open Unemployment Rate.

Total Population (LOGX4) has a coefficient of -1.51. However, the variable is not statistically significant, as its t-statistic of 0.46 is below 1.975 and its p-value of 0.64 exceeds 0.05. The coefficient indicates a negative association, with a 1% increase in Population Size corresponding to a 1.51% decrease in the Open Unemployment Rate, although this relationship is not statistically significant.

Simultaneous Test (F-Test)

Table 6. Simultaneous Test

F-Statistic	22,86
Prob (F-Statistic)	0,00

The F-test shows that all four independent variables together have a meaningful impact on the Open Unemployment Rate. The F-statistic is 22.86, which is higher than the critical value of 2.42. The probability value is 0.00, which is less than the 0.05 significance level. These results show that the Labor Force Participation Rate, Human Development Index, Minimum Wage, and Total Population all play a role in affecting the Open Unemployment Rate.

Coefficient of Determination (R²)

Table 7. Coefficient of Determination

R-Squared	0,83
Adjusted R-Squared	0,80

The model shows an R-squared value of 0.83, which means that 83% of the changes in the Open Unemployment Rate can be explained by the Labor Force Participation Rate, Human Development Index, Minimum Wage, and Total Population. The remaining 17% comes from other reasons that aren't part of this study.

DISCUSSION

The Effect of the Labor Force Participation Rate on The Open Unemployment Rate

The study shows that the labor force participation rate has a strong negative impact on the open unemployment rate in West Java. So, when more people are participating in the labor force, the open unemployment rate tends to go down. These results back up Lewis's (1954) two-sector model, which suggests that more jobs in the modern sector can take in extra workers from the traditional sector, helping to lower unemployment.

The job market in West Java also backs up this idea. According to the West Java Provincial Central Statistics Agency in 2024, the trade and manufacturing sectors are the biggest employers, with trade employing 22.46% of the workforce and manufacturing employing 18.74%. The agriculture, forestry, and fisheries sectors employ 14.99% of the workforce. Between 2019 and 2024, the percentage of people who were working or looking for work went up from 64.99% to 67.71%. At the same time, the rate of people who were unemployed but actively seeking jobs dropped from 8.04% to 6.75%. During this time, the total number of people with jobs increased by about 0.91 million in 2024. This shows that when more people join the workforce, more jobs are created, which helps lower the rate of people who are unemployed and looking for work.

These results match the studies done by Musa et al. (2024), Wati et al. (2024), and Filiasari and Setiawan (2021), which show that when more people are working, it helps lower the number of unemployed people. So, if more people in West Java Province start working, it can help lower the number of people who are unemployed, but only if the increase in the number of workers is matched by enough jobs available.

The Effect of the Human Development Index on The Open Unemployment Rate

The regression results indicate that the Human Development Index (HDI) has a significant negative effect on the open unemployment rate in West Java Province, implying that improvements in HDI are associated with a decline in open unemployment. This finding supports Becker's Human Capital Theory (1964), which states that investment in education, health, and training enhances human capital, thereby improving workforce productivity, skills, and employability. As HDI reflects these dimensions, higher human development strengthens workforce competitiveness and increases employment opportunities.

This finding is consistent with the economic conditions in West Java, where the manufacturing sector contributed 41.39% of the Regional Gross Domestic Product (RGDP) in 2024, making human resource quality a key factor in supporting industrial competitiveness. During the 2019–2024 period, HDI increased from 72.03 to 74.43, while the open unemployment rate declined from 8.04% to 6.75%. At the same time, the number of employed persons rose from 23.50 million in 2023 to 24.42 million in 2024, indicating that improvements in human capital were accompanied by greater labor absorption.

These results are consistent with previous studies by Khalifa (2024), Sanitra (2021), and Mahihody et al. (2018), which found that higher HDI

significantly reduces unemployment by improving workforce quality and employability. Overall, the findings suggest that enhancing human development through better education, health, and living standards contributes to reducing the open unemployment rate in West Java Province.

The Effect of Minimum Wage on The Open Unemployment Rate

The estimation results indicate that the minimum wage has a positive and statistically significant relationship with the Open Unemployment Rate in West Java Province. This suggests that higher minimum wages are associated with an increase in unemployment. The finding is in line with the neoclassical labor market theory described by Mankiw (2015), which explains that a minimum wage above the market equilibrium can raise labor costs for firms and reduce their demand for workers. At the same time, higher wages may encourage more individuals to participate in the labor market. When labor supply exceeds labor demand, unemployment may consequently increase.

The development of the minimum wage and unemployment in West Java provides further context for this result. Between 2019 and 2024, the average minimum wage rose from IDR 1,668,372 to IDR 2,057,495. Although the Open Unemployment Rate decreased following the COVID-19 pandemic, West Java still recorded the highest rate among Indonesian provinces in 2024. This condition indicates that labor market absorption remained a challenge. Higher labor costs may lead firms to adopt more cautious recruitment practices, which can restrict the availability of employment opportunities.

Similar evidence was reported by Pappas and Gkrammis (2025), Latifah et al. (2025), and Simbolon et al. (2023), who found a significant positive relationship between minimum wages and unemployment. Their findings indicate that increases in labor costs can reduce firms' demand for workers and consequently increase unemployment. Therefore, although minimum wage policies are intended to improve workers' welfare, their effects on employment may depend on whether wage growth is accompanied by sufficient expansion of employment opportunities and labor demand.

The Effect of Total Population on The Open Unemployment Rate

The regression results indicate that Population Size has a negative impact on the Open Unemployment Rate in West Java Province, but this effect is not statistically significant. This shows that changes in the number of people in the population do not have a major impact on the Open Unemployment Rate. Therefore, the idea that population size has an effect on the open unemployment rate is not supported. According to Malthus' population theory from 1798, when the number of people grows faster than the number of jobs available, it can cause problems in the job market and lead to more people without work. However, the results of this study do not back that idea, because the population in West Java grew, but the Open Unemployment Rate did not go up much.

According to data from the Central Statistics Agency in 2024, the population of West Java grew from 48.68 million in 2019 to 50.35 million in 2024. At the same time, the rate of open unemployment dropped from 8.04% to

6.75%. This pattern shows that when the population grows, it doesn't always mean more people will be unemployed. One possible reason is that as the population grew, it happened at the same time as more economic activities expanded in places where jobs were available, which helped take in some of the extra workers. So, how population growth affects unemployment might not just be about how many people there are, but also about whether the local economy can generate enough jobs and take in more workers.

This result matches what Gunawan et al. (2024) found, where they saw that Population Size did not significantly affect the Open Unemployment Rate in Serang City. It also aligns with Lestari et al. (2024), who had a similar result in Banten Province. These studies show that unemployment is more affected by things like the state of the economy, features of the job market, and how well different areas can create and take in jobs, rather than just how large the population is. In contrast, S. Sari and Pangestuty (2022) and Mahroji and Anwar (2020) discovered that population growth leads to higher unemployment because the increase in the labor force was not matched by enough job opportunities.

These differences show that how population growth affects an area can depend on how well that area can handle more workers. Therefore, the small impact seen in this study shows that population growth in West Java between 2019 and 2024 was matched by economic activities that took in some of the extra workers, stopping population growth from making the Open Unemployment Rate go up a lot.

CONCLUSIONS AND RECOMMENDATIONS

This study examines the effects of the labor force participation rate, Human Development Index (HDI), minimum wage, and population on the open unemployment rate in West Java Province during the 2019–2024 period. The results show that the labor force participation rate and HDI have a significant negative effect on the open unemployment rate, indicating that higher labor force participation and better human resource quality contribute to reducing unemployment. In contrast, the minimum wage has a significant positive effect, suggesting that increases in the minimum wage may reduce firms' labor demand and lead to higher unemployment. Meanwhile, population has no significant effect on the open unemployment rate. Furthermore, the four variables jointly have a significant effect on unemployment, indicating that labor market participation, human capital, wage policy, and demographic conditions collectively shape unemployment dynamics in West Java.

Based on these findings, the provincial government should continue to promote employment creation by expanding job opportunities and improving workforce quality through vocational training and stronger collaboration between educational institutions and industry. In addition, minimum wage policies should be formulated by considering labor productivity, regional economic conditions, and firms' capacity to absorb workers. Finally, balanced regional economic development should be encouraged to ensure that population growth is accompanied by adequate employment opportunities across districts and municipalities.

ADVANCED RESEARCH

Future studies should look further than 2019 to 2024 to better understand how the labor market changes over a longer period and to get a clearer picture of how the factors affecting the open unemployment rate have changed over time. In addition, future studies should incorporate other relevant variables, such as economic growth, investment, inflation, poverty, labor productivity, and industrialization, which may also influence open unemployment but were not examined in this study. Expanding the geographical scope to include other provinces or conducting comparative analyses across regions is also recommended to improve the generalizability of the findings.

ACKNOWLEDGMENT

The author gratefully acknowledges the blessings, mercy, and guidance of Allah SWT throughout the research and completion of this article. Sincere appreciation is extended to Dr. Lucky Rachmawati, S.E., M.Si., for her guidance, constructive feedback, and continued support during the preparation of this manuscript. The author also expresses heartfelt gratitude to her parents for their constant prayers, love, and support throughout the research process. Appreciation is also extended to the reviewers for their constructive feedback and suggestions, which contributed to the improvement of this manuscript.

REFERENCES

- Adianita, H., Susilowati, D., & Karisma, D. A. P. (2024). Analisis tingkat partisipasi angkatan kerja dan jumlah lapangan kerja melalui pendidikan terhadap tingkat pengangguran di Indonesia. *Gorontalo Development Review*, 7(1), 1-12.
- Anggraini, D., Fasa, M., & Suharto. (2023). Pengaruh pengangguran terhadap kemiskinan ditinjau dari perspektif ekonomi Islam. *Jurnal Ekonomi Syariah*, 18(1), 45-58.
- Arifin, A. S. (2023). Human capital investment: Meningkatkan daya saing global melalui investasi pendidikan. *Jurnal Education and Development*, 11(2), 174-179. <https://doi.org/10.37081/ed.v11i2.4672>
- Aziziah, A., & Ekawaty, M. (2023). Analisis pengaruh upah minimum, jumlah industri, dan inflasi terhadap kesempatan kerja di Kota/Kabupaten Jawa Barat. *Journal of Development Economic and Social Studies*, 2(4), 896-909. <https://doi.org/10.21776/jdess.2023.02.4.15>
- Badan Pusat Statistik. (2024). *Keadaan ketenagakerjaan Indonesia Agustus 2024*. Badan Pusat Statistik.
- Badan Pusat Statistik. (2025). *Keadaan ketenagakerjaan Indonesia Februari 2025*. Badan Pusat Statistik.
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. National Bureau of Economic Research.

- Dirgantara, T., & Santoso, R. P. (2024). Sosiodemografis dan rata-rata produktivitas tenaga kerja di Indonesia. *Jurnal Kebijakan Ekonomi dan Keuangan*, 3(1), 98–108. <https://doi.org/10.20885/jkek.vol3.iss1.art13>
- Fauzi, M. H., & Sari, R. L. (2026). The effect of investment, labor force participation, and tourism on unemployment in 5 ASEAN countries. *TALENTA Conference Series: Local Wisdom, Social, and Arts*, 9, 1–8. <https://doi.org/10.32734/lwsa.v9i1.2730>
- Filiarsari, A., & Setiawan, A. (2021). Pengaruh angkatan kerja, upah, PDRB, dan penduduk terhadap tingkat pengangguran di Provinsi Banten tahun 2002–2019. *Diponegoro Journal of Economics*, 10(2), 112–124.
- Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). McGraw-Hill/Irwin.
- Gunawan, I., Haerani, A., & Hidayati, R. (2024). Influence of population and minimum wage on the rate unemployment in Serang City 2017–2021. *Jurnal Manajemen Ritel*, 4(1), 25–27.
- Hasan, Z., & Sasana, H. (2020). Determinants of youth unemployment rate in ASEAN. *International Journal of Scientific & Technology Research*, 9(3), 6687–6691.
- Hubbansyah, A., Hakim, D., Hartoyo, S., & Widyastutik. (2023). Analisis empiris atas teori dualistik ekonomi Lewis: Studi kasus Indonesia. *Jurnal Ekonomi dan Kebijakan Pembangunan*, 12(1), 1–22. <https://doi.org/10.29244/jekp.12.1.2023.1-22>
- Kementerian Ketenagakerjaan. (2024). *Tenaga kerja ter-PHK tahun 2024*. Satu Data Kemnaker. <https://satudata.kemnaker.go.id/data/kumpulan-data/2342>
- Khalifa, J. (2024). Determinants of unemployment in Tunisia: Regional panel analysis. *International Journal of Economic Perspectives*, 18(9), 1464–1477.
- Latifah, T., Syarif, A. H., & Taufiqurrahman, T. (2025). Analisis pengaruh upah dan tenaga kerja terhadap pengangguran di Indonesia dalam prespektif ekonomi Islam. *Ekonomi, Keuangan, Investasi dan Syariah (EKUITAS)*, 6(4), 500–510. <https://doi.org/10.47065/ekuitas.v6i4.7148>
- Lestari, I., Sulistiyaningsih, N., Sibatuara, T., Nilasari, A., & Arisetyawan, K. (2024). Faktor-faktor yang mempengaruhi tingkat pengangguran terbuka di Provinsi Banten tahun 2020–2023. *INDEPENDENT: Journal of Economics*, 4(3), 201–215.
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School*, 22(2), 139–191. <https://doi.org/10.1111/j.1467-9957.1954.tb00021.x>

- Mahihody, A., Engka, D., & Luntungan, A. (2018). Pengaruh upah dan Indeks Pembangunan Manusia (IPM) terhadap pengangguran di Kota Manado. *Jurnal Berkala Ilmiah Efisiensi*, 18(3), 113–124.
- Mahroji, D., & Anwar, S. (2020). Pengaruh jumlah penduduk, PDRB dan Indeks Pembangunan Manusia (IPM) terhadap tingkat pengangguran di Provinsi Jawa Tengah. *Jurnal Ekobis: Ekonomi, Bisnis & Manajemen*, 10(1), 48–57.
- Malthus, T. R. (1798). *An essay on the principle of population*. J. Johnson.
- Mankiw, N. G. (2015). *Principles of economics* (7th ed.). Cengage Learning.
- Marire, J. (2022). Unemployment, total factor productivity, budget deficit, and wage share in South Africa. *Economic Journal of Emerging Markets*, 14(2), 189–203. <https://doi.org/10.20885/ejem.vol14.iss2.art4>
- Musa, Y., Audu, A., & Junaidu, Y. (2024). An analysis of panel data on unemployment and labor force participation rates in Sub-Saharan African countries. *Dutse Journal of Pure and Applied Sciences*, 10(3b), 154–169. <https://doi.org/10.4314/dujopas.v10i3b.16>
- Nairima, C., Nailah, A., Juliani, L., & Tristiana, F. (2025). Analisis pengaruh TPAK, inflasi, dan investasi terhadap tingkat pengangguran di Indonesia. *Jurnal Edu Research*, 6(4), 1714–1725.
- Pamuji, A., Setiawan, E. P., & Munir, A. M. (2024). Regresi data panel dalam analisis faktor-faktor yang mempengaruhi tingkat pengangguran terbuka di Provinsi Daerah Istimewa Yogyakarta tahun 2017-2021. *Indonesian Journal of Applied Statistics*, 6(2), 162–173. <https://doi.org/10.13057/ijas.v6i2.80010>
- Pandiangan, F., Pasaribu, J., Girsang, D., Tarigan, M., & Lapikolly, R. (2021). Analisis pengaruh jumlah penduduk, Penanaman Modal Dalam Negeri (PMDN), pertumbuhan ekonomi dan inflasi terhadap tingkat pengangguran terbuka di Indonesia tahun 2000-2020. *Visi Ilmu Sosial dan Humaniora (VISH)*, 2(1), 99–109.
- Pappas, A., & Gkrammis, A. (2025). Minimum wage and unemployment dynamics in the EU: A panel data analysis. *National Accounting Review*, 7(4), 522–545. <https://doi.org/10.3934/NAR.2025022>
- Permadi, E., & Chrystanto, E. (2021). Analisa pengaruh jumlah penduduk, Produk Domestik Regional Bruto (PDRB), dan upah minimum kabupaten/kota terhadap tingkat pengangguran terbuka di kabupaten/kota di Provinsi Jawa Timur tahun 2012-2018. *Journal of Economics*, 5(1), 86–95.
- Putra, R., & Sukiyono, K. (2021). Economic growth, inflation, and regional minimum wage: An empirical investigation of the open unemployment

- rate in Sumatera, Indonesia. *Journal of Agri Socio Economics and Business*, 3(2), 109–122. <https://doi.org/10.31186/jaseb.03.2.109-122>
- Sanitra, N. (2021). Effect of economic growth and Human Development Index (IPM) on unemployment in Indonesia. *Jurnal Ekonomi*, 10(1), 15–24.
- Sari, S., & Pangestuty, F. (2022). Analisis pengaruh jumlah penduduk, tingkat pendidikan, dan produk domestik regional bruto terhadap tingkat pengangguran terbuka di Provinsi Jawa Timur tahun 2017–2020. *Journal of Development Economic and Social Studies*, 1(4), 653–665. <https://doi.org/10.21776/jdess>
- Simbolon, C., Karo, R., Daffa, D., & Hidayat, N. (2023). Analisis pengaruh IPM, UMP dan Tingkat Partisipasi Angkatan Kerja terhadap pengangguran terbuka di Indonesia. *Journal of Social and Economics Research*, 5(2), 210–222.
- Todaro, M. P., & Smith, C. S. (2015). *Economic development* (12th ed.). Pearson.
- Umamah, R., & Syafitri, F. (2025). Analisis pengaruh pengangguran, Gini rasio, dan jumlah penduduk terhadap Indeks Pembangunan Manusia di Provinsi Lampung. *Journal of Development Economic and Digitalization*, 4(5), 122–134.
- Wati, I., Utami, A., & Nisa, F. (2024). Pengaruh angkatan kerja dan jumlah penduduk terhadap pengangguran di Provinsi Jawa Timur. *Jurnal Ilmiah Wahana Pendidikan*, 10(15), 499–513. <https://doi.org/10.5281/zenodo.13908957>