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RESEARCH ARTICLE

Analysis Of The Impact Of Economic Growth, Human Development Index (HDI) And Unemployment Rate On Poverty In Sumatra Island

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ABSTRACT
This study aims to analyze the impact of economic growth, the human development index, and the unemployment rate on poverty in each province on the island of Sumatra using panel data regression analysis with the Random Effect Model (REM) over the period 2013-2022. The results of the study indicate that each independent variable has a different effect on the dependent variable. The economic growth variable has a negative but not significant effect on the poverty level in each province on the island of Sumatra. Meanwhile, the human development index variable has a negative and significant effect, and the unemployment rate variable has a positive and significant effect on the poverty level in each province on the island of Sumatra for the period 2013-2022.

Keyword: Poverty, Economic Growth, Human Development Index, And Unemployment Rate

INTRODUCTION

Poverty in developing countries is a highly complex issue and a primary focus in policy-making for many nations (Gweshengwe & Hassan, 2020). Poverty can be understood as the inability of individuals to attain a decent standard of living based on their available capacity and resources. The assessment of poverty plays a crucial role as an indicator in evaluating the welfare level of a country or region. This condition reflects a gap between the economic potential of an area and the quality of life of its inhabitants.

In Indonesia, the concept of poverty applied by the Central Bureau of Statistics and several other countries refers to the ability to meet basic needs. In this context, economic incapacity to fulfill basic needs, such as food and non-food essentials, is a key factor. Understanding poverty from various aspects, such as economic, social, and geographical perspectives, is crucial in designing targeted policies. Adawiyah (2020) states that "poverty alleviation is not only related to economic growth but also to improving the quality of life services, access to education, and decent employment opportunities."

Poverty in Sumatra Island is also a prominent issue in Indonesia, especially considering the region's economic potential. Sumatra is known as one of the islands rich in natural resources. However, despite its abundant natural wealth, poverty remains a significant challenge in several provinces, particularly on Sumatra Island. The disparity between rural and urban areas exacerbates the situation, where access to basic services such as education, healthcare, and infrastructure is much more limited in rural regions.

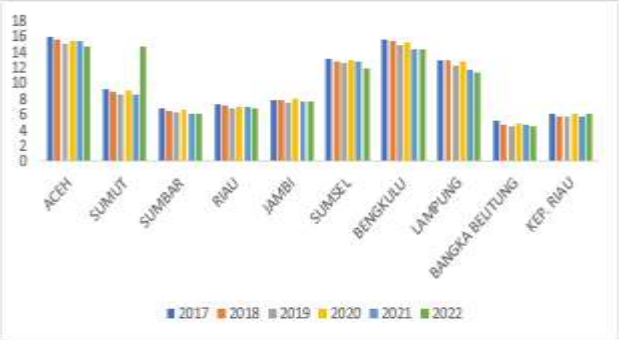

Fig 1. Poverty Percentage in Sumatra Island by Province
Source : Central Bureau of Statistics, data processed

The graph illustrates the poverty percentage in each province on Sumatra Island from 2017 to 2022. Most provinces show a downward trend in poverty, reflecting an improvement in the welfare of the population during this period. Aceh and Bengkulu face greater challenges compared to other provinces, as they have the highest poverty rates. Additionally, 2020 appears to have been a difficult year for all provinces, likely due to the impact of the COVID-19 pandemic, which caused a slight increase in poverty.

Economic growth is often viewed as one of the most common solutions to address poverty. This refers to the overall growth of a country's output, measured using GDP or GRDP at the regional level. In theory, when the economy grows, the income of the population increases, leading to more job opportunities and an overall improvement in welfare (Ridwansyah & Anggraeni, 2023). However, in reality, economic growth does not always provide benefits evenly across society. The distribution of the economic growth results is often uneven, where poorer segments of society do not gain adequate access to new economic opportunities (Purwono et al., 2021).

In addition, economic growth cannot be separated from the involvement of skilled human resources as drivers of the economic sector. The quality of human resources determines

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how inputs are processed into valuable outputs that contribute to economic growth (Purwono et al., 2021). This can be measured through the Human Development Index (HDI), where a higher HDI indicates that the community has better access to healthcare and education, which ultimately can reduce poverty (Fahmi et al., 2023). Improving the HDI plays a significant role in helping people escape poverty (Dwiarsyah et al., 2022), as good education quality and access to healthcare enhance productivity and economic opportunities (Tschudin, 2007).

Moreover, according to Prawoto & Selatan (2009), not only uneven economic growth and HDI that can influence poverty, but the unemployment rate also has a crucial impact on poverty levels. Unemployed individuals who do not earn sufficient income to meet their basic needs indicate that high unemployment shows many people are unable to capitalize on economic opportunities, which ultimately worsens poverty (Gweshengwe & Hassan, 2020). Additionally, prolonged unemployment can lead to a decline in skills and productivity, making poverty alleviation even more difficult (Meng et al., 2005). On the other hand, low unemployment indicates that more people have access to jobs, which, in turn, helps improve their economic conditions and reduce poverty.

Therefore, this study aims to analyze the impact of economic growth, the Human Development Index (HDI), and the unemployment rate on poverty in each province on Sumatra Island during the analysis period from 2013 to 2022. The research is expected to provide comprehensive insights for policymakers when formulating strategies to promote poverty alleviation in Indonesia in general.

LITERATURE REVIEW

Poverty

Poverty is one of the long-standing social and economic issues that has garnered significant attention. According to Todaro and Smith (2012), "poverty is defined as a condition where an individual or a group of people is unable to meet the basic needs required to live a decent life." These basic needs include shelter, clothing, food, education, and access to healthcare services. Poverty is often measured using an approach based on a community's ability to fulfill these basic needs, particularly by assessing the minimum expenditure required for food and non-food essentials (Setyo & Anggraini Rambe, 2024).

Moreover, Tschudin (2007) emphasizes the importance of the capability approach in measuring poverty. According to him, poverty is not only the inability to achieve a certain material standard of living, but also the inability of individuals to pursue life goals they value as important. Therefore, poverty alleviation should not only focus on economic growth but also on empowerment and the development of human resources' quality.

Economic Growth

The relationship between economic growth and poverty has been widely studied in various literatures. Susanto & Pangesti (2021) found that economic growth contributes to poverty reduction, especially when the growth is inclusive, meaning that the benefits of growth are distributed evenly across society. Economic growth, measured by GDP or GRDP per capita, is believed to increase people's income and create more job opportunities, thus helping to reduce poverty (Odekon, 2015).

Similar results were also found by Damanik & Sidauruk (2020), who stated that economic growth plays a role in reducing poverty levels. However, some studies show that economic growth alone is not enough to address poverty if income distribution is uneven. Prawoto & Selatan (2009) argue that although economic growth can improve the living standards of the majority of society, the poorest groups often do not benefit from this growth. This condition underscores the importance of policies focused on distributing the benefits of economic growth to significantly reduce poverty, especially in developing countries like Indonesia

Human Development Index (HDI)

The Human Development Index (HDI) is an indicator developed by the United Nations Development Programme (UNDP) to measure the quality of human development across three key dimensions: education, health, and a decent standard of living (Tschudin, 2007). The role of HDI in poverty levels can be observed through the development of access to education and healthcare, which ultimately increases economic productivity and per capita income (Becker, 1964).

Various studies have been conducted on similar topics, such as the research by Praja et al. (2023), which found that the Human Development Index (HDI) plays a role in reducing poverty levels in Jakarta. Similarly, a study by Azzahra et al. (2022) indicated that HDI is capable of lowering poverty rates in several provinces in Indonesia. This is marked by improvements in the quality of human resources and enhanced access to education, healthcare, and a decent standard of living.

Unemployment Rate

Unemployment is one of the significant factors contributing to high poverty levels. Okun (1962) discussed the relationship between unemployment and economic growth through the concept of Okun's Law, where an increase in economic growth is typically followed by a decrease in the unemployment rate. As more job opportunities become available, people earn more stable incomes, which ultimately helps reduce poverty levels (Mardiatillah et al., 2021).

As shown in the analysis conducted by Fatmasari (2017), structural unemployment can slow down poverty reduction, even when the economy is growing. A similar finding was made by Praja et al. (2023), who explained that prolonged unemployment, especially when caused by a mismatch between workers' skills and market demand, can hinder the economy's ability to reduce poverty. Therefore, reducing unemployment through the creation of quality jobs and maximizing the skills of the workforce becomes crucial in poverty alleviation.

Method

This study uses panel data provided by the Central Bureau of Statistics (BPS), which combines time series and cross-sectional data for the years 2013-2022 in each province on Sumatra Island. In this study, economic growth is defined as the annual percentage change in Gross Domestic Product (GDP)/Gross Regional Domestic Product (GRDP) over a specific period, and it can be observed through data based on current prices or constant prices. The Human Development Index (HDI) is a composite measure reflecting the average achievements in health, education, and a decent standard of living, expressed on an index scale. The unemployment rate represents the percentage of the labor force that is unemployed but actively seeking employment, indicating the availability of jobs in each province. Meanwhile, poverty rate as the dependent variable is defined as the percentage of the population below the poverty line per province, indicating the economic condition of the population in the poor category.

The analysis technique applied in this study is panel data regression. Panel data regression is a regression analysis methodology that combines both cross-sectional and time-series data into a single model. Regression using panel data is also useful for testing changes in the dependent variable resulting from variations in the independent variables within an observation unit over a specific period (Restat, 2023). The regression model for panel data can be expressed as follows:

$$KMS_{it} = \beta_0 + \beta_1 PE_{it} + \beta_2 IPM_{it} + \beta_3 TP_{it} + e_{it}$$

Where:

KMSit : overty in unit i at time t

β_0 : Constant

$\beta_1 PE_{it}$: Economic Growth in unit I at tim
$\beta_2 IPM_{it}$: Unemployment Rate in unit i at time t
$\beta_3 TP_{it}$: Unemployment Rate in unit i at time t
e_{it} : Error term
i : Sample
t : Time

Results And Discussion

The panel data regression analysis method was chosen because it allows for capturing dynamics over time while accounting for heterogeneity between provinces. With panel data, it is possible to obtain more robust results compared to using time-series or cross-sectional data alone (Savitri et al., 2021). Additionally, in panel data analysis, selecting the appropriate model is crucial to obtaining accurate estimates. Before determining the model to be used, several tests must be conducted, including the Chow test, LM test, and Hausman test. The Chow test is applied to identify whether there are significant differences between data groups, while the Hausman test helps in choosing between the fixed-effect model (FEM) and the random-effect model (REM). The LM test is used to evaluate whether the random-effect model (REM) is more appropriate than the ordinary regression model.

Table 1. Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	853.606872	(9,87)	0.0000
Cross-section Chi-square	449.204806	9	0.0000

The Common Effect Model (CEM) is applied when the probability value from the Chow test is greater than 0.05. If the probability value is less than 0,05, then the Fixed Effect Model (FEM) is chosen. Table 1 shows a chi-square probability value of 0,00 < 0,05, which refers to the findings of the Chow test. Therefore, the Fixed Effect Model (FEM) is selected as the appropriate model.

Table 2. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.101546	3	0.5516

After the Chow test, the Hausman test is conducted. If the probability value is > 0,05, the Random Effect Model (REM) is chosen if it is < 0,05, the Fixed Effect Model (FEM) is used. In Table 2, the results of the Hausman test show a probability value of 0,5516 > 0,05. Therefore, the selected model is REM. If both tests yield inconsistent probability values, the Lagrange Multiplier (LM) test will be conducted to determine the best model (Savitri et al., 2021).

Table 3. LM Test

	Cross-section	Test Hypothesis Time	Both
Breusch-Pagan	388.6154 (0.0000)	1.414782 (0.2343)	390.0302 (0.0000)

Since the results of both tests were inconsistent, the LM test was conducted. The rule is that if the probability value is > 0,05, the Common Effect Model (CEM) is chosen, but if it is < 0.05, the Random Effect Model (REM) is used (Savitri et al., 2021). It can be seen that the results of the LM test show a probability value of 0,00 < 0,05, which means that the best model in this study is the REM.

Based on the results of the model selection test, the chosen model is REM. Therefore, the classical assumption tests that need to be conducted are the multicollinearity and heteroscedasticity tests (Basuki & Yuliandi, 2014: 183) (Napitupulu et al., 2021: 120). Each variable used, namely Economic Growth, Human Development Index, and Unemployment Rate, has undergone a series of classical assumption tests to ensure the reliability of the analysis results. The multicollinearity test results showed that each variable is free from multicollinearity. Meanwhile, the heteroscedasticity test indicated that the residuals are within the specified range (500 and -500), which suggests that the residual variance is equal. As a result, both the heteroscedasticity test and its symptoms showed no issues (Napitupulu et al., 2021: 143).

After the model passes the heteroscedasticity test, the next step is to perform the coefficient of determination (R^2) test. This test aims to calculate the extent to which the independent variables can explain the dependent variable. The higher the R-squared value, the better the model represents the relationship be

Table 4. t-Test, Determination Coefficient Test (R2), and F-Test

Variable	Constand	Coefficient	Std. Error	Prob.
C	4.019143		2.816326	0.0000
PE		-0.037467	0.024389	0.1278
IPM		-0.432520	0.032843	0.0000
TP		0.105954	0.052610	0.0468
R-squared	0.726826			
F-statistic	85.14141			
Prob(F-statistic)	0.000000			

Table 4 shows the results of the coefficient of determination (R^2) test. The R-squared value obtained is 0726826 or 72,6%. This number indicates that the variables of Economic Growth, Human Development Index, and Unemployment Rate can explain 72,6% of Poverty. Meanwhile, the remaining 27,4% is explained by other variables outside the scope of this study's model.

After obtaining the coefficient of determination, the next step is to conduct an F-test. This test is used to identify whether the independent variables can simultaneously influence the dependent variable. In Table 4, the calculated F value is 85,14141 > the F table value of 2,69939, and the significance value is 0,00000 < 0,05. This means that the Human Development Index (HDI), economic growth, and the unemployment rate all simultaneously have an impact on poverty in Sumatra during the 2013-2022 period.

After conducting the F-test and obtaining significant results, the next step is to perform the t-test. The t-test aims to analyze the individual impact of each independent variable on the dependent variable. This test is important to identify which variables have a significant effect individually.

After conducting the R^2 test and the F-test, the next step is to observe the regression equation from the panel data. A better understanding of the relationship between the independent and dependent variables can be achieved with the help of the following regression model equation.

$$KMS = 40.19 - 0.04PE - 0.43IPM + 0.10TP + e$$

Based on the regression estimation results, the constant value of 40,19 indicates that without the influence of the variables Economic Growth (PE), Human Development Index (HDI), and Unemployment Rate (TP), the poverty rate in Sumatra is estimated to be 40,19%. The Economic Growth

coefficient of -0,04 indicates that each 1% increase in economic growth, assuming other variables remain constant, will reduce the poverty rate by 0,04%. However, the t-test results show that economic growth is not significant and does not have an impact on poverty in Sumatra during the 2013-2022 period, with a significance level of 0,1278 > 0,05.

For the Human Development Index (HDI), the coefficient of -0,43 means that a 1% increase in HDI will reduce poverty by 0,43%, with a significant influence of 0,00 < 0,05, indicating that HDI has a significant effect in reducing poverty in Sumatra from 2013 to 2022.

Finally, the Unemployment Rate coefficient of 0,10 indicates that each 1% increase in the unemployment rate will increase poverty by 0,10%. The t-test results show that the unemployment rate has a significant positive effect on poverty, with a significance level of 0,0468 < 0,05. This context indicates that an increase in the unemployment rate has a significant impact in raising poverty in Sumatra during the 2013-2022 period.

Discussion

Based on the panel data regression analysis results, the economic growth variable shows a negative direction, which theoretically means that an increase in economic growth can reduce poverty. However, the t-test results show that the effect of economic growth on poverty in Sumatra during the 2013-2022 period is not significant. This context can be justified by several possibilities. The economic growth that occurred may not have been evenly distributed across all levels of society, or it may have only benefited certain groups without reaching the broader population (Amrullah et al., 2020). This situation often arises when economic growth is not accompanied by equitable income distribution, making its impact on poverty reduction insignificant. A similar finding was also reported by Susanto & Pangesti (2021), where economic growth had a negative but insignificant effect.

In the case of the HDI (Human Development Index) variable, it shows a negative and significant coefficient for poverty, meaning that improvements in human development quality consistently reduce poverty levels. This can be justified because improvements in the three main components of the HDI—education, health, and standard of living—directly enhance human resource quality (Tschudin, 2007). An increase in HDI opens up access to better job opportunities, raises income, and improves overall well-being (Sonu Madan, 2012). Thus, the higher the HDI, the greater the potential for poverty reduction in the region. Similar results were found in studies conducted by Praja et al. (2023) and Azzahra et al. (2022), which indicate that the HDI can enhance human resource quality, allowing communities to better capitalize on opportunities from economic activities, ultimately lowering poverty levels.

A different result was obtained for the unemployment rate variable, which has a positive and significant impact on poverty levels. This finding aligns with the research conducted by Fatmasari (2017). This can be explained because unemployment reflects the inability of a portion of the population to obtain employment and income, which ultimately increases their vulnerability to poverty. A high unemployment rate indicates that many people lack access to productive jobs, thereby worsening their economic conditions and increasing poverty in the region (Prawoto & Selatan, 2009).

Conclusion

Based on the results of the panel data regression analysis for the period 2013-2022, it can be concluded that there are two variables that significantly affect poverty, namely the Human Development Index (HDI) and the unemployment rate, while economic growth has a negative but insignificant effect on poverty in Sumatra Island.

Implications And Recommendations

The government needs to encourage more inclusive economic growth so that its benefits can be felt by all segments of society, especially low-income groups. Income redistribution policies and the creation of equitable job opportunities can help ensure that economic growth has a significant impact on poverty reduction. The improvement of the Human Development Index (HDI) has been proven to reduce poverty in Sumatra, making it crucial for regional governments to continue investing in education, healthcare, and public welfare. On the other hand, the high unemployment rate exacerbating poverty requires solutions through job creation and the development of SMEs and the creative industries. By promoting access to education and job skills, expanding targeted social assistance programs, and fostering collaboration with the private sector for investments, it is hoped that poverty levels in Sumatra can be significantly reduced.

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