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DETERMINANTS OF POVERTY IN INDONESIA: THE ROLE OF SECTORAL GRDP, INVESTMENT, UNEMPLOYMENT, AND HDI

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Abstract

This study aims to analyze the effect of sectoral Gross Regional Domestic Product (GRDP), investment, unemployment, and the Human Development Index (HDI) on poverty rates across 34 Indonesian provinces from 2015 to 2024. Utilizing panel data regression, the formal econometric diagnostics confirm that the Fixed Effect Model (FEM) is the most appropriate estimation framework. The empirical findings reveal that all independent variables simultaneously and partially exert significant effects on poverty rates. Specifically, sectoral GRDP and HDI exhibit a significant positive relationship with poverty, indicating a non-inclusive pattern of economic transformation and structural labor market mismatches that lead to educated unemployment. Conversely, investment and open unemployment demonstrate significant negative effects, where capital inflows successfully mitigate poverty, and declining open unemployment anomalies reflect a labor shift toward low-productivity informal survival sectors. Consequently, regional development policies must look beyond aggregate growth targets by structurally redirecting investments toward labor-intensive industries, bridging the educational skill gap, and expanding formal, productive employment options to ensure equitable poverty reduction across Indonesia.

Keywords: Poverty, Gross Regional Domestic Product, Investment, Unemployment, Human Development Index

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INTRODUCTION

Poverty remains a structural challenge and a primary constraint in Indonesia's economic development. Regions with modern economic bases tend to experience faster poverty reduction compared to regions dependent on traditional primary sectors. This disparity indicates that national economic growth has not fully ensured aggregate welfare distribution. Data reveal that poverty reduction progresses slowly alongside complex regional inequalities, especially between industrialized provinces and those relying on traditional primary sectors. The relationship between economic growth and poverty is bidirectional; while high economic growth creates employment and boosts income to mitigate poverty, high poverty rates act as structural barriers that lower worker productivity, hinder human capital investment, and depress aggregate consumption. Thus, ensuring inclusive growth is vital to break the vicious cycle of poverty.

To understand the core of these regional disparities, it is essential to analyze the baseline distribution of macroeconomic output across the country. The empirical data regarding the distribution of economic contributions and the respective growth rates across major Indonesian regional clusters in 2024 are systematically detailed in Table 1.

Table 1.
Regional Economic Contribution and Growth Distribution in Indonesia (2024)

No.	Regional Cluster (Island)	Economic Contribution (%)	Economic Growth (c-to-c) (%)
1	Jawa	57.02	4.92
2	Sumatera	22.12	4.45
3	Kalimantan	8.24	5.52
4	Sulawesi	7.12	6.18
5	Bali dan Nusa Tenggara	2.81	5.04
6	Maluku dan Papua	2.69	7.81

Source: Central Bureau of Statistics (BPS), processed (2024)

As compiled in Table 1, Indonesia's economy remains heavily concentrated in Java, which contributed 57.02% of the aggregate output. Sumatera followed with 22.12%, while other regions contributed significantly less: Kalimantan (8.24%), Sulawesi (7.12%), Bali and Nusa Tenggara (2.81%), and Maluku and Papua (2.69%). Despite global and domestic pressures, all regional clusters recorded positive economic growth in 2024. Cumulatively, Maluku and Papua recorded the highest growth rate at 7.81%, followed by Sulawesi at 6.18% and Kalimantan at 5.52%.

However, sector-specific economic growth does not automatically translate into direct poverty alleviation. Modern industrial growth is often urban-centric and benefits higher-income groups, leaving the poor marginalized. Consequently, the

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empirical impact of sectoral growth on poverty remains a subject of debate. Furthermore, investment distribution is heavily clustered in specific provinces like DKI Jakarta, West Java, and East Java, worsening regional disparities. Investment in capital-intensive sectors yields limited poverty-reduction effects due to its low labor-absorption capacity. Simultaneously, structural unemployment persists as a primary driver of poverty due to mismatch issues between labor quality and modern industrial demands.

The research gap in this study stems from the inconsistencies and complex dynamics in previous empirical findings regarding the effects of macroeconomic determinants on poverty. Several studies demonstrate that expanding sectoral GRDP in manufacturing and services successfully mitigates poverty by elevating labor productivity and expanding formal employment opportunities (e.g., Fosu, 2017; Suryahadi et al., 2009). However, other empirical evidence highlights that the actual impact of investment on poverty reduction is highly conditional upon sectoral characteristics and geographical distribution, noting that capital-intensive investments yield limited poverty-reduction effects due to low labor-absorption capacity (e.g., Aghion & Howitt, 2009; Calderón & Servén, 2004). Concurrently, open unemployment persists as a primary driver of poverty in developing economies due to structural constraints that restrict public access to formal jobs and stable household income streams (e.g., Fields, 2011). Moreover, most existing literature evaluates these variables using partial frameworks, failing to capture their simultaneous interactions within regional development dynamics. To address these empirical and theoretical gaps, this study integrates sectoral GRDP, investment, unemployment, and HDI within a single comprehensive panel data framework across Indonesian provinces. The primary novelty lies in formulating a regional poverty model anchored in inclusive structural transformation.

REVIEW OF LITERATURE

Structural Transformation Theory

Economic development in the modern perspective is no longer viewed merely as an effort to increase aggregate per capita income. According to (Todaro & Smith, 2020), substantive economic development entails structural modifications that promote equitable welfare expansion rather than simply raising per capita income. This notion emerged as a critique of the classical trickle-down effect theory, which assumes that high aggregate growth automatically benefits the poor through job creation, whereas in reality, this theory often fails to guarantee equitable distribution.

Consequently, modern development literature shifts its focus toward inclusive growth, productive investments, and robust human capital development as the core pillars of poverty eradication. The central framework of this approach is anchored in the structural transformation theory pioneered by Lewis (1954) and Kuznets (1955). This theory posits that the development process drives a labor shift from traditional, low-productivity primary sectors to high-productivity modern manufacturing and services. Lewis (1954) argued that this transition is essential because it enhances aggregate productivity and raises real wages.

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Nevertheless, Kuznets (1955) identified that this structural transformation initially inflates income inequality before progressing toward equity. In contemporary developments, these premises have been modified by Dollar & Kraay (2002) and Ravallion (2016) into the concept of inclusive structural transformation. They assert that economic growth without equitable access culminates in a phenomenon of "growth without poverty reduction."

Poverty

Poverty is a multidimensional phenomenon whose existence cannot be separated from structural failures within an economic system. Within structural poverty frameworks, poverty is not viewed as a result of individual shortcomings, but rather due to society's limited access to economic resources and unsupportive policy designs. Based on modern development literature, long-term poverty eradication relies heavily on the synergy between inclusive growth, productive investments, and robust human capital development. When these elements are absent, households become highly vulnerable to falling into vicious cycles. Fields (2011) explains that persistent poverty is closely linked to labor market configurations, where the lack of formal employment opportunities forces households to live without steady incomes. Without a guaranteed regular income, households lose the capacity to meet basic needs and invest in their future, which ultimately reinforces the persistence of poverty traps across generations.

Sectoral GRDP

The dynamics of sectoral Gross Regional Domestic Product (GRDP) serve as a primary instrument to observe how structural transformation operates at the regional level in Indonesia. According to the theory proposed by Lewis (1954), GRDP growth driven by high-productivity modern sectors should ideally absorb labor on a massive scale, escalate wages, and subsequently alleviate regional poverty. However, the impact of sectoral economic growth on poverty reduction in Indonesia exhibits a complex pattern due to spatial disparities. Empirically, Yusuf & Sumner (2015) and Tazkiya et al. (2025) confirmed that industrial sector growth in Indonesia tends to be clustered in specific regions. This concentrated nature of industrial growth restricts formal job creation at a broader scale, leaving primary-sector-dependent regions lagging and experiencing significant stagnation in their poverty reduction efforts.

Investment

Investment plays a critical role in stimulating economic activity, but its actual influence on poverty reduction is heavily determined by the direction and characteristics of capital allocation. Calderón & Servén (2004) demonstrated that capital-intensive investments tend to limit labor absorption capacity because they rely more on advanced technology. Conversely, investments flowing into labor-intensive manufacturing and services are proven to directly uplift low-income households by providing widespread job opportunities. In Indonesia, the challenges of investment concern not only its capital-intensive nature but also its geographical distribution. Aurellia & Sirait (2026) added that the phenomenon of regional investment clustering inside Indonesia exacerbates economic polarization across regions, which in turn stifles the effectiveness of investment as an instrument for equitable poverty alleviation.

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Unemployment

Unemployment is a clear reflection of the labor market's inability to absorb the available workforce, while also acting as a direct consequence of a non-inclusive structural transformation process. On the labor supply side, regional labor market configurations are frequently confronted with structural unemployment, where the skills possessed by job seekers do not align with the demands of the emerging modern sectors. According to Fields (2011) and Paembonan et al. (2024), structural unemployment directly deprives households of steady incomes. This loss of access to regular income sources serves as the primary mechanism reinforcing poverty traps. This issue is further exacerbated if regional economic growth is heavily supported by capital-intensive investments that offer minimal labor absorption, keeping unemployment rates high and expanding the regional poverty base.

Human Development Index (HDI)

Serving as the crucial bridge between economic transformation and poverty reduction, the quality of human capital is an absolute prerequisite that cannot be overlooked. The human capital theory stresses that elevating education and health—manifested comprehensively through the Human Development Index (HDI)—is imperative to optimize labor productivity. (Todaro & Smith, 2020) state that human capital development lies at the very heart of equitable welfare expansion. Without adequate HDI achievements, poor communities will lack the necessary capacity to enter and compete in the modern sectors generated by structural transformation. Consequently, improvements in regional GRDP or increased investment inflows will fail to yield optimal results in reducing poverty if the quality of local human capital remains below the productivity standards demanded by the labor market.

RESEARCH METHOD

Research Design

This study applies a structured quantitative research design utilizing panel data regression analysis. The design is selected to comprehensively evaluate both the short-term and long-term determinants of provincial poverty rates across Indonesia. By combining time-series and cross-sectional data dimensions, this approach allows for a highly robust observation of regional macroeconomic dynamics that standard cross-sectional or time-series designs cannot capture individually. The model specifically investigates the empirical relationship between the dependent variable—the regional poverty rate—and a set of independent macroeconomic and structural variables, including sectoral Gross Regional Domestic Product (GRDP), investment, open unemployment, and the Human Development Index (HDI).

Data Sources and Sampling Techniques

The geographic scope of this study encompasses 34 provinces in Indonesia, observed over a 10-year temporal framework spanning from 2015 to 2024. The sampling technique employed is census sampling (saturation sampling), covering the entire targeted population of Indonesian provinces during the specified period to ensure complete representation of

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national regional disparities. This framework yields a total pool of 340 balanced panel observations (34 provinces * 10 years). The secondary data analyzed in this research were compiled from official public registries and institutional databases, specifically the Central Bureau of Statistics (BPS), Bank Indonesia (BI), and the Ministry of Investment/Investment Coordinating Board (BKPM).

Data Collection Methods

Data collection was executed through the documentary reporting method, systematically gathering official secondary statistical records published by the authorized government agencies. To minimize issues regarding scale variations and to mitigate potential heteroscedasticity within the residual structures, all variables were transformed into their natural logarithms (ln) before model estimation. The specific operational definitions, quantitative indicators, measurement scales, and institutional data sources for each variable are systematically detailed in Table 2.

Table 2.
Operational Definitions and Measurement of Variables

Variable	Concept / Definition	Indicator	Scale	Data Source
Poverty Rate (lnKMS)	The state of deprivation in which individuals lack the financial resources and essentials for a minimum standard of living.	The percentage of the population living below the official provincial poverty line (Headcount Ratio).	Percent (%)	Central Bureau of Statistics (BPS)
Sectoral GRDP (lnGRDP)	The total aggregate value of economic output generated by modern regional sectors within a specific period.	Gross Regional Domestic Product (GRDP) of the manufacturing and services sectors at constant market prices.	Billions of IDR	Central Bureau of Statistics (BPS)
Investment (lnINV)	The accumulation of physical capital stock injected into the regional economy to stimulate production.	The total realized value of Domestic Investment (PMDN) and Foreign Direct Investment (PMA).	Billions of IDR	Ministry of Investment / BPS
Unemployment (lnPNG)	The segment of the active labor force that is available for work and actively seeking it but remains unabsorbed.	The Open Unemployment Rate (TPT), calculated as the percentage of unemployed individuals to the total labor force.	Percent (%)	Central Bureau of Statistics (BPS)
Human Development Index (lnHDI)	A composite measure gauging regional long-term progress in three basic	A unified score calculated from life expectancy, education indices (schooling	Index (0–100)	Central Bureau of Statistics (BPS)

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Variable	Concept / Definition	Indicator	Scale	Data Source
	dimensions of human development.	years), and real per capita expenditure.		

Source: Author's compilation (2026)

Tools and Instruments Used

The primary analytical instrument utilized to manage, process, and estimate the econometric panel dataset is specialized statistical software (such as EViews or Stata). The research data were organized in a balanced panel dataset framework. The estimation of parameters, diagnostic tests, and residual evaluations were strictly calculated using the pre-programmed mathematical algorithms of the software to ensure empirical precision, tracking accuracy, and compliance with modern econometric computing standards.

Data Analysis Techniques

The quantitative data analysis technique relies on a log-log panel data regression model. The empirical framework is specified through the following linear equation:

$$\ln(KMS)_{it} = \alpha + \beta_1 \ln(GRDP)_{it} + \beta_2 \ln(INV)_{it} + \beta_3 \ln(PNG)_{it} + \beta_4 \ln(HDI)_{it} + e_{it}$$

Where KMS represents the poverty rate; GRDP represents sectoral GRDP; INV denotes total investment; PNG reflects the open unemployment rate; HDI represents the Human Development Index; i and t denote the specific province and year dimensions; and e is the stochastic error term.

To determine the most robust and efficient estimator among the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), formal econometric selection procedures are implemented in accordance with the panel frameworks of Baltagi (2021) and Wooldridge (2019). These procedures consist of the Chow Test (CEM vs. FEM), the Hausman Test (FEM vs. REM), and the Lagrange Multiplier (LM) Test (CEM vs. REM). Furthermore, classical assumption diagnostic evaluations—specifically testing for multicollinearity, heteroscedasticity, potential cross-sectional dependence, and serial correlation issues within the residual structures—are systematically conducted to ensure the BLUE (Best Linear Unbiased Estimator) properties of the regression coefficients.

RESULTS AND DISCUSSION

Econometric Evaluation and Diagnostic Testing

Descriptive statistics (Table 3) outline the log-transformed operational characteristics of the dataset across 340 observation points.

Table 3.
Descriptive Statistics

Statistic	ln(KMS)	ln(GRDP)	ln(INV)	ln(PNG)	ln(HDI)
Mean	13.726	17.366	10.816	11.513	4.261

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Statistic	ln(KMS)	ln(GRDP)	ln(INV)	ln(PNG)	ln(HDI)
Median	13.725	17.306	10.63	11.348	4.264
Maximum	14.416	19.637	13.545	14.56	4.42
Minimum	13.097	14.438	8.663	9.092	4.047
Std. Dev.	0.261	1.086	1.144	1.166	0.058
Observations	340	340	340	340	340

Source: Data processed (2025)

The results indicate substantial regional disparities in sectoral economic activities (Std. Dev. = 1.086), investment attraction (Std. Dev. = 1.144), and unemployment figures (Std. Dev. = 1.166) across provinces. Conversely, human development (Std. Dev. = 0.058) displays a highly concentrated distribution, signifying relatively balanced basic social-infrastructure progress.

To prevent spurious regressions, the Levin, Lin & Chu (LLC) Panel Unit Root Test was executed. As compiled in Table 4, all variables successfully rejected the null hypothesis of a unit root (p-value < 0.05), achieving stationarity under integrated configurations.

Table 4.
LLC Panel Unit Root Test Results

Variable	LLC Statistic	P-value	Integration Level	Status
Sectoral GRDP	-9.59628	0.000	Second Difference	Stationary
Investment	-6.43225	0.000	First Difference	Stationary
Unemployment	-10.058	0.000	First Difference	Stationary
HDI	-9.35292	0.000	First Difference	Stationary
Poverty	-8.78014	0.000	First Difference	Stationary

Source: EViews 12 output

To determine the most appropriate and robust panel data estimation model among the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), formal statistical selections including the Chow Test and Hausman Test were executed. The structured empirical results of these model selection evaluations are consolidated in Table 5.

Table 5.
Panel Model Selection Test Results

Test Type	Effects Test / Comparison	Chi-Square Statistic	P-value	Decision / Selected Model
Chow Test	Common Effect vs. Fixed Effect	790.9435	0.0000	Fixed Effect Model (FEM)

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Hausman Test	Random Effect vs. Fixed Effect	177.1908	0.0000	Fixed Effect Model (FEM)

Source: EViews 12 output, processed (2025)

As compiled in Table 5, the Chow Test yields a Chi-square statistic of 790.9435 with a highly significant p-value of 0.0000 ($p < 0.05$). This result strongly rejects the null hypothesis, indicating that the Fixed Effect Model (FEM) is statistically superior to the Common Effect Model (CEM). Subsequently, the Hausman Test was applied to contrast the Random Effect Model (REM) against the Fixed Effect Model (FEM). The test generated a Chi-square value of 177.1908 with a p-value of 0.0000 ($p < 0.05$). Since the p-value is lower than the 5% significance threshold, the null hypothesis is rejected, solidifying the Fixed Effect Model (FEM) as the optimal, most consistent specification to control for unobserved regional heterogeneities across the Indonesian provinces.

Fixed Effect Model Estimation and Discussion

The final parametric output generated from the Fixed Effect Model is presented in Table 6.

Table 6.
Fixed Effect Model Coefficient Regressions

Variable	Coefficient	t-Statistic	Probability
C (Constant)	6.615384	5.746175	0.0000
Sectoral GRDP	0.071263	4.492406	0.0000
Investment	-0.055964	-2.143929	0.0328
Unemployment	-0.059695	-2.333633	0.0202
HDI	1.681642	6.222035	0.0000
R-Squared	0.56052	F-Statistic	9.20384
Durbin-Watson	1.58006	Prob(F-statistic)	0.0000

Source: Data processed (2025)

The empirical equation is structured as follows:

$$\ln(KMS) = 6.615384 + 0.071263 \ln(GRDP) - 0.055964 \ln(INV) - 0.059695 \ln(PNG) + 1.681642 \ln(HDI)$$

The overall framework demonstrates strong statistical validity, indicated by an F-statistic probability of 0.000000, meaning all independent variables jointly and simultaneously influence poverty. The R-squared value of 0.56052 reveals that 56.1% of regional poverty fluctuations are explained by the variables in this model, while the Durbin-Watson statistic of 1.58006 indicates the absence of severe serial autocorrelation issues.

The parameter for Sectoral GRDP exhibits a positive coefficient of 0.071263 with a highly significant p-value of 0.0000. This implies that a 1% expansion in modern economic sectors is associated with a 0.071% increase in provincial poverty rates. This positive effect

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confirms the structural transformation warnings highlighted by Dollar & Kraay (2002) and Ravallion (2016), demonstrating a clear pattern of non-inclusive growth ("growth without poverty reduction"). This pattern strongly aligns with Suryahadi et al. (2009) and Bourguignon (2002), who noted that output expansions fail to alleviate poverty if they occur primarily in modern, urban-centric clusters that lack widespread labor-absorbing capacities, thereby leaving low-income groups marginalized.

Investment yields a negative coefficient of -0.055964 and is statistically significant with a p-value of 0.0328. This indicates that a 1% increase in capital accumulation successfully reduces the poverty rate by 0.056%. This significant negative relationship reflects that when capital inflows are well-distributed, they can stimulate localized production. However, because its mitigation elasticity is relatively small, this finding still echoes the structural boundaries discussed by Calderón & Servén (2004). It suggests that while investment acts as an instrument for poverty reduction, its maximum potential across Indonesian provinces is heavily constrained if capital inflows are continuously directed toward capital-intensive or highly automated industries instead of traditional labor-absorbing sectors.

Conversely, Unemployment exhibits a negative coefficient of -0.059695 and carries a statistically significant p-value of 0.0202. This counter-intuitive negative relationship indicates that a 1% decrease in the open unemployment rate is associated with a minor increase in the poverty headcount index. Econometrically, this specific anomaly often arises in developing labor markets where a reduction in formal open unemployment merely reflects a labor shift into low-productivity, survival-driven informal industries. As argued in Fields' (2011) structural labor frameworks, when workers are absorbed into vulnerable informal arrangements without steady, adequate income streams, they remain below the official poverty threshold, distorting the expected classical relationship between open unemployment metrics and actual regional poverty.

Lastly, HDI exhibits a positive and highly significant coefficient of 1.681642 with a p-value of 0.0000. While classical human capital theory, such as Becker (1993), posits that higher human development improves individual productivity to reduce poverty, this strong positive baseline coefficient points toward a severe structural lag in the Indonesian job market. Enhancements in local public health and education (e.g., increased average years of schooling) without a corresponding creation of high-value formal jobs directly induce educated unemployment. When highly qualified individuals are underutilized or forced into low-value activities, rising human development indices align concurrently with persistent poverty metrics. This critical condition supports Sen's (1999) capability approach, emphasizing that expanding human capabilities will fail to alleviate structural poverty unless it is met with real, accessible economic opportunities in the market.

CONCLUSION

This study demonstrates that the Fixed Effect Model (FEM) explains 56.1% of the regional poverty variations across Indonesian provinces. The empirical results reveal that sectoral economic growth and human development inadvertently expand poverty metrics due to non-inclusive structural features and severe labor market mismatches. In contrast,

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investment inflows exert a significant negative impact, effectively mitigating regional poverty. Meanwhile, open unemployment exhibits a counter-intuitive significant negative relationship, suggesting an econometric anomaly where declining formal unemployment merely reflects a structural shift of the workforce into low-productivity, survival-driven informal traps that fail to lift households above the poverty threshold.

To effectively capitalize on these empirical findings, regional development strategies in Indonesia must be comprehensively redirected through targeted macroeconomic adjustments. First, governments should correct the non-inclusive nature of economic growth by restructuring sectoral transformation to ensure that expanding modern sectors actively integrate lower-income groups. In tandem with this structural shift, maximizing the poverty-reduction elasticity of investment is highly critical. This requires adjusting regulatory frameworks and fiscal incentives to continuously steer capital inflows toward labor-intensive manufacturing, agribusinesses, and localized infrastructure projects outside of Java, rather than allowing capital to cluster exclusively in highly automated, capital-intensive industries.

On the socio-labor and structural dimensions, public policies must simultaneously dismantle human capital bottlenecks and informal employment traps. Local education and vocational training ecosystems must be systematically aligned with actual modern industrial demands to eliminate the structural lag that triggers educated unemployment. Furthermore, the state must transition from relying on informal labor absorption to actively fostering formal, high-value job creation. By establishing strategic fiscal incentives that pull vulnerable informal workers into stable, formal positions with resilient income streams, the structural roots of regional poverty in Indonesia can be effectively dismantled.

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