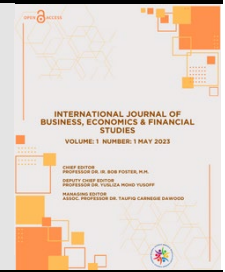


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Original Article



The Role of Employment Opportunities in Mediating the Impact of Human Capital and Wages on Provincial Poverty in Indonesia

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Abstract

This study aims to examine the role of employment opportunities in mediating the effects of human capital and wages on poverty across provinces in Indonesia. This study uses secondary annual data from 34 provinces spanning 2015 to 2022 (panel data). The study employs panel data regression analysis for model estimation, with path analysis and the Sobel test used to assess the mediating role. The findings indicate that human capital has a significant negative direct and indirect impact on poverty through employment opportunities. In contrast, wages do not directly affect poverty but have a significant indirect effect through employment opportunities. Employment opportunities negatively influence poverty and act as a partial mediator between human capital and poverty and a complete mediator in the relationship between wages and poverty. Based on these results, it is recommended that policies aimed at enhancing human capital and increasing employment opportunities be implemented concurrently to reduce short- and long-term poverty. Additionally, it is advised that the government prioritize increasing the minimum wage to strengthen the impact of employment opportunities in alleviating poverty over time. Policies that simultaneously target improvements in human capital, employment opportunities, and minimum wages are crucial for significantly reducing poverty across Indonesia's 34 provinces.

Copyright: © 2024 by the authors. Submitted for possible open-access publication under the terms and conditions of the Creative Commons Attribution (CC BY 4.0) license (<https://creativecommons.org/licenses/by/4.0/>).**1. Introduction**

Humans play a central role in economic development by providing labour, skills, and entrepreneurship. Beyond being a factor of production, they create and develop technology and use factors more effectively and efficiently. According to the United Nations, in 2022, Indonesia ranked fourth as the world's most populous country with 275 million people (United Nations, 2023). Despite progress in global poverty reduction in recent decades, the pace has slowed since 2014, making ending extreme poverty by 2030 increasingly difficult. From 1990-2013, over one billion people rose out of extreme poverty, with the global poverty rate falling from 37.8% to 11.7%.

However, the rate declined by only 0.6% per year between 2014 and 2019 (Calva, 2023). In 2020,

progress halted abruptly due to major crises like the COVID-19 pandemic, climate change, conflicts, and food price spikes, setting back progress by three years between 2020 and 2022. Global poverty rates are now back to pre-pandemic levels, though still low. Low-income countries were hit hardest and have not fully recovered. Global poverty remains a major issue, with around 700 million people living below the poverty line in 2022. Despite decades of progress in poverty reduction, crises and shocks in 2020-2022 led to setbacks. Low-income countries impacted have not fully recovered losses as of 2023 (The World Bank, 2023).

For addressing the poverty issue, the world committed through international treaties and agreements like the Sustainable Development Goals (SDGs) agreed by 193 UN member states in 2015 to end extreme poverty by 2030, the Millennium Development

Goals (MDGs) set in 2000 aiming to reduce those living in extreme poverty by 2015, and the 1966 UN Covenant on Economic, Social and Cultural Rights guaranteeing economic, social and cultural rights including freedom from poverty.

The UN establishing poverty eradication in the SDGs and following up on the MDGs shows global commitment to addressing this issue since 2001. The SDGs aim to end all forms of poverty worldwide, a priority for countries including Indonesia as a developing UN member. Although Indonesia's poverty rate decreased, events like rising basic goods prices and mobility restrictions during the COVID-19 pandemic increased the number and %age of poor people. Poverty is also related to many studies, such as socio-demographics (Wintara et al., 2021), income inequality (Suriani et al., 2020), price changes (Yavishan et al., 2024), and education & health (Sugiharjo et al., 2022).



Figure 1. Headcount and Percentage of Poor People in Indonesia for March 2015 to September 2022

Figure 1 shows that from March 2015 to September 2022, the number and %age of poor people in Indonesia trended downward, though with some fluctuations. In March 2015, the poverty peak was 28.59 million, or 11.22 % of the total population. After that, the poverty rate continued declining until reaching its lowest point in September 2019 with 24.78 million people (9.22%). However, in 2020, there was an increase to 27.55 million people (10.19%), related to the COVID-19 pandemic's impact on Indonesia and globally. Nevertheless, the downward poverty trend resumed in the next period. In September 2022, the number of poor people decreased to 26.36 million, or 9.57% of Indonesia's population.

In economic development, there are moments when the government fails to develop the economy, and growth that fails to alleviate poverty is often caused by the government's failure to manage the economic growth pace. One main factor is the failure to manage the wage system, the primary income source. People's welfare is affected when wages stagnate or decline, impacting poverty levels. The government is trying to create balanced, dynamic, and fair industrial relations by regulating worker protections through minimum wages.

In developing countries, providing adequate wages and employment opportunities for people experiencing

poverty is a key mechanism to reduce poverty and income inequality. Adequate wages enable individuals/families to meet basic needs such as food, housing, education, and healthcare. Providing employment opportunities for people experiencing poverty helps improve their skills, earn better incomes, and achieve financial independence, contributing to inclusive and sustainable economic growth (Arsyad, 1997).

According to Asyhadie (2007), the minimum wage is the lowest standard for workers in a company. Poor workers believe low minimum wages lead to low and worsening living standards over time (Sarbia & Burkhauser, 2010). Low incomes cause high poverty levels (Hariawan & Swaningrum, 2015). Higher wages positively impact employment opportunities, attracting more workers (Karlinda, 2015). Figure 2 shows the government's regional/provincial minimum wage data from 2018-2022.

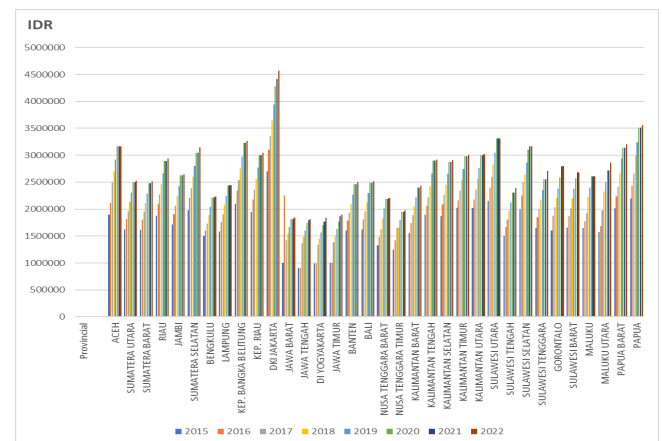


Figure 2. Provincial Minimum Wage in Indonesia for 2015-2022

Figure 2 shows the variation in provincial minimum wages (PMW) across Indonesia from 2015 to 2022. DKI Jakarta had the highest PMW yearly, while Nusa Tenggara Timur and West Java had the lowest. In 2022, the highest PMW was in DKI Jakarta (IDR 4,573,845), and the lowest was in Nusa Tenggara Timur (IDR 1,975,000). The national average PMW increased from IDR 2,268,874 in 2018 to IDR 2,725,576 in 2022. The data indicates an overall increase in PMW in Indonesia during this period, but with significant disparities across provinces.

According to Todaro and Smith (2015), human capital can be measured through education and health. Arfida (2003) argues that education and training can increase a person's value. Meanwhile, according to Rahayu and Tisnawati (2014), the level of education can determine a person's type of work; the higher the education level, the greater the opportunity to get a decent job. The better the quality of education, the greater the hope for future success (Kurniawan, 2016). Parekh et al. (2011) argue that the societal structure must be more competitive in the knowledge-based economy era that emphasizes

basic human capital and creates policies on education worldwide.

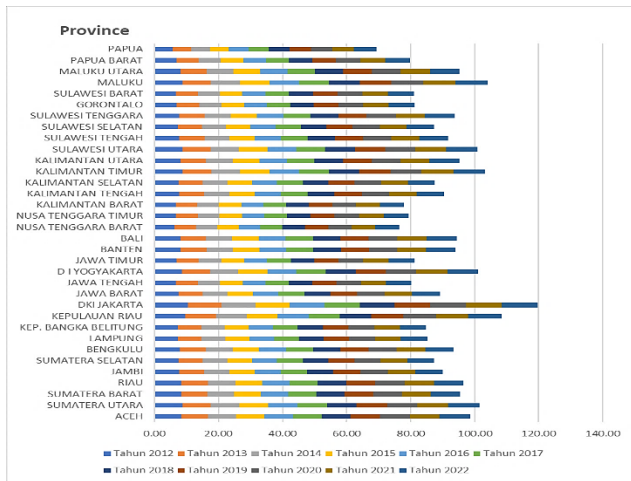


Figure 3. Provincial Average Years of Schooling in Indonesia for 2015-2023

Figure 3 shows the average years of schooling in Indonesia from 2015 to 2022, with DKI Jakarta having the highest average while Papua had the lowest. In 2022, the highest average years of schooling was 11.31 years in DKI Jakarta, while the lowest was 7.02 years in Papua. The national average for years of schooling increased from 8.17 in 2018 to 8.69 in 2022. The data indicates an overall increase in Indonesia's average years of schooling during this period, although significant disparities across provinces remained.

Employment opportunities reflect the proportion of the total labour force that can be absorbed or actively participate in economic activities (Ling et al., 2024). According to Khan (2007), Increasing employment opportunities can help the poor escape poverty by increasing their productivity and income. Employment opportunities include available and filled job vacancies, which are an important part of development (Danawati et al., 2016). This reflects the labour demand in the job market and the need for productive workers whose wages are commensurate with their performance (Sukirno, 2010; Tambunan, 2001). In other words, employment opportunities indicate the number of people working, not the potential.

Formal workers are individuals employed by an organization or company with a clear employment contract, receiving fixed salaries, benefits, and facilities. The formal work environment has an orderly organizational structure, specific job descriptions, and legal protection and social security for workers. Discipline, professionalism, and skills development are core values, with opportunities for promotion and career advancement. Although the informal sector has shortcomings, it plays a significant role in providing alternative employment when the formal sector is insufficient and contributes as a distributor to support the livelihoods of large-scale business workers.

The data in Figure 4 shows a considerable disparity in the %age of formal workers between provinces in Indonesia between 2015 and 2022. The provinces with the highest %age of formal workers in 2022 are Riau Islands (63.68%), DKI Jakarta (63.12%), and Banten (52.04%). These three regions are known as major economic centres with relatively high minimum wages and good levels of public education. These favourable conditions encourage the growth of the formal sector, which can provide structured employment opportunities with decent compensation.

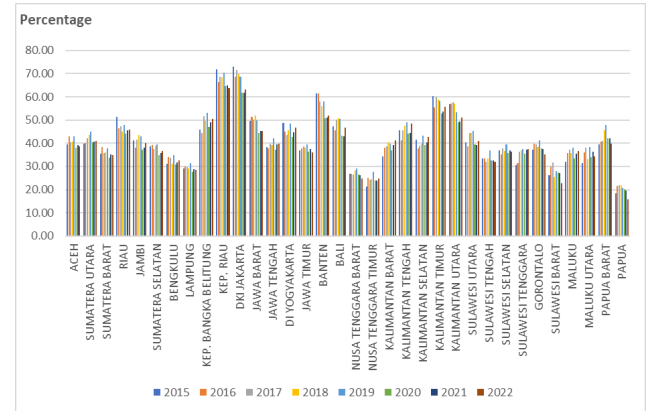


Figure 4. Percentage of Formal Labor by Province 2015-2022 in Indonesia

The development of human capital, provincial minimum wages, employment opportunities, and poverty rates in Indonesia over 2015-2022 shows a complex pattern. Despite increased investment in education, rising minimum wages, and growth in formal employment, poverty rates in some provinces are still high. This suggests that the relationship between human capital, wages, and employment opportunities with poverty reduction is not simple. Research into these entities is needed to understand the influence of the relationship and identify effective strategies to reduce poverty across Indonesia.

2. Literature Review

Poverty arises when a person or group cannot meet the minimum standard of living considered basic needs (Supriatna, 1997; Gammel, 2002; Mowafi and Khawaja, 2005; Machmud, 2016). The contributing factors include low economic growth, unequal income distribution, and lack of job opportunities (Kuncoro, 2010; Suriani, 2017). Classical economists like Adam Smith, David Ricardo, and Thomas Malthus held diverse views on poverty. Smith introduced the concept of a free market that could reduce poverty in the long run (Smith, 2007), while Ricardo focused more on the theory of value and income distribution (Ricardo, 2015).

Malthus saw poverty as a result of uncontrolled population growth (Malthus, 1992), but this approach was considered to overlook broader social and economic factors. Contemporary economists like Amartya Sen and

Jeffrey Sachs have developed new, more holistic approaches. Sen emphasized the importance of individuals' capabilities to live and participate in society, while Sachs stressed the need for investment in education, health, and economic development (Sachs, 2015). Employment opportunities refer to the availability of jobs that can be filled by job seekers, encompassing both occupied and vacant positions (Tambunan, 2001; Lilimantik, 2016; Astuti, 2018).

Minimum wages can help reduce poverty by increasing household/individual incomes (Riva et al., 2014; Tumangkeng, 2019). The quality of human capital, such as education and skills, is crucial for economic growth. Education is the key to improving productivity and well-being (Majid, 2014; Yusnandar et al., 2020). Education is a fundamental indicator in the context of preparing the productive-age population. Better educational qualifications and adequate skills assist in obtaining employment more easily and accurately (Zulham & Basyiran, 2015).

2.1. Human Capital, Wages and Employment Opportunities

Investment in human capital, such as education and experience, is important for labor productivity and economic growth ((Becker, 1994; Mincer, 1974; Schultz, 1993)). Policymakers seek to increase labor market benefits, and attracting investment is important for improving labor market conditions (Abdurachman et al. 2021). Investment and labor are functions of output, where an increase in profit drives an increase in input, especially labor, and vice versa.

2.2. Human Capital, Wages, Employment Opportunities and Poverty

Labor economic theory and human development theory explain that human capital, wages, and employment opportunities affect poverty (Banerjee & Duflo, 2007). An individual's level of education and skills play an important role in reducing the risk of poverty. Policies promoting education, training, and decent jobs with fair wages can help reduce poverty.

3. Materials and Methods

This study uses secondary data for the 2015-2022 period, with the variable being the role of employment opportunities in mediating the effect of human capital and wages on poverty. This study uses a simultaneous equation model. According to Gujarati and Porter (2012), a simultaneous equation is a model that contains more than one equation using independent variables and more than one dependent variable. An operational definition of poverty (PO) is proxied by the %age of the population living below the poverty line set by BPS, expressed as a %age. Job Opportunity (EO) is proxied by

the %age of formally employed workers in Indonesia, expressed as a %age.

Human Capital (HC) is proxied by the mean years of schooling, expressed in years. Wage (MW) is proxied by the provincial minimum wage data in Indonesia, expressed in Indonesian Rupiah (IDR).

Table 1. Research Variables

Variable	The symbol	Proxy Data/Unit	Source
Poverty	PO	Poor population (percentage)	BPS
Job Opportunity	EO	Formally employed (percentage)	BPS
Human Capital	HC	Mean years of schooling (years)	BPS
Wage	MW	Provincial minimum wage (IDR)	BPS

Source: Indonesia Statistical Catalog 2015-2023

According to Table 1, to address the first research objective, which is to examine the influence of human capital and wage on job opportunity, the dependent variable used in the research is Job Opportunity. In contrast, the independent variables are Human Capital and Wage. Furthermore, the dependent variable used is poverty to address the second research objective: to examine the influence of human capital, wage, and job opportunities on poverty. In contrast, the independent variables are Human Capital, Wage, and Job Opportunity. Lastly, path analysis and the Sobel test will address the third research objective: to observe whether job opportunity can mediate the influence of human capital and wages on poverty.

This study used descriptive and inferential statistical analysis approaches as research analysis methods. Descriptive analysis is a statistic used to analyze research statistical results but is not used to make broader conclusions or generalizations. Descriptive data statistics can be seen from the average (mean), standard deviation, maximum value, and minimum value to provide an overview of the development of human capital, wages, employment opportunities, and poverty in 34 provinces in Indonesia during the 2015-2022 period.

Inferential analysis is used in the form of panel data regression analysis and the Sobel test. Panel data regression analysis is to determine the magnitude of the influence of independent variables on the dependent variable, while path analysis and the Sobel test are used to determine the role of the influence of independent variables on the dependent variable directly or indirectly and the role of mediating variables (Yudiansyah et al., 2022).

According to Winarno (2013), a study that studies the relationship between variables, namely dependent variables, independent variables, and intermediate or intervening variables. In general, the independent variable is a function of all dependent variables. This relationship can be denoted in the form $Y = f(X_1, X_2, \dots, X_n)$ or in the linear regression equation commonly used with panel data, namely:

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_n X_{nit} + \varepsilon_{it} \quad (1)$$

Neuman (2014) states that conducting a literature review helps researchers identify gaps in existing knowledge and develop theoretical models with appropriate variables. This study uses multiple linear regression analysis with the Eviews program because there is more than one independent variable. The variables of this study include human capital, wages, employment opportunities, and poverty as independent and dependent variables, while employment opportunities are used as intervening variables. Several previous studies have also been used to analyze the influence of these variables including (Rahmawati, 2013; Sisca et al., 2013; Awandari & Indrajaya, 2016; Hasmawati et al., 2021; Ariska & Sentosa, 2021; Putra et al., 2021; Istiyani et al., 2022; Mandak et al., 2022; Tobing et al., 2023; Ulhafiah & Arianti, 2023; Sahil et al., 2023; Aziziah & Ekawaty, 2023; Nurlinda & Saputri, 2023; Wijaksono & Syafitri, 2023).

Then the research conducted by Martasari et al. (2014), Atiyatna et al. (2019), Pradnyaswari et al. (2020), Gunawan and Arka (2021), Nofrita and Marwan (2022), Iksan and Arka (2022), and Moyo et al. (2022) who found that increasing human resources and wages can reduce poverty levels both directly and indirectly through employment opportunities. Based on these studies, the model of Multiple Regression Analysis (MRA) to explain the relationship between these variables, namely:

$$EO_{i,t} = \alpha_0 + \alpha_1 HC_{i,t} + \alpha_2 MW_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$PO_{i,t} = \beta_0 + \beta_1 HC_{i,t} + \beta_2 MW_{i,t} + \beta_3 EO_{i,t} + \varphi_{i,t} \quad (3)$$

Where: EO: Job opportunity, HC: Human capital, MW: Wage, PO: Poverty, $\alpha_0, \alpha_1, \alpha_2$: constant, $\beta_0, \beta_1, \beta_2, \beta_3$: regression coefficients, $\varepsilon_{i,t}, \varphi_{i,t}$: residuals, $i: 1,2,3,\dots,34$ (number of cross sections, 34 provinces) and $t: 1,2,3,\dots,8$ (number of time series, years 2015-2022)

Equation (2), or Model 1, expresses employment opportunities as a function of human capital and wages. Model 1 is used to address the first research objective. Furthermore, equation (3), or Model 2, expresses poverty as a function of human capital, wages, and employment opportunities. Model 2 is used to address the second research objective. Then, path analysis and the Sobel test will be conducted for the third research objective, which is to examine the mediating role of the employment opportunities variable.

Estimating multiple linear regression models aims to predict the regression model parameters, namely the constant value (intercept) and the regression coefficients (slopes). This objective also applies to panel data regression, which results in different intercepts and slopes for each entity and period. Estimating panel data regression models requires intercept, slope, and error term assumptions. According to Widarjono (2005), there are several possibilities for these assumptions, such as

constant intercepts and slopes, different intercepts across entities, different intercepts across time and entities, different slopes across individuals, and different intercepts and slopes across time and individuals.

Several models or techniques can be employed in panel data regression from these various possibilities. Although there are several possibilities, in much of the literature, only the first three assumptions are often used as the basis, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM).

3. Results and Discussions

Indonesia is the largest archipelago in the world, with 17,504 islands and an area of 5.2 million km² consisting of 1.9 million km² of land and 3.3 million km² of ocean. Indonesia's five major islands are Sumatra, Java, Kalimantan, Sulawesi and Papua. Indonesia is located between 6°N-11°S and 95°BT-141°BT, stretching for 3,977 miles between the Indian Ocean and the Pacific Ocean. Indonesia is a unitary republic with 34 provinces, 413 regencies, and 98 cities. Indonesia has a diversity of ethnicities, languages, and religions, with most of the population being Malays.

Indonesia's population continues to grow yearly, reaching 278.69 million people by mid-2023, with an uneven distribution, with the highest concentration in Java. Indonesia's economy grew 6.23 % in 2012 and 5.31 % in 2022. Average years of schooling and provincial minimum wages also increased from 2012 to 2022. Formal sector workers in Jakarta dominate with 63.12 % in 2022, in line with the increase in educated labour. The number of workers increased, and unemployment decreased in 2022. The low-educated population still dominates labour absorption, although the number of higher-education workers continues to increase. Description of the research data used, namely human capital, wages, employment opportunities, and poverty in 34 provinces in Indonesia. During the period 2015-2022. Descriptive research data can be seen in Table 2 below:

Table 2. Result of descriptive statistics analysis

Description	PO	EO	HC	MW
Mean	10,9218	41,0121	8,4414	2.309.856
Median	9,1400	39,4500	8,4350	2.267.356
Maximum	28,5400	72,9600	11,3100	4.573.845
Minimum	3,4700	15,8900	5,9900	910.000
Std. dev	5,7084	10,8666	0,9711	606.785
Observations	272	272	272	272

Note: PO is the poverty rate in %, EO is employment opportunity based on formal labour in %, EC is human capital based on average years of schooling, and MW is the provincial minimum wage in rupiah.

Table 2 shows four variables: PO, EO, HC, and MW, with 272 observations per variable. The average of each variable is 10.92180 (PO), 41.01210 (EO), 8.441434 (HC), and 2,309,856 (MW). The median value is slightly different from the mean. The large standard deviations

of the PO, EO, and MW variables indicate high variation in the data around the mean, while for HC the variation is low.

Based on Model 1 (equation 2) and Model 2 (equation 3), it will be selected which model is most appropriate to estimate the desired regression equation model with the Chow Test, Hausman Test, and Lagrange Multiplier test according to Widarjono (2005) model parameters with panel data, there are three techniques (models) that are often offered, and Basuki and Prawoto (2017) state the same thing, while the regression test results on the two equations in selecting the best model are as follows.

Table 3 shows the testing results for selecting the best model in the two research equations. In the first step, the Chow test was carried out to determine whether the CEM or FEM model was the best. The Chow test results show that the p-value is 0.0000, smaller than the 5 % α ($0.0000 < 0.05$). This means that with a significance level of 5 %, the decision is to reject H_0 or accept H_a , so this study concluded that FEM is better than CEM.

Table 3. Result of Model Selection Criteria

Model	Statistics / Probability			Conclusion
	Chow Test	Hausman Test	Langrange Multiplier Test	
Model 1 (Equation #3.2)	94.0794*** (0.0000)	8,1836 (0.0924)	655.2124*** (0.0000)	REM
Model 2 (Equation #3.3)	495.9771*** (0.0000)	6.6762 (0.0830)	869.5278*** (0.0000)	REM

Note: *** and ** is significant at 1 and 5 percent.

Furthermore, in the second stage, the Hausman test was conducted to determine whether the REM or FEM model was the best. The Hausman test on the two equations consecutively found p-values of 0.0924 and 0.0830, greater than the 5 % α (0.0924 and $0.0830 > 0.05$). This means that with a significance level of 5 %, the decision is to accept H_0 or reject H_a , so REM is better than FEM. To ensure which is better, REM or FEM, a Lagrange Multiplier (LM) test was conducted with the result that the p-value on the two equations is 0.0000 or less than 0.05.

This indicates that with a significance level of 5 %, the decision is to reject H_0 or accept H_a . So, Model 1 and Model 2 are better using REM regression than FEM. The results of the best model selection are the Random Effect Model (REM). This is following the opinions of several econometric experts who state that if the panel data has a smaller number of time (t) compared to the number of individuals (i), then it is recommended to use the Random Effect method.

Classical assumption testing was conducted to ensure that the estimated parameter coefficient has the Best Linear Unbiased Estimator (BLUE) properties. This study uses 272 observations (>100), so the normality assumption test is not necessary (Gujarati and Porter,

2012). In addition, the autocorrelation assumption occurs in data that only use time series. Testing for autocorrelation in data that is not solely time-series, namely using a combination of time-series and cross-section or panel data, will be futile or meaningless (Basuki & Prawoto, 2017).

Therefore, testing the classical assumptions in this study assumes multicollinearity and heteroscedasticity, even though, according to Melati and Suryowati (2018), parameter estimation using REM used is Generalized Least Square (GLS). Thus, the use of GLS has overcome multicollinearity and heteroscedasticity. However, this study tries to test for multicollinearity and heteroscedasticity to see the conditions. The results obtained are shown in Table 4.

Table 4. Classical Assumption Testing

Model	Classic Assumption Test	
	Multikolinieritas	Heteroskedastisitas
Model 1 (Equation #3.2)	0.4229 (HC, MW)	0.7827 (HC) 0.2821 (MW)
Model 2 (Equation #3.3)	0.4229 (HC, MW) 0.6319 (HC, EO) 0.2507 (MW, EO)	0.0689 (HC) 0.6487 (MW) 0.0938 (EO)

Note: Multicollinearity was tested using the tolerance test (Prob < 0.90); Heteroscedasticity was tested using the Breusch-Pagan abs(resid) test (Prob > 0.05).

The tolerance test was used to test the multicollinearity assumption. If the variable coefficient value is <0.90, it can be concluded that there is no multicollinearity problem. The tolerance test results in the two models show that the coefficient value between variables is 0.4229 (HC and MW), not greater than 0.90 in Model 1, and in Model 2 the respective coefficient value is 0.4229 (HC and EO). 0.6319 (HC and EO), and 0.2507 (UP and KK) are smaller than 0.90, so it can be concluded that there are no multicollinearity problems (Kleinbaum et al., 1978).

Then, the Breusch-Pagan abs(resid) test is used to test the heteroscedasticity assumption in Model 1 and Model 2, where the probability value for each variable is 0.7827 (HC), and 0.2821 (MW) in Model 1. The probability values are 0.0689 (HC), 0.6487 (MW), and 0.0938 (EO) are greater than 0.05, it is concluded that heteroscedasticity does not occur. Theoretically, in some literature, the REM model estimation used is Generalized Least Square (GLS), so that the use of GLS can overcome heteroscedasticity (Setyawan et al., 2019).

4.1. Human Capital and Wages on Employment Opportunities

The panel data regression results in Model 1 on the effect of human capital and wages on employment opportunities can be seen in Table 5. Table 5 shows that the constant (C) has a value of 22.357970 with a probability value of 0.0017, less than 0.05. It can be concluded that human resources and wages jointly influence employment opportunities. The regression

result of the R-squared value (0.625047) is not optimal, showing that the independent variables (human capital and wages) can only explain around 62.50 of the variation in employment opportunities. This means other variables not included in the model can influence employment opportunities.

Table 5. Result of panel data regression for job opportunity function

Variable	Coefficient	t-Statistic	Probability
C	22.357970***	3.176459	0.0017
MM	3.116300***	3.121791	0.0020
UP	-0.000003***	-4.237302	0.0000
R-squared	0.625047	F-statistic	89.67386
Adj. R-squared	0.555345	Prob(F-statistic)	0.000170

Note: ***, **, * represent the significance level at 1, 5 and 10 percent

Prob value. (F-statistic) obtained at 0.000170 (significant) shows that overall, the regression model is influential and can be used to predict employment opportunities. However, the R-squared value, which is still low, indicates that there is complexity that has not been explained by this model, where it is necessary to consider additional factors in further analysis to understand better the factors that influence employment opportunities, such as economic growth, development industrial sectors, worker migration, government policies regarding the economy, fiscal and monetary, as well as socio-cultural conditions that cause differences in opportunities between men and women.

These results are supported by several theories, namely Human Capital Theory, which states that higher human capital can increase productivity and employment opportunities—wage Compensation Theory, which states that higher wages can attract more workers. Productive and Marginal Productivity Theory links human capital with productivity and wages received by workers. The combination of these three theories can explain that human capital (such as education) and wages are crucial factors that jointly (simultaneously) influence employment opportunities in the formal sector. Increasing human capital and decreasing wages can simultaneously increase employment opportunities.

Next, a partial interpretation of the human capital variable on employment opportunities from the regression results found a coefficient value of 3.116300 (positive sign), t-statistic 3.121791 (absolute value > 2, significant at the 5% significance level), probability of 0.0020 (confidence level above 95%). This means that human capital positively affects employment opportunities with a confidence level of 95 percent. If human capital increases by 1 unit, it will increase employment opportunities by 3.116300 *ceteris paribus*.

The results of this test are in the research hypothesis formed previously, where human capital (average years of schooling) has a positive effect on employment opportunities (formal sector workers), by the theoretical explanation which states that higher human capital can increase employment opportunities, especially in the formal sector. These results are also in line with research

conducted by Iksan and Arka (2022), Wijaksono and Syafitri (2023), and (Atiyatna et al., 2019).

Several perspectives that support the argument that higher human capital (such as a higher level of education) will increase a person's job opportunities, especially in the formal sector, include Human Capital Theory. Gary Becker developed this theory and explained that investment in human capital, such as education and training, can increase labor productivity. Workers with higher human capital tend to be more productive, so they will be more sought after by companies and have a greater chance of getting a job, especially in the formal sector, which is more selective in recruiting workers.

Then, it also follows the Signaling Theory. This theory states that a higher level of education can signal to companies that a person has better abilities and productivity. Companies tend to use education level as a proxy for assessing the quality of prospective workers. The higher the level of education, the stronger the positive signal given, thereby increasing the chances of getting a job in the formal sector.

Furthermore, it is also by Endogenous Growth Theory. This theory emphasizes the importance of human capital in driving long-term economic growth. Higher human capital makes the workforce more productive and innovative, increasing overall economic productivity. This, in turn, can create more job opportunities, especially in the formal sector, which is generally associated with more productive and growth-oriented economic activities.

From Table 5 of the wage variable on employment opportunities, it is found that the coefficient value is -0.000003 (negative sign), the t-statistic is -4.237302, and the probability is 0.0000. This means that wages (provincial minimum wage) have a negative effect on employment opportunities (formal sector workers) at the 95 percent confidence level. This follows the research results of Mandak et al. (2022) and Martasari et al. (2014) which stated that the research results show that drinking wages negatively and significantly affect employment opportunities.

The results of this research show that wages have a negative and significant effect on formal sector employment opportunities with the theory which states that an increase in the minimum wage can have a negative effect on employment opportunities, especially in the formal sector, including the Labor Demand Theory. According to this theory, wages are a cost for companies in employing workers. When wages increase (such as an increase in the minimum wage), labour costs for companies also increase. To maintain profits, companies tend to reduce the number of workers employed or replace labour with more efficient capital or technology. As a result, employment opportunities in the formal sector may decrease.

Then it is also supported by the Production Cost Theory. An increase in the minimum wage can increase production costs for companies. To remain competitive,

companies may seek to reduce costs by reducing the number of workers employed. This may lead to a decrease in employment opportunities. Furthermore, Labor Market Theory also states the same thing, that if the minimum wage is set above the market equilibrium level, there will be an excess supply of labour (excess supply). As a result, some workers cannot be absorbed, thereby reducing employment opportunities.

The negative relationship between wage levels and labour absorption shows the suitability of the theory that has been valid so far. Based on the Hick-Marshall rule, total production costs will increase proportionally if wages increase. Consequently, the price level of goods also increases so that the quantity of goods demanded will decrease so that companies will reduce the number of workers requested (Santoso & Susilo, 2002). In line with the opinion of Simanjuntak (2005) that wages are seen as a burden by entrepreneurs, because the higher the wage level, the smaller the proportion of profits entrepreneurs enjoy. Therefore, employers will respond to an increase in the minimum wage by reducing the number of workers Willis (2016), as is the case with Nurlinda and Saputri (2023) research aligns with the assumptions of this research.

4.2. Human Capital and Wages on Employment Opportunities

The panel data regression results in Model 2 regarding the influence of human capital, wages and employment opportunities on poverty can be seen in Table 6 below.

Table 6. Result of panel data regression for job poverty function

Variable	Coefficient	t-Statistic	Probability
C	29.031440***	13.292160	0.0000
HC	-1.623984***	-5.687476	0.0000
MW	-0.000025	-1.165460	0.2449
EO	-0.093109***	-6.311178	0.0000
<i>R-squared</i>	0.498142	<i>F-statistic</i>	88.671910
<i>Adj. R-squared</i>	0.492524	<i>Prob. (F-statistic)</i>	0.000000

Note: ***, **, * represent the significance level at 1, 5 and 10 percent

Table 6 shows the effect of human capital on poverty with a coefficient of -1.623984 (negative sign), t-statistic -5.687476 (absolute value > 2, significance level 5% and 1%), probability 0.0000 (95% and 99% confidence level). This negative coefficient shows that the effect of increasing human capital will reduce poverty with a statistical confidence level of 99 percent. Furthermore, the effect of wages on poverty with a coefficient of -0.000025 (negative sign), where the t-statistic is -1.165460, probability 0.2449. It can be concluded that wages do not affect reducing poverty.

For employment opportunities on poverty with a coefficient of -0.093109 (negative sign), t-statistic -6.311178 (absolute value > 2, significance level 5% and 1%), probability 0.0000 (95% and 99% confidence level). The negative coefficient indicates that increasing

employment opportunities will reduce the poverty rate. The significant t-statistic and probability confirm that the effect of employment on poverty has a statistically significant 99 percent confidence level.

The suboptimal values of R-squared (0.498142) and Adjusted R-squared (0.492524) as well as the F-statistic of 88.671910 (significant at the 5% and 1% significance levels) and Prob. (F-statistic) of 0.000000 indicate that the variables of human capital, wages, and employment opportunities can simultaneously explain about 49.81 percent of the variation in the poverty rate, while 50.19 percent is explained by other variables not included in the model, which could be access to physical capital, infrastructure, access to social services, environmental conditions, and government policies. The significant F-statistic value indicates that overall, the regression model is influential and can be used to predict the poverty rate.

Based on these regression results, it can be concluded that human capital (average years of schooling) and employment opportunities (percentage of formal sector workers) simultaneously significantly reduce poverty. This aligns with theories stating that increasing human capital, employment opportunities, and income can contribute to reducing poverty. However, the effect of minimum wage is not significant in this model. This is consistent with the results of another study by Awan et al., (2011) that education and experience are negatively associated with poverty status. The independent variables of education level, health and labor force have a positive (negative for poverty) and significant influence on economic growth (Wijaksono & Syafitri, 2023).

Meanwhile, research conducted by Wulandari and Ariusni (2022) found that variables such as labor, human capital, investment, and technology simultaneously have a significant positive (or conversely, negative for poverty) impact on economic growth in West Sumatra. The analysis results show that labor has a negative effect, while human capital has a positive and significant effect in the region. Research by Putra and Bendesa (2022) shows that women's average years of schooling negatively affect the percentage of poor people.

Meanwhile, Saifuloh et al. (2019) revealed that the best model for analyzing panel data in research is the random effect model. The results showed that the labor force participation rate and the level of open employment had a negative and significant effect on poverty. In contrast, the regional minimum wage had a negative and insignificant effect on poverty. Likewise, other studies such as those by Sisca et al. (2013), Ling et al. (2024), Satria and Mubarak (2019) and Wau (2022) found a negative and significant effect of independent variables on the dependent variable poverty.

The regression results in Table 6 provide empirical evidence that supports several economic theories related to human capital, employment opportunities, and poverty. According to Human Capital Theory and

Endogenous Growth Theory, average years of schooling, which is a proxy for human capital, significantly negatively affects poverty. This suggests that investing in education and improving human capital can increase labor productivity, boost economic growth, and ultimately reduce poverty.

Furthermore, the percentage of formal workers also significantly negatively affects poverty. This finding is in line with Labor Market Theory, which states that increasing employment opportunities, especially in the formal sector, can increase individual and household income, thus helping to reduce poverty. In other words, greater employment opportunities in the formal sector give individuals access to better incomes, which in turn can help them move out of poverty.

Although minimum wage does not show a significant effect in this model, the combination of higher human capital and increased employment opportunities in the formal sector simultaneously significantly affects poverty reduction. This is consistent with the concept that increased income through increased productivity and access to better jobs can help lift individuals or households out of poverty.

However, the regression model in this study's independent variables of human capital (average years of schooling), wages (provincial minimum wage) and employment opportunities (percentage of workers in the formal sector) can only explain about 49.81 percent of the variation in poverty rates in 34 provinces in Indonesia over the 2015-2022 time period, which suggests that there are still other factors not included in the model that can also affect poverty. Therefore, further analysis by including other relevant variables may provide a more complete understanding of the dynamics between human capital, employment opportunities, and poverty.

4.3. Mediation Analysis using Sobel Test

Path analysis describes the effect of independent variables on the dependent variable as direct and indirect effects. In addition, this study uses the Sobel test to see the level of influence of the mediating variable of employment opportunities. From the regression results for Model 1 and Model 2, the following multiple regression equation is obtained:

$$\text{Model 1: } EO = 22.36 + 3.12 * HC - 0.000003 * MW$$

$$\text{Model 2: } PO = 29.03 - 1.62 * HC - 0.000025 * MW - 0.09 * EO$$

Meanwhile, the following equation is obtained to see the direct effect of human capital (HC) on poverty (PO) without including other variables: $PO = 26,05208837 - 1,79238352 * HC$. Furthermore, looking at the direct effect between wages (MW) on poverty (PO) without including other variables, the equation result is $PO = 13,78305961 - 0,00000124 * MW$

Thus, we can calculate the indirect effect of human capital or wages on poverty by mediating employment opportunities. Lleras (2005) states that the magnitude of the indirect effect is obtained by multiplying the coefficient in the path between two interrelated variables. For this reason, by multiplying the coefficient of human capital (HC) or wages (MW) in model 1 with the coefficient of employment opportunities (EO) in model 2, the result is -0.290156 ($HC \rightarrow EO \rightarrow PO = (3.116300)(-0.093109)$) for human capital and 0.00000028 ($MW \rightarrow EO \rightarrow PO = (0.000003)(-0.093109)$) for wages. Then, the Sobel test is conducted to identify whether it is significant or insignificant. In this study, the Sobel test was conducted online through the Sobel calculation link <https://quantpsy-org/sobel>, with the results shown in Figure 5 and Figure 6.

	Memasukkan:	Statistik uji:	Std. Kesalahan:	p -nilai:
A	3.116300	Tes sobel: -2.79818431	0.10369423	0.00513908
B	-0.093109	Tes Aroian: -2.77038343	0.10473481	0.00559903
s _a	0.998241	Tes orang baik: -2.8268393	0.10264311	0.00470099
dengan b	0.014753	Reset all	Menghitung	

Figure 5. Result of Sobel Test of Human Capital on Poverty with Employment Opportunity as the Mediator

	Memasukkan:	Statistik uji:	Std. Kesalahan:	p -nilai:
A	-3.31E-06	Tes sobel: 3.51533835	9e-8	0.00043919
B	-0.093109	Tes Aroian: 3.48529073	9e-8	0.0004916
s _a	7.82E-07	Tes orang baik: 3.54617677	9e-8	0.00039086
dengan b	0.014753	Reset all	Menghitung	

Figure 6. Result of Sobel Test of Wages on Poverty with Employment Opportunity as the Mediator

Figure 5 shows that $HC \rightarrow EO \rightarrow PO$ produces a p-value of 0.005139 with a test statistic of 3.515338, greater than 1.96, so it can be said that employment opportunities (EO) are significant as a mediator of human capital on poverty. Furthermore, $MW \rightarrow EO \rightarrow PO$ as shown in Figure 6 with a p-value of 0.000439 with a test statistic value greater than 1.96, it can be said that employment opportunities (EO) are significant as a mediator of wages on poverty. So, it can be concluded that employment opportunities mediate the effect of human capital and wages on poverty.

Table 7 shows that the Sobel test for the indirect effect of human capital and wages on poverty through employment is significant at the 5 percent level. Table 7 shows that in the path analysis, the $HC \rightarrow EO \rightarrow PO$ path is partial mediation, while the $MW \rightarrow EO \rightarrow PO$ path is perfect mediation. This aligns with the theory that if the effect of X to Y decreases to zero after inserting M into the regression equation (or c' is insignificant), then perfect mediation occurs. However, if the effect of the independent variable on the dependent decreases but is not equal to zero by including the mediator (or c' is significant), then partial mediation occurs (Baron and Kenny, 1986). From the results of the Sobel test, the indirect effects of $HC \rightarrow EO \rightarrow PO$ and $MW \rightarrow EO \rightarrow PO$ both show significance, so it can be concluded that

employment opportunities (EO) play a mediating role, where the effect of human capital as a partial mediator and the effect of wages as a perfect mediator on poverty.

Table 7. Result of Direct Effect, Indirect Effect, and Sobel Test

Path Analysis	Direct Effect	Indirect Effect	Sobel Test	
			Statistical Value	P-value
Terhadap Mediasi				
MM→KK	3.116300*** (0.0020)			
UP→KK	-0.000003*** (0.0000)			
Dengan Mediasi				
MM→KM	-1.623984*** (0.0000)			
UP→KM	-0.000025 (0.2449)			
KK→KM	-0.093109*** (0.0000)			
MM→KK→KM		-0.290156***	2.798184 (> 1.96)	0.005139 (< 0.05)
MM→KK→KM		0.0000028***	3.515338 (> 1.96)	0.000439 (< 0.05)

Note: ***, **, * represent the significance level at 1, 5 and 10 percent

Table 8. Result of Mediating Test

Path Analysis	Direct Effect	Indirect Effect	Total Effect	Conclusion
Against Mediation				
HC→EO	3.116300***			Significant
MW→EO	-0.000003***			Significant
With Mediation				
EO→PO	-0.093109***			Significant
MM→PO	-1.623984***			Insignificant
UP→PO	-0.000025			Significant
HC→EO→PO		-0.290156***	-1.914140	Partial mediation
HC→EO→PO		0.0000028***	-0.00002472	Perfect mediation
Without Mediation				
EO→PO	-0.062170***			Significant
HC→PO	-1.792384***		-0.121756	Increased
MW→PO	-0.00000124***		-0.00002348	Increased

Note: ***, **, * represent the significance level at 1, 5 and 10 percent

MW→EO→PO is perfectly mediated, meaning that EO fully mediates the effect of MW on PO. There is no direct effect of MW on KM after including EO. To reduce KM through this path, the main strategy is to increase the effect of MW to EO first. After that, increasing KK will have an optimal impact on reducing PO.

Meanwhile, HC→EO→PO is a partial mediation, meaning that HC directly and indirectly influences PO through EO. To reduce PO, HC and EO must be increased simultaneously for optimal impact. Overall, HC has a greater direct influence in reducing PO than MW. However, HC also has a significant indirect effect through EO. Meanwhile, the effect of MW on PO is fully mediated by EO with a relatively small total effect. Therefore, the main strategy to reduce PO is to increase HC directly and indirectly through increasing EO. Meanwhile, increasing MW can be a supporting strategy through increasing EO.

Figure 7 displays that to reduce poverty, local governments can simultaneously increase human capital and employment opportunities. Strategic measures include (1) improving the quality of primary and secondary education and vocational training (Afrina et al., 2019; Nuraeni et al., 2022); (2) collaborating with industry in apprenticeship and training programs (Afrina et al., 2019); (3) facilitating access to capital and

technology for SMEs; (4) investing in economic infrastructure; (5) developing integrated social protection programs; and (6) improving information campaigns on employment and training opportunities (Eddyono, 2019; Muhibuddin, 2014).

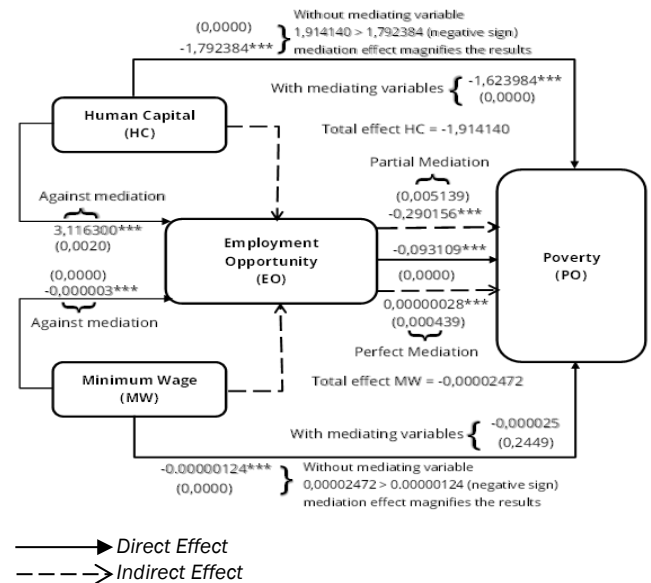


Figure 7. Summary of overall results

While increasing employment opportunities through wages, local governments need to consider increasing minimum wages before ensuring an increase in employment opportunities because employment opportunities are the perfect mediator between wages and poverty. This implies the need for labour policies that increase wages and ensure fair wages and decent working conditions to increase productivity and employment opportunities, ultimately reducing poverty (Eddyono, 2019).

5. Conclusions

Using panel data regression and path analysis, several key conclusions emerge from this study. First, human capital has a direct negative effect on poverty and a significant indirect negative effect through employment opportunities across 34 Indonesian provinces. Second, while wages do not significantly directly affect poverty, they do exert a notable indirect effect via employment opportunities. Third, employment opportunities negatively influence poverty, acting as a partial mediator between human capital and poverty and as a complete mediator in the relationship between wages and poverty.

These findings offer several recommendations can be made. First, initiatives aimed at enhancing both human capital and employment opportunities should be implemented simultaneously to reduce short- and long-term poverty effectively. Second, the government should prioritize raising the minimum wage to bolster the impact of increased employment opportunities on poverty reduction. Third, policies focused on improving human

capital and expanding employment opportunities in the formal sector should be pursued through increased investment, apprenticeship programs, and training tailored to company needs. These measures will enhance productivity, stimulate economic growth, and help reduce poverty over time. Raising the minimum wage is essential to fostering more employment opportunities and supporting long-term poverty alleviation.

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