
Academia Open



By Universitas Muhammadiyah Sidoarjo

Table Of Contents

Journal Cover	1
Author[s] Statement.....	3
Editorial Team	4
Article information	5
Check this article update (crossmark)	5
Check this article impact	5
Cite this article.....	5
Title page.....	6
Article Title	6
Author information	6
Abstract	6
Article content	7

Originality Statement

The author[s] declare that this article is their own work and to the best of their knowledge it contains no materials previously published or written by another person, or substantial proportions of material which have been accepted for the published of any other published materials, except where due acknowledgement is made in the article. Any contribution made to the research by others, with whom author[s] have work, is explicitly acknowledged in the article.

Conflict of Interest Statement

The author[s] declare that this article was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright Statement

Copyright © Author(s). This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licences/by/4.0/legalcode>

Academia Open

Vol. 11 No. 2 (2026): December
DOI: 10.21070/acopen.11.2026.14711

EDITORIAL TEAM

Editor in Chief

Mochammad Tanzil Multazam, Universitas Muhammadiyah Sidoarjo, Indonesia

Managing Editor

Bobur Sobirov, Samarkand Institute of Economics and Service, Uzbekistan

Editors

Fika Megawati, Universitas Muhammadiyah Sidoarjo, Indonesia

Mahardika Darmawan Kusuma Wardana, Universitas Muhammadiyah Sidoarjo, Indonesia

Wiwit Wahyu Wijayanti, Universitas Muhammadiyah Sidoarjo, Indonesia

Farkhod Abdurakhmonov, Silk Road International Tourism University, Uzbekistan

Dr. Hindarto, Universitas Muhammadiyah Sidoarjo, Indonesia

Evi Rinata, Universitas Muhammadiyah Sidoarjo, Indonesia

M Faisal Amir, Universitas Muhammadiyah Sidoarjo, Indonesia

Dr. Hana Catur Wahyuni, Universitas Muhammadiyah Sidoarjo, Indonesia

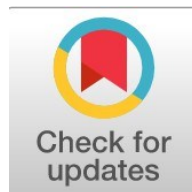
Complete list of editorial team ([link](#))

Complete list of indexing services for this journal ([link](#))

How to submit to this journal ([link](#))

Article information

Check this article update (crossmark)



Check this article impact (*)



Save this article to Mendeley



(*) Time for indexing process is various, depends on indexing database platform

GRDP Per Capita Dominance in Sampang Human Development: Dominasi PDRB Per Kapita dalam Pembangunan Manusia Sampang

Fernanda Aurellia Putri Mukhlisin, 22011010068@student.upnjatim.ac.id (*)

Department of Economic Development, Universitas Pembangunan Nasional “Veteran” Jawa Timur, Indonesia

Ririt Iriani Sri Setiawati, ririt.iriani.ep@upnjatim.ac.id

Department of Economic Development, Universitas Pembangunan Nasional “Veteran” Jawa Timur, Indonesia

(*) Corresponding author

Abstract

General Background: The Human Development Index (HDI) captures regional progress in health, education, and living standards, yet substantial disparities persist across Indonesian regions. **Specific Background:** Sampang Regency has historically recorded the lowest HDI among regencies and cities in East Java, alongside high poverty, limited access to quality education, and inadequate economic infrastructure. **Knowledge Gap:** Few studies have specifically examined Sampang Regency using time-series data to assess poverty, the Open Unemployment Rate (TPT), and gross regional domestic product (GRDP) per capita jointly. **Aims:** This study evaluates these three macroeconomic factors using secondary data from 2010–2023 and Ordinary Least Squares regression with first-difference transformation after the original model exhibited multicollinearity and autocorrelation. **Results:** Poverty changes were positive and significant for HDI changes (coefficient 0.178; $p = 0.039$), TPT was negative but nonsignificant (coefficient -0.172 ; $p = 0.428$), and GRDP per capita was positive and significant (coefficient 0.000014; $p = 0.008$). The transformed model explained 95.39% of HDI variation ($R^2 = 0.9539$) and satisfied the classical assumptions. **Novelty:** The study provides context-specific time-series evidence for Sampang and identifies GRDP per capita as the strongest significant economic indicator in the transformed model. **Implications:** Regional policy should prioritize inclusive GRDP per capita growth, connect poverty reduction with health and basic education access, and focus employment programs on the productivity and quality of the dominant informal workforce.

Highlights:

- Poverty changes were positive and statistically significant ($p = 0.039$).
- Open unemployment was negative but nonsignificant ($p = 0.428$).
- First-difference OLS explained 95.39% of variation in the dependent measure.

Keywords: Human Development Index, Poverty, GRDP Per Capita, OLS Regression

Published date: 2026-09-07

Introduction

The Human Development Index (HDI) is a composite indicator of a region's progress in health, education, and a decent standard of living. UNDP [1] highlights that the HDI serves as a benchmark for the general quality of human life, not just a reflection of economic growth. Although Indonesia's HDI has consistently shown an upward trend at the national level, regional disparities, particularly between urban and rural areas, remain problematic.

Sampang Regency, located on Madura Island in East Java Province, has historically had the lowest HDI among all regencies and cities in East Java. High poverty rates, limited access to high-quality education services, and inadequate economic infrastructure all contribute to this difficulty. Although positive trends have emerged over the past ten years, Sampang Regency's HDI in 2023 remains below the provincial average according to Statistics Indonesia (BPS) [2].

Theoretically, several macroeconomic factors influence the HDI. According to human capital theory Becker [3] investment in human resources will increase productivity and quality of life. This is made possible, in part, by regional income growth. Sen [4] added, using a capability perspective, that unemployment and poverty limit people's ability to realize their full potential, directly hindering improvements in the Human Development Index (HDI). Meanwhile, increased per capita income provides communities and governments with more funds to spend on health and education.

The relationship between macroeconomic factors and the HDI has been the subject of several previous studies. According to Kuswanto [5], the HDI in Jambi Province is positively and significantly influenced by per capita GRDP. Conversely, several regional studies have shown that poverty and unemployment hinder HDI improvements Budiastuti & Wibowo ; Rahmawati & Hardani [6], [7]. However, there remains a significant research gap that needs to be filled, as currently very few studies specifically analyze the environment of Sampang Regency using time series data.

This study uses an OLS approach with data transformation to evaluate the influence of poverty, the Open Unemployment Rate (TPT), and per capita GRDP on the HDI in Sampang Regency from 2010 to 2023. It is hoped that the results of this study will increase knowledge about regional economic growth and offer evidence-based policy advice to the Sampang Regency government.

Literature Review

1. Human Development Index

The UNDP first created the Human Development Index (HDI) in 1990 in response to the limitations of GRDP as a development indicator. A long and healthy life, as defined by life expectancy; knowledge, as determined by average and estimated years of schooling; and a respectable standard of living, as assessed by adjusted per capita expenditure, are the three primary dimensions of the HDI. These elements are connected and reinforce one another when assessing total human quality UNDP [8]

2. Poverty and the HDI

According to Sen [4], In terms of human development, poverty is described as the absence of basic skills required to live a dialogical existence. High poverty rates are a reflection of households' incapacity to meet fundamental necessities, such as access to health and education services, which are components of the HDI. Nurkse [9] demonstrates how poverty fosters conditions that promote progress in the quality of human capital through his theory of the cycle of poverty (the vicious circle of poverty). Extending this to the larger setting, Afriwan, Putra, and Fahmi [10] discovered that a rise in the Human Development Index significantly lowers poverty rates in Jambi Province, supporting the local negative association between these two variables.

3. Open Unemployment Rate and HDI

Unemployment affects human resource quality in two ways. Unemployment directly reduces personal income and limits access to social services. Unemployment indirectly reduces tax revenue for the government, which limits its ability to provide public services such as health and education. A high unemployment rate is a sign of inefficient labor utilization, which ultimately hinders income growth and human development, according to Okun's theory [11]. In a panel data analysis of 34 provinces in Indonesia, Ardina [12] verified that the HDI is negatively affected by the Open Unemployment Rate (TPT).

4. GRDP Per Capita and HDI

One common indicator for measuring the average level of welfare in a region is GDP per capita. Theoretically, an increase in GDP per capita increases people's purchasing power and allows local governments to allocate funds to the health and education sectors. According to Romer's endogenous growth theory [13], Since human capital is what propels long-term economic progress, there is a reciprocal relationship between GDP per capita and HDI. In their study in Jambi Province, Hauzan al [5] found a positive and substantial relationship between GDP per capita and HDI. Rahman et al. [14] confirmed similar results in the Indonesian setting, further demonstrating that poverty has a major impact on the HDI.

Method

A. Data and Data Sources

This analysis utilizes secondary time series data for Sampang Regency from 2010 to 2023. The Human Development Index (HDI), poverty rate, open unemployment rate (TPT), and GDP per capita were obtained from the Central Statistics Agency (BPS) of Sampang Regency and official publications of East Java Province. The original model used a total of 14 data points, while 13 data points were used after the differentiation process.

B. Classical Assumption Test

The main estimation model used in this study follows the following log-level regression formulation:

$$\text{HDI} = \beta_0 + \beta_1 \text{LOG(POVERTY)} + \beta_2 \text{LOG(TPT)} + \beta_3 \text{LOG(GRDP_PERCAPITA)} + \varepsilon \quad (1)$$

After identifying multicollinearity and autocorrelation in the original model, the data for each variable was transformed using the first difference method, changing the model to:

$$\Delta \text{HDI} = \beta_0 + \beta_1 \Delta(\text{POVERTY}) + \beta_2 \Delta(\text{UNEMPLOYMENT}) + \beta_3 \Delta(\text{GRDP_PERCAPITA}) + \varepsilon \quad (2)$$

Description:

HDI = Human Development Index;

POVERTY = percentage of poor population;

TPT/UNEMPLOYMENT = Open Unemployment Rate;

GRDP_PERCAPITA = GRDP per capita at constant prices;

Δ = first-difference operator;

β_0 to β_3 = regression coefficients;

ε = residual.

C. Classical Assumption Test

A number of traditional assumption tests were carried out in order to satisfy the requirements for the BLUE (Best Linear Unbiased Estimator) OLS estimation. These tests included: (1) a normality test using the Jarque-Bera statistic, with a passing criterion if the probability is >0.05 (2) a multicollinearity test using the Variance Inflation Factor (VIF), with a passing criterion if the VIF is <10 (3) a heteroscedasticity test using the White Test, with a passing criterion if the probability of Obs*R-squared is >0.05 and (4) an autocorrelation test using the Breusch-Godfrey Serial Correlation LM Test. EViews software was used for all data processing.

To satisfy the conditions for the BLUE (Best Linear Unbiased Estimator) OLS estimate, several traditional assumption tests were carried out. These tests include the following: (1) normality test using Jarque-Bera statistics, with a passing criterion if the probability is >0.05 (2) multicollinearity test using Variance Inflation Factor (VIF), with a passing criterion if $VIF < 10$ (3) heteroscedasticity test using White Test, with a passing criterion if the probability of Obs*R-squared >0.05 and (4) autocorrelation test using the Breusch-Godfrey LM Serial Correlation Test, with a passing criterion if the probability of Obs*R-squared >0.05 . All data processing was done using EViews software.

Results and Discussion

A. Classical Assumption Test of Transformation Models

Following the application of the first-difference transformation, Table 1 presents the outcomes of all classical assumption tests on the model. The model satisfies the OLS estimation criterion because all tests produced satisfactory results.

Table 1. An overview of the results of the classical assumption test

Assumption Test	Method	Statistical Value / Prob.	Conclusion
Normality	Jarque-Bera	1,339 / 0,511	Normal
Multicollinearity	VIF (max. 6,636)	VIF < 10	Lolos
Heteroscedasticity	White Test	Obs*R ² = 11,758 / 0,227	Lolos
Autocorrelation	Breusch-Godfrey LM	Obs*R ² = 4,697 / 0,096	Lolos

1. Multicollinearity Test

All independent variables have VIF values less than 10, according to the findings of the model VIF test after differential transformation. Specifically, the VIFs for D(Poverty), D(Unemployment), and D(GRDP per capita) are 1.746, 1.215, and 1.872, respectively. These results indicate that there is no substantial multicollinearity problem among the main variables of the model, thus allowing for reliable interpretation of the coefficient estimates.

2. Normality Test

With a probability of 0.511, the Jarque-Bera statistical test for residual normality produced a result of 1.339. The null hypothesis that the residuals are normally distributed cannot be rejected because this probability value is significantly higher than the 5% significance level. Additionally, the residual histogram supports the statistical and visual normality of the residuals by displaying a generally symmetric distribution with a skewness of 0.144 and a kurtosis value of 4.545.

The residuals' normal distribution is confirmed by the histogram and Jarque-Bera test results shown in Figure 1 below.

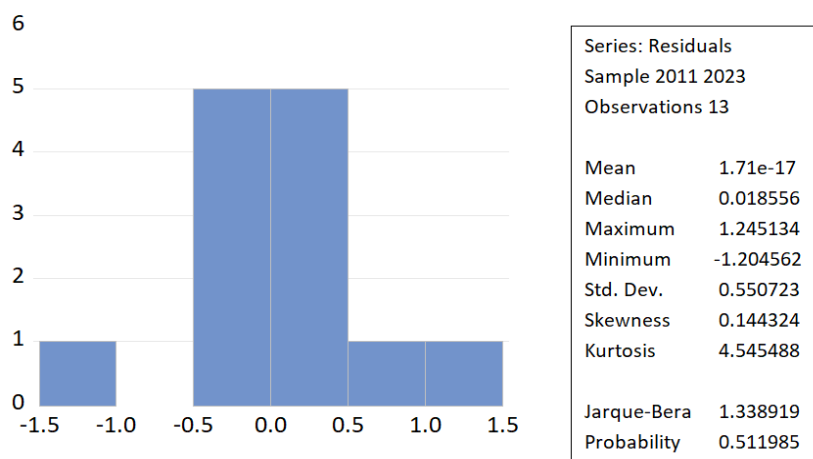


Figure 1. Residual Normality Test (Jarque-Bera Test)

3. Heteroscedasticity Test

The White test results in an Obs*R-squared score of 11.758 and a chi-square probability of 0.227. The residual variance is homoscedastic and the model shows no signs of heteroscedasticity if the probability value is greater than 0.05.

To guarantee accurate OLS coefficient estimate, this is essential. Figure 2 below shows the White test result verifying the lack of heteroscedasticity.

Heteroskedasticity Test: White			
Null hypothesis: Homoskedasticity			
F-statistic	3.156872	Prob. F(9,3)	0.1869
Obs*R-squared	11.75843	Prob. Chi-Square(9)	0.2273
Scaled explained SS	9.990648	Prob. Chi-Square(9)	0.3512

Figure 2. Heteroscedasticity Test (White Test)

4. Autocorrelation Test

The Breusch-Godfrey LM Serial Correlation Test yielded an Obs*R-squared value of 4.697 with a Chi-Square probability of 0.095 at lag 2. The probability value slightly above 5% shows that the model is free of autocorrelation issues following the implementation of the differencing transformation, in contrast to the condition in the original model before to the transformation.

Figure 3 below displays the results of the Breusch-Godfrey LM test, which confirms that the model is autocorrelation-free following differencing modification.

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	1.980128	Prob. F(2,7)	0.2082
Obs*R-squared	4.697274	Prob. Chi-Square(2)	0.0955

Figure 3. Autocorrelation Test (Breusch-Godfrey LM Test)

B. OLS Regression Estimation Results

The estimation results of the original regression model (prior to change) using log-level data are shown in Table 2. The estimation findings shed light on the level correlations between variables, even if this model was not chosen as the final model because of assumption breaches.

Figure 4 below shows the complete regression output of the original log-level model computed with EViews.

Dependent Variable: IPM				
Method: Least Squares				
Date: 03/27/26 Time: 23:27				
Sample: 2010 2023				
Included observations: 14				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-255.3903	55.31596	-4.616937	0.0010
LOG(KEMISKINAN)	16.42371	6.056827	2.711604	0.0219
LOG(TPT)	-1.009613	1.222073	-0.826148	0.4280
LOG(PDRBPERKAPITA)	27.02128	3.813056	7.086516	0.0000
R-squared	0.953900	Mean dependent var	60.01571	
Adjusted R-squared	0.940070	S.D. dependent var	4.078299	
S.E. of regression	0.998395	Akaike info criterion	3.069622	
Sum squared resid	9.967934	Schwarz criterion	3.252209	
Log likelihood	-17.48735	Hannan-Quinn criter.	3.052720	
F-statistic	68.97277	Durbin-Watson stat	0.976706	
Prob(F-statistic)	0.000001			

Figure 4. Log-Level Model Regression Output (EViews)

The transformation model estimation (final model) yields the following equation:

$$\Delta \text{HDI} = 0.496 + 0.178\Delta(\text{POVERTY}) - 0.172\Delta(\text{UNEMPLOYMENT}) + 0.000014\Delta(\text{GRDP_PERCAPITA}) \quad (3)$$

Table 2. Summary of OLS Regression Estimation Results of Transformation Model

Variables	Coefficient	Std. Error	t-Statistik	Prob.
Constant (C)	0,496	0,353	1,404	0,192
$\Delta(\text{POVERTY})$	0,178	0,178	2,145*	0,039
$\Delta(\text{UNEMPLOYMENT})$	-0,172	0,172	-0,829	0,428
$\Delta(\text{GRDP PER CAPITA})$	0,000014	0,0000040	3,512***	0,008
R-squared = 0,9539		Adjusted R-squared = 0,9401		
F-statistik = 68,973 (Prob. 0,000001)		N observasi = 13 (setelah differencing)		

Note: * significant at α 5%; ** significant at α 1%; *** significant at α 1%

C. Discussion

1. The Impact of Poverty on HDI

At the 5% significance level, the estimated results show that changes in poverty have a positive and significant impact on changes in the HDI, with a coefficient of 0.178. Although this outcome seems to defy general theory, a number of contextual circumstances can account for it. First, because there may be a lag effect, whereby prior poverty reductions are only reflected in rises in the HDI years later, the positive association in this short-run model reflects dynamic conditions throughout the transition period.. Second, the unique nature of Sampang Regency as a high-poverty area may result in a different short-run relationship due to the presence of social assistance programs that simultaneously improve health and education enrollment without directly reducing poverty levels over the same time period.

This explanation is consistent with the findings of Ersad, Amir, Zulgani [15], who found that the effect of poverty on the HDI varies according to the stage of regional development in the context of eastern Indonesia. Social assistance program interventions often increase the HDI in disadvantaged areas without temporarily reducing poverty levels.

2. The influence of TPT on HDI

Theoretically, the TPT coefficient is negative (-0.172), but not statistically significant (prob. 0.428). This insignificance can be explained by the labor market structure of Sampang Regency, which is largely dominated by subsistence agriculture and the informal sector, where the formal TPT concept is less accurate in capturing the true labor market strength. Furthermore, Sampang's small size and relatively consistent TPT figures throughout the observation period may result in fluctuations that are too small to identify a substantial effect. Uswatun Hasanah et al. [16] showed that the formal TPT is not necessarily a strong predictor of changes in the HDI in their study of agricultural-based areas in Java.

3. The Influence of Per Capita GRDP on HDI

HDI is positively and significantly influenced by GDP per capita, with a probability value of 0.008. This is the strongest conclusion of this study and is consistent with previous research. The expansion of regional fiscal capacity, which allows for higher spending allocations to the health and education sectors, two key components of the HDI, is reflected in an increase in GRDP per capita. Furthermore, higher per capita income immediately increases people's purchasing power, enabling them to access healthcare and education services independently. These findings align with the research findings of Ekaputri [17] in Southern Sumatra and Kuswanto [5] in Jambi Province, both of which emphasized the crucial role of economic expansion in driving improvements in the HDI.

D. Policy Implications

Based on the findings above, there are at least three policy recommendations that can be formulated. First, the Sampang Regency Government needs to prioritize economic development strategies that can drive an inclusive increase in per capita GRDP, such as strengthening local leading commodities, developing agricultural processing industries, and improving infrastructure connectivity. Second, in order to have a more immediate influence on the Human Development Index (HDI), programs aimed at reducing poverty should be closely linked with expanding access to healthcare and basic education. Third, given that the unemployment rate (TPT) has not been proven significant, employment policies need to be directed at improving the quality and productivity of the dominant informal sector workforce, rather than simply reducing the formal unemployment rate.

At least three policy recommendations can be developed based on the findings mentioned above. The Sampang Regency Government should first prioritize economic development measures that can drive an equitable increase in per capita GDP, such as strengthening leading local products, developing agricultural processing businesses, and improving infrastructure connectivity. Second, to have a more direct impact on the Human Development Index (HDI), programs aimed at reducing poverty should be closely linked to expanding access to health services and basic education. Third, instead of just reducing formal unemployment, employment programs should focus on improving the quality and productivity of the dominant informal sector workforce, because the Integrated Workforce (TPT) has not been proven significant..

Conclusion

This study uses OLS regression with differencing transformation to examine the factors influencing the Human Development Index (HDI) in Sampang Regency between 2010 and 2023. There are three primary conclusions that can be made. First, the mechanism of social assistance programs that raise the HDI dimensions without proportionately lowering poverty rates over the same period explains why poverty has a positive and large impact on short-term changes in the HDI in the context of Sampang Regency. Second, because the informal sector dominates the area employment structure, the Open Market Opportunity (TPT) has little impact on the HDI. Third, it has been demonstrated that GRDP per capita is the primary cause of positive and extremely significant gains in the HDI, demonstrating the significance of high-quality economic growth as the cornerstone of human development.

With an R-squared value of 0.9539, which indicates extremely high explanatory power, the constructed model effectively satisfies all traditional assumptions methodologically when the transformation is implemented. In order to provide a more detailed picture of the dynamics of human development in Sampang Regency, future research is advised to employ panel data across sub-districts and broaden the scope of variables by incorporating indicators of public investment in the health and education sectors.

References

1. United Nations Development Programme, Human Development Report 2023. New York, NY, USA: UNDP, 2023. [Online]. Available: <https://hdr.undp.org>
2. Badan Pusat Statistik, Data Kemiskinan dan Ketenagakerjaan Indonesia. Jakarta, Indonesia: Badan Pusat Statistik, 2023. [Online]. Available: <https://www.bps.go.id>
3. G. S. Becker, Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. Chicago, IL, USA: University of Chicago Press, 1964.
4. Sen, Development as Freedom. Oxford, U.K.: Oxford University Press, 1999.
5. K. Kuswanto, "The impact of economic growth on the human development index in Jambi Province in 2004–2019," *Asian Journal of Economics and Business and Accounting*, vol. 21, no. 12, pp. 22–28, 2021, doi: 10.9734/ajeba/2021/v21i1230449.
6. N. Rahmawati, P. K. Prasetyanto, and F. S. Islami, "Pengaruh Indeks Pembangunan Manusia (IPM), Upah Minimum Regional (UMR), dan Tingkat Pengangguran Terbuka terhadap jumlah penduduk miskin di Indonesia tahun 2017–2021," *Convergence: Journal of Economic Development*, vol. 4, no. 1, pp. 19–31, 2022, doi: 10.33369/convergencejep.v4i1.23358.
7. D. Zanzibar, F. Rahmadhania, R. Kiswanda, and M. L. Rohmi, "Pengaruh Indeks Pembangunan Manusia dan pengangguran terhadap kemiskinan di Jawa Timur," *Jurnal Economina*, vol. 3, no. 4, pp. 562–574, 2024, doi: 10.55681/economina.v3i4.1296.
8. United Nations Development Programme, Human Development Report. New York, NY, USA: United Nations Development Programme, 2022. [Online]. Available: <http://hdr.undp.org>
9. R. Nurkse, Problems of Capital Formation in Underdeveloped Countries. Oxford, U.K.: Oxford University Press, 1953.
10. Afriwan, A. Putra, and A. Fahmi, "Analyzing the impact of human development index, inflation, and unemployment on poverty levels in Jambi Province," *Jurnal Prajaiswara*, vol. 6, no. 2, pp. 593–606, 2025, doi: 10.55351/prajaiswara.v6i2.220.
11. M. Okun, "Potential GNP: Its measurement and significance," in *Proc. Business and Economic Statistics Section*, American Statistical Association, pp. 89–104, 1962.
12. T. Ardina, "Analisis pengaruh jumlah penduduk, IPM dan tingkat pengangguran terbuka terhadap tingkat kemiskinan di Provinsi Jawa Timur," *Economie: Jurnal Ilmu Ekonomi*, vol. 6, no. 1, pp. 60–73, 2024, doi: 10.30742/economie.v5i2.3582.

13. P. M. Romer, "Endogenous technological change," *Journal of Political Economy*, vol. 98, no. 5, pt. 2, pp. S71–S102, 1990, doi: 10.1086/261725.
14. W. W. Rahman, A. Wahab, L. Rukmani, and Y. Karmila, "The influence of poverty, unemployment and government expenditures on the human development index (HDI)," *Jurnal Imara*, vol. 8, no. 1, pp. 1–12, 2024, doi: 10.31958/imara.v8i1.12226.
15. M. E. Ersad, A. Amir, and Z. Zulgani, "Dampak IPM, tingkat pengangguran dan tingkat kemiskinan terhadap ketimpangan pendapatan di Sumatera Bagian Selatan," *Jurnal Paradigma Ekonomika*, vol. 17, no. 2, pp. 425–438, 2022, doi: 10.22437/jpe.v17i2.15614.
16. L. Uswatun Hasanah, S. Hodijah, and M. Safri, "Kausalitas antara pertumbuhan ekonomi, pengeluaran pemerintah dan Indeks Pembangunan Manusia kabupaten/kota di Provinsi Jambi," *Jurnal Paradigma Ekonomika*, vol. 17, no. 2, pp. 273–288, 2022, doi: 10.22437/jpe.v17i2.19620.
17. R. A. Ekaputri and A. Zulyanto, "Analysis of economic growth, agglomeration and poverty in Southern Sumatra," *Equity: Jurnal Ekonomi*, vol. 11, no. 1, pp. 36–45, 2023, doi: 10.33019/equity.v11i1.136.