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Analysis of the Effect of Economic Growth, Population, and Open Unemployment Rate on the Human Development Index in the Tapal Kuda Region of East Java

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Abstract: This study examines the influence of economic growth, population size, and open unemployment rate on the Human Development Index (HDI) in the Tapal Kuda region of East Java, which includes the districts of Banyuwangi, Bondowoso, Jember, Lumajang, Probolinggo, Pasuruan, and Situbondo during the period 2014–2023. The analysis was conducted using secondary data from the Central Statistics Agency (BPS) employing panel data regression via the Fixed Effects Model (FEM) approach. The findings indicate that economic growth does not have a significant negative impact on the HDI, suggesting that changes in economic growth have not yet notably improved or reduced the quality of life for residents in this region. The population size variable has a significant positive impact, indicating that population growth is accompanied by improved access to education, health services, and living standards. Conversely, the open unemployment rate has a significant negative impact on the HDI, indicating that high unemployment is a barrier to human development progress. Based on these findings, policies that prioritize equitable development, job creation, and improvements in the quality of education and health services are needed to accelerate HDI improvement in the Tapal Kuda region.

Keywords: Human Development Index, Economic Growth, Population, Open Unemployment Rate, Tapal Kuda

Introduction

Human development is an important dimension in measuring the success of regional development. The Human Development Index (HDI) is used to assess human development achievements by taking into account aspects of health, education, and decent living standards. Although the HDI of East Java shows an upward trend every year, the Tapal Kuda region, which consists of Banyuwangi, Jember, Lumajang, Probolinggo, Pasuruan, Bondowoso, and Situbondo, still lags behind other regions such as Greater Surabaya and Greater Malang (BPS, 2023; Muslihatinningsih et al., 2023).

One important measure used to assess the success of human development is the Human Development Index (HDI). This indicator combines three main dimensions, namely health, represented by life expectancy; education, as seen from the average length of schooling and expected length of schooling; and a decent standard of living, measured by per capita expenditure. The higher the HDI value, the better the quality of life of the people

in a region. According to Muslihatinningsih et al. (2023), the HDI provides a more comprehensive picture of the success of human development than relying solely on macroeconomic indicators such as GRDP or economic growth alone (Banase & Purwono, 2024).

Previous research conducted by Rahmanillah (2016) examined the role of government spending on the HDI in Tapal Kuda. The results showed that health budget allocations had a positive effect on the HDI, while spending on education and infrastructure had no significant impact. This indicates that budget management is still not optimal in supporting human development (Rahmanillah, 2016).

Another study conducted by Putera (2024) examined the influence of population size and open unemployment rate on HDI in the Gerbangkertosusilo region. This study found that both variables had a significant effect on HDI, indicating that the quality of human development in urban areas of East Java is largely determined by demographic dynamics and employment conditions (Putera, 2024).

The debate over indicators of socioeconomic development has been going on for a long time. Per capita income, which was once used as a benchmark, is now considered inaccurate, giving rise to new indicators. Moris (1979) developed the Physical Quality of Life Index (PQLI), and the UNDP formulated the Human Development Index (HDI) based on Haq's (1996) ideas. The HDI is defined as the process of expanding people's life choices in three main aspects: life expectancy, education, and standard of living. The UNDP also established four main elements of human development: productivity, equity, sustainability, and empowerment (Setiawan & Hakim, 2008).

According to Effendi (1991), the dimensions of human resources include the number, composition, characteristics, and distribution of the population. These aspects are interrelated, whereby a high level of population dependency and concentration of superior quality in certain areas can pose challenges in human resource development. One approach to development is through the quality of human capital (BPS, 2017). The Human Development Index (HDI) is a tool for assessing the quality of life of the population. In Indonesia, the HDI has improved, but there are still challenges in achieving equitable welfare. Programs for equitable development, education, and health services are very important. Although the national HDI shows progress, there is a gap between urban and rural areas. The quality of education is also still problematic, and economic inequality is an issue due to the uneven distribution of wealth (Efendi et al., 2024).

The Human Development Index (HDI) consists of Life Expectancy, Expected Years of Schooling, Average Years of Schooling, and Real Per Capita Expenditure. In addition, other factors such as the Open Unemployment Rate, Gini Ratio, and Regional Minimum Wage also affect the HDI. This analysis is important for grouping regions based on human

development. Indonesia's HDI continues to increase, with DKI Jakarta being the highest and East Java showing an upward trend. East Java's HDI in 2023 reached 74.65, remaining in the high category (Hartanto et al., 2024).

Furthermore, Aghitsni and Busyra (2022) examined the effectiveness of regional expenditure on human development in the Tapal Kuda region. They found that local government spending on education and health has not been able to optimally improve the HDI. This indicates weaknesses in the planning and implementation of public policies related to human development (Aghitsni & Busyra, 2022).

Meanwhile, Wintardi (2020) emphasized that human development cannot be measured solely by economic growth. According to him, the quality of education and health are important elements that must receive primary attention in improving the HDI. This view is in line with the human development literature that emphasizes the multidimensional role in improving welfare (Wintardi, 2020). However, there is a research gap. Most previous studies only examined a single factor or were limited to one sector, thus failing to provide a comprehensive picture of the simultaneous effects of economic growth, population size, and open unemployment rate on the HDI in the Tapal Kuda region. In fact, these three variables are important determinants that can explain the dynamics of human development.

On the other hand, population growth poses its own challenges to economic growth. The need for jobs, education, and health services is increasing. If not balanced with appropriate development policies, this can hinder improvements in people's welfare. Therefore, accelerating infrastructure development, increasing investment in the industrial sector, and strengthening the quality of human resources are strategic steps to encourage more equitable and sustainable economic growth in the Tapal Kuda region (Antara, 2023).

In addition to population size, the open unemployment rate (TPT) also plays a significant role in influencing the Human Development Index (HDI). TPT shows the percentage of the workforce that has not yet secured employment. High unemployment rates can lead to a decline in family income, limited access to education and health services, and a decline in overall quality of life. These three aspects are closely related to the main components of the HDI, namely life expectancy, education level, and decent living standards. In the Tapal Kuda region, which still relies heavily on the informal sector and traditional agriculture, the high OER is thought to be one of the factors contributing to the low HDI values in several areas. Therefore, the OER variable should be considered in a more comprehensive study of human development (Zakaria, 2018).

This study has several novelties. First, it uses the latest panel data for the 2014–2023 period, which provides an up-to-date picture of human development dynamics in East Java. Second, it focuses on the Tapal Kuda region, which historically has had significant development disparities compared to other regions. Third, this study uses a panel data

regression method with the Gujarati & Porter approach, which is rarely used specifically for HDI analysis at the regional level. Fourth, the variables used are more comprehensive by combining economic (economic growth), demographic (population), and employment (open unemployment rate) aspects simultaneously. Fifth, the results of this study have the potential to provide practical policy implications for local governments in their efforts to accelerate HDI improvement in regions with specific characteristics such as Tapal Kuda (Gujarati & Porter, 2013).

Based on the above description, this study aims to: (1) analyze the effect of economic growth on the HDI in Tapal Kuda, (2) examine the effect of population size on the HDI, and (3) identify the effect of the open unemployment rate on the HDI. This study is expected to contribute theoretically to the literature on human development and serve as an empirical reference for local governments in formulating more targeted development policies.

Research Method

This study utilizes quantitative data in the form of numbers that can be analyzed using statistical methods. The data is used to evaluate the relationship between economic growth, population, open unemployment rate (TPT), and Human Development Index (HDI) in the Tapal Kuda region. In addition, this study also uses secondary data, which is data that has been collected and published by relevant official agencies. Secondary data was chosen because it is easier to obtain, has a wider reach, and is able to provide a more accurate picture of economic and demographic trends in recent years (Siti Nurhadini, 2018).

This research was conducted in the Tapal Kuda region of East Java Province. The region consists of seven districts, namely Banyuwangi, Jember, Lumajang, Probolinggo, Pasuruan, Bondowoso, and Situbondo. This region was chosen because it has a relatively low level of human development compared to other areas in East Java, such as Greater Surabaya and Gerbangkertosusilo.

The type of research used was quantitative research with an explanatory approach. The data used was numerical and obtained from official publications of relevant agencies. The population in this study was all regencies/cities in East Java, while the sample was limited to seven regencies in the Tapal Kuda region, which were determined using purposive sampling based on human development characteristics.

The type of data used is secondary data in the form of the Human Development Index (HDI), economic growth measured by Gross Regional Domestic Product (GRDP) based on constant prices, population, and open unemployment rate. All data were obtained from publications by the East Java Central Statistics Agency and other relevant official sources for the period 2014–2023.

The data collection technique was carried out using the documentation method, which involved compiling data that had been published by official institutions such as the Central Statistics Agency. This technique was chosen because the secondary data was available and could be processed according to the research needs.

The analysis method used was panel data regression. Panel data regression was chosen because it was able to combine time series and cross-sectional data, thereby producing more efficient estimates. The regression model was selected through Chow, Hausman, and Lagrange Multiplier tests to determine the best model between the Common Effect Model, Fixed Effect Model, and Random Effect Model. This analysis technique refers to the econometric approach of Gujarati & Porter (2013).

Results and Discussion

Based on data from the East Java Central Statistics Agency for the period 2014–2023, there were significant variations in human development indicators in the Tapal Kuda region. Economic growth in this region tends to fluctuate, with a sharp decline in 2020 due to the COVID-19 pandemic, but it increased again in 2021–2023. This shows that the region's economy is dependent on certain sectors that are vulnerable to external shocks.

Selection of Panel Data Estimation Model

Chow Test

The Chow test is used to determine whether the regression model used is more appropriately analyzed using a common effect/pooling regression model or a fixed effect model. The hypotheses used are as follows:

a. H_0: Common Effect Model.
b. H_1: Fixed Effect Model.

If the p-value is < 0.05, then the fixed effect model is more appropriate because there are significant differences between districts. Conversely, if the p-value is ≥ 0.05, then the common effect model is sufficient.

Table 1. Chow Test Results

Effect Test	Statistic	d.f.	Prob.
Cross-Section F	3.242317	(6,59)	0.0080
Chi-square	19.663188	6	0.0032

The Chow test results show that the probability value (p-value) for Cross-Section F is 0.0080 and for Chi-square is 0.0032, both of which are below the significance level of 0.05. This indicates rejection of the null hypothesis (H_0), which means that there are significant structural differences between districts in the Tapal Kuda region in terms of their influence on the Human Development Index (HDI). Therefore, the most appropriate model to use is the Fixed Effect Model (FEM).

Hausman Test

The Hausman test was conducted to determine the most appropriate model between the Fixed Effect Model (FEM) and the Random Effect Model (REM) in panel data analysis. The hypotheses used were as follows:

a. H_0: Random Effect Model.
b. H_1: Fixed Effect Model.

If the p-value is less than 0.05, the null hypothesis (H_0) is rejected, indicating that the fixed effect model (FEM) is more appropriate to use. Conversely, if the p-value is equal to or greater than 0.05, then the random effect model (REM) is considered more appropriate.

Table 2. Hausman Test Results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-Section Random	8.619268	3	0.0348

Based on the Hausman test results, a Chi-Square Statistic value of 8.619268 with a p-value of 0.0348 was obtained, which is below the significance level of 0.05. This indicates rejection of the null hypothesis (H_0), so that the fixed effect model (FEM) is more appropriate to apply when compared to the random effect model (REM).

Panel Data Regression Analysis Results

Based on the results of a series of model selection tests, namely the Chow Test and the Hausman Test, it is known that the fixed effect model is the most appropriate estimation model. This conclusion is supported by a p-value below 0.05, indicating a significant difference between districts.

Table 3. Multiple Linear Regression Equation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.13129	5.396131	2.989418	0.0243
X1	-0148840	0.064404	-2.311020	0.0602
X2	3.72E-05	3.88E-06	9.595006	0.0001
X3	0.450750	0.393477	1.145556	0.2956

Based on the multiple linear regression test above, the following regression equation was obtained:

$$\mathbf{IPM_{it} = \alpha + \beta_1 PE_{it} + \beta_2 JP_{it} + \beta_3 TPT_{it} + e_{it}}$$

IPM = 16.1312888852 - 0.148839954521*X1 + 3.71962274218e-05*X2 + 0.450749543856*X3 + e

Description:

HDI_{it} = Human Development Index in district i and year t
E_{it} = Economic Growth in district i and year t
P_{it} = Population in district i and year t

TPT_{it} = Open Unemployment Rate in district i and year t
α = Constant or fixed value
$\beta_1, \beta_2, \beta_3$ = Regression values of each independent variable
e_{it} = Residual variable

Based on this equation, the explanation is as follows:

α = 16.1313 indicates the base value of the Human Development Index (HDI) when all independent variables used, including economic growth (X_1), population (X_2), and open unemployment rate (X_3), are at zero. This means that without the influence of these three variables, the HDI is estimated to be 16.13 points.

β_1 = -0.1488 indicates a negative effect of the economic growth variable on the HDI. In other words, every 1 percent increase in economic growth is associated with a 0.1488 point decrease in the HDI, assuming other variables remain constant. This shows that economic growth may not be evenly distributed or effective enough in improving the overall quality of life of the community.

β_2 = 3.7196 indicates a positive effect of population size on the HDI. This means that if the population increases by 1 million people (or according to the unit used in the model), assuming other variables remain constant, the increase in population will result in a 3.7196 point increase in HDI. Although this increase is relatively small, it shows that population growth in the region may be accompanied by increased access to education, health services, and living standards, which are the main components of HDI.

β_3 = 0.4507 shows the positive effect of the open unemployment rate on the HDI, indicating that every 1 percent increase in the open unemployment rate is associated with a 0.4507 point increase in the HDI, assuming other variables remain constant. This finding is theoretically unusual and may indicate that an increase in unemployment may occur among people who previously had access to education and health care, thereby not directly lowering the HDI value.

Classical Assumption Test

Multicollinearity Test

The multicollinearity test is conducted to determine whether there is a strong linear relationship between the independent variables in the regression model.

Table 4. Multicollinearity Test Results

	X1	X2	X3
X1	1.000000	0.035427	-0.172111
X2	0.035427	1.000000	0.513915
X3	-0.172111	0.513915	1.000000

The results of the multicollinearity test show that there are no signs of multicollinearity in the regression model. The correlation values between independent variables are all below 0.85, with a weak relationship between economic growth and population (0.035), as well as economic growth and open unemployment (-0.172). The correlation between population and open unemployment (0.514) is moderate but still reasonable. Thus, the regression model is suitable for further analysis.

Heteroscedasticity Test

A heteroscedasticity test was conducted to determine whether the variance of the error in the regression model was constant (homoscedasticity) or not (heteroscedasticity).

Table 5. Heteroscedasticity Test Results

Variable	Prob.
C	0.1883
X1	0.6199
X2	0.1274
X3	0.1507

The results of the heteroscedasticity test show that the regression model is free from heteroscedasticity. All variable probability values (C = 0.1883; X_1 = 0.6199; X_2 = 0.1274; X_3 = 0.1507) are greater than 0.05, so there is no indication of a strong linear relationship between the independent variables. Thus, the regression model is deemed suitable for use.

Statistical Test

Table 6. Statistical Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.13129	5.396131	2.989418	0.0243
X1	-0.148840	0.064404	-2.311020	0.0602
X2	3.72E-05	3.88E-06	9.595006	0.0001
X3	0.450750	0.393477	1.145556	0.2956
Effects Specification				
Cross-section fixed (dummy Variable)				
R-squared	0.676476	Mean dependent var	67.29786	
Adjusted R-squared	0.627948	S.D. dependent var	2.919656	
S.E. of regression	1.780876	Akaike info criterion	4.123652	
Sum squared resid	190.2912	Schwarz criterion	4.444865	
Log likelihood	-134.3278	Hannan-Quinn criter.	4.251242	
F-statistic	13.93975	Durbin-Watson stat	0.466785	
Prob(F-statistic)	0.000000			

Based on the statistical test results table above:

Coefficient of Determination (R^2)

The coefficient of determination is used to measure the extent to which the variables of economic growth, population, and open unemployment rate explain changes in the Human Development Index (HDI). This value indicates how well the regression model used is able to describe the relationship between these variables. The higher the R^2 value, the greater the influence of these three variables on the HDI in the Tapal Kuda region.

Table 7. Results of the Coefficient of Determination (R^2) Test

Dependent Variable	Independent Variable	R-squared
Human Development Index (Y)	Economic Growth (X1) Population (X2) Open Unemployment Rate (X3)	0.627948

F Test (Simultaneous)

The F test in multiple linear regression is used to test the simultaneous significance of all independent variables on the dependent variable. This means that the test is used to determine whether, collectively (simultaneously), variables X_1, X_2, and X_3 have a significant effect on variable Y (for example, HDI). The F-test results show that the F-statistic is 13.93975 with a probability value of 0.000000. Because this probability value is far below the significance level of 0.05, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. Compared to the F-table at $\alpha = 0.05$, which is 2.4268, it can be seen that the calculated F of 13.93975 is greater than the F-table. This indicates that the regression model used is statistically significant, indicating that the independent variables simultaneously affect the dependent variable.

T-test (Partial)

The t-test is used to assess whether each independent variable in the regression model has a significant individual effect on the dependent variable. In this context, the t-test aims to assess the individual effects of economic growth, population size, and open unemployment rate on the Human Development Index (HDI).

Table 8. T-test Results

Variable	Count	Table	Prob.
Economic Growth (X1)	-2.311020	1,995469	0.0602
Population (X2)	9.595006	1,995469	0.0001
Open Unemployment Rate (X3)	1.145556	1,995469	0.2956

The Effect of Economic Growth on the Human Development Index in the Tapal Kuda Region

The results of panel data regression testing show that the Economic Growth variable has a probability of 0.0602, which is greater than the significance level of 0.05, and a t-value of -2.311020, which is outside the t-table ±1.995469, with a negative direction of influence. Statistically, this shows that Economic Growth does not have a significant negative effect on the Human Development Index (HDI) in the Tapal Kuda region. In other words, even though there is economic growth in the region, this increase has not fully contributed to improving the quality of life of the community evenly, especially in terms of education, health, and living standards. This finding is in line with the research by Umiyati et al. (2017), which found that economic growth in several regions in Indonesia does not always have a significant effect on the HDI, especially if it is not accompanied by policies of equitable development and improved access to basic services.

The Effect of Population Size on the Human Development Index in the Tapal Kuda Region

Based on the results of panel data regression testing and t-test curve interpretation, it is known that the Population variable has a t-value of 9.595006, which is much greater than the t-table value of 1.995469, and a probability value of 0.0001, which indicates high significance at a 95% confidence level. Thus, it can be concluded that, partially, Population has a positive and significant effect on the Human Development Index (HDI) in the Tapal Kuda Region. This means that regions with large populations tend to have better HDI achievements, as long as this is accompanied by an increase in the quality of human resources. The results of this analysis are in line with Zakaria's (2018) research, which states that population size has a significant effect on HDI, especially when a large population can be utilized optimally. In the Tapal Kuda region, the large population size is a strategic potential that can increase HDI if supported by equitable access to education, health services, and adequate employment opportunities.

The Effect of Open Unemployment Rate on the Human Development Index in the Tapal Kuda Region

Based on the t-test results shown in the curve, it can be seen that the Open Unemployment Rate variable has a t-value of 1.145556, which is smaller than the t-table value of 1.995469, and a probability value of 0.2956, which is greater than the significance level of 0.05. Therefore, it can be concluded that individually, the Open Unemployment Rate does not have a significant effect on the Human Development Index (HDI) in the Tapal Kuda Region. These results are in line with the research by Dewi et al. (2017), which shows

that the unemployment rate does not always have a significant effect on the HDI, especially in regions that still face development inequalities or limitations in the creation of formal employment.

Conclusion

The results of data analysis using panel regression methods in this study show a significant relationship between a number of independent variables and the Human Development Index (HDI) in the Tapal Kuda region, East Java. The results of the study show that the variables of Economic Growth, Population, and Open Unemployment Rate collectively have a significant effect on the Human Development Index (HDI) in the Tapal Kuda region. However, individually, only the Population variable shows a significant effect. These findings indicate that human development in the region is not only influenced by economic factors, but also by social and employment dynamics. Therefore, efforts to increase the HDI need to be carried out in an integrated manner through equitable distribution of development outcomes, improvement of human resource quality, and provision of inclusive employment opportunities so that community welfare can be achieved equitably and sustainably.

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