Available online at https://journal.rescollacomm.com/index.php/ijqrm/index

International Journal of Quantitative Research and Modeling

e-ISSN 2721-477X
p-ISSN 2722-5046

Vol. 6, No. 3, pp. 298-306, 2025

Multiple Linear Regression Analysis of Factors Influencing Human Development Index By Regency/City in East Java Province in 2024

Nurul Itsnaini[1], Agung Prabowo[2*], Diah Paramita Amitarwati[3]

[1]*Mathematics Study Program, Faculty of Mathematics and Natural Sciences, Universitas Jenderal Soedirman, Purwokerto, Indonesia*
[2]*Statistics Study Program, Faculty of Mathematics and Natural Sciences, Universitas Jenderal Soedirman, Purwokerto, Indonesia*
[3]*Sharia Economics Study Program, Faculty of Islamic Economics and Business, UIN Saifuddin Zuhri, Purwokerto, Indonesia*

**Corresponding author email: agung.prabowo@unsoed.ac.id*

Abstract

The Human Development Index (HDI) is an indicator used to assess the success of human development. The Human Development Index (HDI) is used to measure the impact of efforts to improve basic human capital capabilities. Based on BPS data, the HDI in East Java has consistently increased and has reached a high category, however, when compared to DKI Jakarta and DI Yogyakarta, the HDI in East Java is still relatively low. This study aims to determine the factors that influence the HDI in East Java Province. The research data are the 2024 HDI data for East Java Province obtained from the BPS of Lamongan Regency and the BPS website of East Java Province. This study uses the multiple linear regression method with RStudio software. Based on the results of the study, the multiple linear regression model with HLS, RLS, UHH, and GK factors has an influence of 97.94% on the HDI in East Java Province, while the TPT does not show a significant influence on the HDI in East Java Province.

Keywords: Human Development Index, East Java, Multiple Linear Regression

1. Introduction

One of the government's efforts to improve people's welfare and improve the quality of a region is development (Puspitasari et al., 2021). Development is a process of change that is always attempted to improve the welfare of the people in a region (Alkhoiriyah & Sa'roni, 2021). According to Dwi et al. (2021) In the development and economic process, the government has made the quality of human resources its basic module (Alkhoiriyah & Sa'roni, 2021). believes that human resources play an important role in creating development that aims to make society healthy and able to lead a productive life.

Human development basically has four main components, namely: empowerment, productivity, justice, and sustainability.(Wahyudi et al., 2023)By optimizing these four factors, human development can be successful. Successful human development means that a country's people have the opportunity to live longer and healthier lives, receive a decent education, and utilize their knowledge in productive activities.

One indicator that can be used to measure the success of development implementation is the Human Development Index (HDI). According to Fitriyah et al. (2021) The Human Development Index can be used as a benchmark to assess the success of efforts to improve the quality of life in a region. The Human Development Index is crucial information used to measure government performance and allocate resources for the General Allocation Fund (DAU).(Arum et al., 2023).

East Java is one of six provinces on the island of Java. According to Statistics Indonesia (BPS) data, the Human Development Index (HDI) of East Java Province has consistently increased from 2022 to 2024. In 2024, the Human Development Index (HDI) in East Java reached 75.35. This figure is higher than the HDI of Central Java (73.87) and West Java (74.92). However, when compared to the HDI of Yogyakarta Special Region (81.62), Jakarta Special Region (84.15), and Banten (76.35), East Java's HDI is still relatively lower. Given the importance of the Human Development Index (HDI) in a region, particularly in East Java, an analysis of the HDI is necessary. This analysis can be conducted statistically by identifying factors that have a significant influence on the HDI. One statistical method that can be used to achieve this research objective is multiple linear regression analysis.

There are several previous studies on HDI, including: (Arum et al., 2023) in his research examined the factors that influence the Human Development Index based on Regency/City in Central Java in 2022. The research used multiple linear regression analysis with the variables used being the Human Development Index (Y), Life Expectancy (X1), Expected Years of Schooling (X2), Average Years of Schooling (X3), and Per Capita Expenditure (X4). The results of the study showed that the variables of life expectancy, expected years of schooling, average years of schooling, and per capita expenditure had a significant effect on the human development index in 2022 and the coefficient of determination or R-Square value was 99.9%.

Other research, namely Puspitasari et al. (2021) which examines the robust regression model for the Human Development Index in East Java with M Estimation in 2019. The variables used in the study are HDI as the dependent variable and life expectancy, average years of schooling, expected years of schooling, and per capita income as independent variables. In the study there are outlier data so that the distribution of the residuals is not normal, therefore a robust regression analysis was conducted to overcome the outliers. The results of the study obtained a determination coefficient value of 99.91% and all independent variables have a significant effect on the HDI.

The objectives of this research are:

a) Analyzing the factors that influence the human development index by Regency/City in East Java Province in 2024;
b) Obtaining a multiple linear regression model for factors influencing the Human Development Index by Regency/City in East Java Province in 2024 using RStudio software.

2. Literature Review

2.1. Human Development Index

The Human Development Index is an indicator used to assess the success of human development (Susanti & Saumi, 2022). According to Hasibuan et al. (2020) the concept of human development was first introduced by the United Nations Development Programmed (UNDP) in 1990, in its report "Global Human Development Report" which states that human development is defined as the process of expanding individual choices so that they have the opportunity to live a healthy and long life, acquire sufficient knowledge and skills, so that they can utilize these skills in productive activities to improve their quality of life.

The Human Development Index (HDI) is constructed through a three-dimensional approach: a long and healthy life, knowledge, and a decent standard of living. According BPS 2025, human development achievements in a region at a certain time are grouped into four groups, namely:

a) Very High Group : HDI ≥ 80
b) High Group : 70 ≤ HDI ≤ 80
c) Medium Group : 60 ≤ HDI ≤ 70
d) Lower Group : HDI < 60

2.2. Regression Method

2.2.1. Simple Linear Regression

According to Wahyudi et al. (2023) Simple linear regression analysis is an approach method for modeling the relationship between one dependent variable and one independent variable. As for according to Montgomery et. al. (2021) The form of the simple linear regression model equation is:

$$Y = \beta_0 + \beta_1 X + \varepsilon \quad (1)$$

with:

Y : vbound variables
β_0 : constant (intercept)
β_1 : kregression coefficient (slope)
X : vindependent variables
ε : standard error

2.2.2. Multiple Linear Regression

The multiple linear regression method is a development of simple linear regression. In simple linear regression, only one independent variable is used, while in multiple linear regression, more than one independent variable is used (Arum et al., 2023). According to Maharadja et al. (2021) Multiple linear regression is a method for making predictions involving two or more variables: an influencing variable and an affected variable. These variables are interrelated or have a causal relationship (Daniya et al., 2020). The form of the multiple linear regression model equation is:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + \varepsilon_i \quad (2)$$

with:

Y_i : vbound variables
X_{ki} : vindependent variables
$\beta_0, \ldots, \beta_k$: kregression coefficient
ε_i : *error*

2.3. Classical Assumption Test

2.3.1. Normality Test

According to Mardiatmoko (2020) The normality test is used to determine whether residual values are normally distributed. A good regression model is one with normally distributed residual values. Normality tests can be performed using statistical tests such as Kolmogorov-Smirnov, Shapiro-Wilk, etc. The hypotheses used are:

a) H0: Residuals are normally distributed
b) H1: Residuals are not normally distributed

Furthermore, the testing criteria are as follows:

a) If p-value > α, then H_0 is accepted
b) If p-value < α, then H_0 is rejected

2.3.2. Multicollinearity Test

According to Anastashya et al. (2023) Multicollinearity testing is a test that aims to determine whether there is a correlation between independent variables in a regression model. To determine the presence of multicollinearity, the Variance Inflation Factor (VIF) value is used. According to (Susanti & Saumi, 2022) if the VIF value is < 10 then it is free from multicollinearity and if $VIF > 10$ then multicollinearity occurs.

2.3.3. Autocorrelation Test

According to Susanti and Saumi (2022) the autocorrelation test aims to test whether in a linear regression model there is a correlation between the error of the disturbance in period t and the error in the previous t-1. According to Mardiatmoko (2020) autocorrelation testing can be performed using the Durbin-Watson (DW) test. Other methods include the Breusch-Pagan test, the Run Test, and others. The criteria for autocorrelation testing in regression analysis are shown in Table 1:

Table 1 : Durbin-Watson Test Criteria

Durbin-Watson Statistical Value	Results
$0 < d < dL$	positive autocorrelation occurs.
$dL \leq d \leq dU$	without decision.
$dU \leq d \leq (4 - dU)$	there is no positive/negative correlation.
$(4 - dU) \leq d \leq (4 - dL)$	without decision.
$(4 - dL) \leq d \leq 4$	negative autocorrelation occurs.

with:

d : Durbin-Watson Value
dL : Durbin-Watson Lower Bound
dU : Durbin-Watson Upper Limit

2.3.4. Heteroscedasticity Test

According to Mardiatmoko (2020) heteroscedasticity is a condition where there is inequality in the variance of the residuals for all observations in the regression model. According to Susanti and Saumi (2022) heteroscedasticity testing can be done using the scatterplot method by observing the points in the image. If the points in the image are spread out around 0 on the Y-axis and do not form a pattern, heteroscedasticity does not occur.

2.4. Model Feasibility Test

2.4.1. Simultaneous Test (F Test)

According to Susanti and Saumi (2022) the F test is used to determine whether or not there is a joint or simultaneous influence between independent variables on the dependent variable. The hypothesis used is:

a) H_0 : $\beta_1 = \beta_2 = \cdots = \beta n = 0$ (no significant effect)
b) H_1 : there is $\beta_i \neq 0, i = 1,2, \ldots, n$ (significant impact)

Furthermore, the decision criteria for simultaneous testing are:

a) If $F_{count} > F_{\text{table}}$, then H_0 is rejected
b) If $F_{count} < F_{\text{table}}$, then H_0 is accepted

2.4.2. Coefficient of Determination (R2)

According to Mardiatmoko (2020) determination analysis is a measure that shows how much variable X contributes to variable Y. A small R^2 value means that the ability of the independent variable is very limited in explaining the variation in the dependent variable (Anastashya et al., 2023).

3. Research Methods

The method used in this research is a literature study method, namely the researcher conducted a literature study by searching, studying, and also understanding material on the Human Development Index (HDI) and multiple linear regression methods from various sources such as journals, e-books, theses, and other references. The data used in this report is secondary data on the Human Development Index (HDI) in East Java Province obtained from the BPS Lamongan Regency and the official website of the BPS East Java Province.

The dependent variable used is the Human Development Index (Y), while the independent variables consist of 4 variables, namely the Open Unemployment Rate (X1), Expected Years of Schooling (X2), Average Years of Schooling (X3), Life Expectancy (X4), and Poverty Line (X5). The data analysis used is multiple linear regression analysis with data processing using RStudio.

The stages in this research include data collection and determining the independent and dependent variables to be analyzed. The next step is to conduct classical assumption tests, including normality, multicollinearity, autocorrelation, and heteroscedasticity. After ensuring that all classical assumptions are met, model feasibility tests are conducted using simultaneous tests (F tests), partial tests (t tests), and the coefficient of determination (R2).

4. Results and Discussion

4.1. Data

The data used in this report is secondary data on the Human Development Index (HDI) in East Java Province in 2024. The data is available in Table 2.

Table 2 : Human Development Index (HDI) Data in East Java Province in 2024

No.	Regency/City	HDI (%)	TPT (%)	HLS (th)	RLS (th)	UHH (th)	Poverty Line (Rp/Month/Capita)
1.	Pacitan Regency	71.49	1.56	12.69	7.90	74.74	370,643
2.	Ponorogo Regency	73.70	4.19	13.78	7.80	75.28	413,619
3.	Trenggalek Regency	72.47	3.90	12.63	7.92	75.35	434,146
4.	Tulungagung Regency	75.13	4.12	13.36	8.68	75.20	447,793
5.	Blitar Regency	73.44	4.77	12.67	7.87	75.32	408,399
6.	Kediri Regency	75.18	5.10	13.63	8.26	75.07	403,621
7.	Malang Regency	73.53	5.13	13.49	7.80	75.34	420,334
8.	Lumajang Regency	70.31	3.28	12.41	7.27	74.57	405,136
9.	Jember Regency	70.93	3.23	13.50	6.54	74.17	459,043
10.	Banyuwangi Regency	74.30	4.03	13.14	7.78	74.13	470,713
11.	Bondowoso Regency	71.22	3.63	13.33	6.53	73.31	517,741
12	Situbondo Regency	71.22	3.15	13.20	6.93	73.36	413,611
13.	Probolinggo Regency	70.85	3.00	12.64	6.31	73.93	537,724
14.	Pasuruan Regency	72.36	5.02	12.78	7.46	74.61	450,088
15.	Sidoarjo Regency	82.67	6.49	15.22	10.91	75.63	597,284
16.	Mojokerto Regency	76.69	3.87	12.99	9.13	74.95	508,618
17.	Jombang Regency	75.67	3.75	13.61	8.78	74.64	514,170
18.	Nganjuk Regency	75.24	3.87	13.18	8.25	74.64	539,714
19.	Madiun Regency	74.81	4.34	13.27	8.20	74.79	460,205
20.	Magetan Regency	76.77	3.28	14.08	8.69	75.42	455,119
21.	Ngawi Regency	73.91	2.40	12.89	7.84	75.21	445,865
22.	Bojonegoro Regency	72.75	4.42	13.18	7.59	74.91	471,457
23.	Tuban Regency	72.31	4.28	12.54	7.53	74.95	488,131
24.	Lamongan Regency	75.90	4.34	14.03	8.48	75.07	524,636
25.	Gresik Regency	78.93	6.45	13.98	10.03	74.48	608,828
26.	Bangkalan Regency	67.33	5.35	11.98	6.01	73.43	547,017
27.	Sampang Regency	66.72	2.50	12.55	5.08	73.66	491,753
28.	Pamekasan Regency	70.85	1.64	13.69	7.17	73.66	467,493

No.	Regency/City	HDI (%)	TPT (%)	HLS (th)	RLS (th)	UHH (th)	Poverty Line (Rp/Month/Capita)
29.	Sumenep Regency	69.78	1.69	13.59	6.10	73.86	506,569
30.	Kediri City	81.88	3.91	15.71	10.92	75.94	621,051
31.	Blitar City	81.44	5.11	14.81	10.82	75.20	596,105
32.	Malang City	84.68	6.10	15.79	11.14	75.54	706,341
33.	Probolinggo City	77.79	4.44	13.98	9.72	74.31	654,409
34.	Pasuruan City	78.90	4.63	13.67	9.94	74.86	554,195
35.	Mojokerto City	81.76	3.76	14.13	11.38	75.99	610,968
36.	Madiun City	84.51	4.30	14.54	12.11	75.67	637,838
37.	Surabaya City	84.69	4.91	14.87	10.89	76.02	742,678
38.	Batu City	79.69	3.63	14.58	9.87	75.36	642,778

4.2. Classical Assumption Test

4.2.1. Normality Test

a. Hypothesis
H0: Residuals are normally distributed
H1: The residuals are not normally distributed.
b. Test Statistics
The Shapiro-Wilk test with RStudio gives the results in Table 3.

Table 3. Shapiro-Wilk Test Results with RStudio

W	*p-value*
0.97911	0.6859

c. Significance Level
$\boldsymbol{\alpha = 5\% = 0,05}$
d. Decision
Based on Table 3, p-value (0.6859) >$\boldsymbol{\alpha}$(0.05), then H0 is accepted.
e. Conclusion
It can be concluded that the residuals are normally distributed (normal data distribution).

4.2.2. Multicollinearity Test

From the multicollinearity output results in Table 4, the VIF value for variable X1 is 1.367052; X2 is 3.102448; X3 is 6.114509; X4 is 2.985974; and X5 is 2.725217. The VIF value of each variable is less than 10, so it can be concluded that there is no multicollinearity in the data.

Table 4: Multicollinearity Test Results with RStudio

	X_1	X_2	X_3	X_4	X_5
VIF	1,367052	3,102448	6,114509	2.985974	2,725217

4.2.3. Autocorrelation Test

a. Hypothesis
H0: Residuals are independent (there is no autocorrelation)
H1: Residuals are mutually dependent (there is autocorrelation)
b. Test Statistics
The Durbin-Watson test with RStudio gives the results in Table 5.

Table 5: Durbin-Watson Test Results with RStudio

DW	*p-value*
1,4279	0.01455

In the Durbin-Watson table:
n (number of data) = 38
k (number of independent variables +1) = (5+1) = 6
dL (Durbin Watson lower limit) = 1.1463
dU (Durbin Watson upper limit) = 1.8641

c. Significance Level
$\alpha = 5\% = 0,05$

d. Decision
dL d dU≤≤
1.1463 1.4279 1.8641≤≤
e. Conclusion
Thus, no conclusion can be drawn because it is an area of doubt/no decision

4.2.4. Heteroscedasticity Test

Based on the Residual vs Fitted graph in Figure 1 produced by RStudio, it can be seen that the data distribution is spread out and does not form a certain pattern or gather at a certain point, so it can be concluded that heteroscedasticity does not occur.

4.3. Model Feasibility Test

4.3.1. Simultaneous Test (F Test)

a. Hypothesis
H0: $\beta_1 = \beta_2 \ldots = \beta_5 = 0$, meaning that the independent variables simultaneously do not have a significant effect.
H1: $\beta_i \neq 0, i = 1,2, \ldots,5$, meaning that the independent variables simultaneously have a significant influence.
b. Test Statistics
The F test with RStudio gives the results in Table 6.

Table 6: Test Results F with RStudio

F_{count}	F_{table}
304.2	2,512255

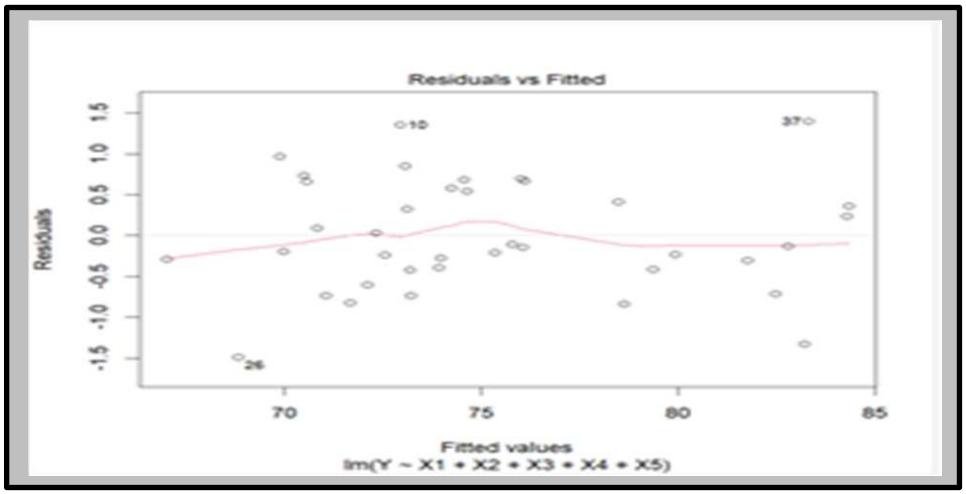

Figure 1: Residual vs Fitted

c. Significance Level
$\alpha = 5\% = 0{,}05$
d. Decision
F_{count} (304.2) > F_{table} (2.512255), then H0 is rejected.
e. Conclusion
Thus, it can be concluded that the independent variables simultaneously have a significant influence in the model.

4.3.2. Partial Test (t-Test)

a. Hypothesis
H0: $\beta_1 = \beta_2 \ldots = \beta_5 = 0$, meaning that there is no influence of the first independent variable on the dependent variable.
H1: $\beta_i \neq 0, i = 1,2, \ldots,5$, meaning that there is an influence of the first independent variable on the dependent variable.
b. Test Statistics

The t-test with RStudio gives the results in Table 7.

Table 7: Test Resultst with RStudio

	X_1	X_2	X_3	X_4	X_5
t_{count}	1,322	4,112	10,505	2,150	2,803
t_{table}	2.036933	2.036933	2.036933	2.036933	2.036933

c. Significance Level
$\alpha = 5\% = 0{,}05$
d. Decision criteria
If $t_{count} > t_{table}$ or $t_{count} < -t_{table}$, then H0 is rejected.
e. Conclusion
Based on Table 4.10, the independent variable X1 shows that t count < t table, so H0 is accepted, meaning there is no influence of the independent variable X1 on the dependent variable Y. Furthermore, variables X2, X3, X4 and X5 show that each t count > t table, so H0 is rejected, meaning there is an influence of the independent variables X2, X3, X4 and X5 on the dependent variable Y.

4.3.3. Coefficient of Determination

Based on the output in Table 8 obtained from RStudio (Figure 2), the independent variables in the model have an influence of 0.9794 or 97.94% on the dependent variable, and the remainder is influenced by other variables not included in the model.

Table 8: Results of the Determination Coefficient Test with RStudio

Multiple R-squared	Adjusted R-squared
0.9794	0.9762

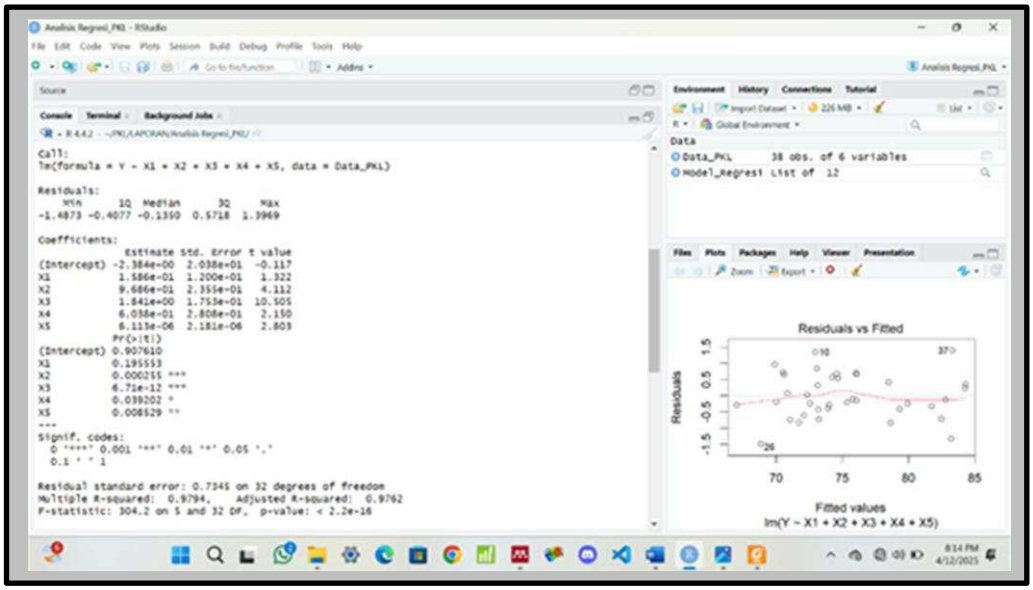

Figure 2: RStudio Output for Regression Coefficient and Determination Coefficient

4.4. Multiple Linear Regression

Based on the results of processing and analysis carried out with RStudio (Figure 2), the multiple linear regression model obtained is as follows:

$$Y = -2.384125465 + 0.158604007\,X_1 + 0.969587362\,X_2 + 1.841493941\,X_3 + 0.603813921\,X_4 + 0.000006113\,X_5$$

It can be interpreted that:

a) The intercept value obtained is -2.384125465. This indicates that when all independent variables are zero, the predicted value of Y is approximately -2.384125465;
b) The coefficient value for the TPT (X1) variable is 0.158604007. This shows that every 1% increase in TPT (X1) will increase the HDI by 0.158604007;

c) The coefficient value for the HLS variable (X2) is 0.969587362. This shows that every 1-year increase in HLS (X2) will increase the HDI by 0.969587362;
d) The coefficient value for the RLS variable (X3) is1.8414939941. This shows that every 1-year increase in RLS (X_3) will increase the HDI by 1.8414939941;
e) The coefficient value for the UHH variable (X_4) as big as 0.6038133921. This shows that every 1-year increase in UHH (X4) will increase the HDI by 0.6038133921;
f) The coefficient value for the GK variable (X5) is0.000006113. This shows that every 1 unit increase in GK (X_5) will increase the HDI by 0.000006113.

5. Conclussion and Suggestions

Based on the results of multiple linear regression analysis and model feasibility test, it was found that the variables that significantly influence the HDI at a 5% significance level are the Expected Years of Schooling (HLS), Average Years of Schooling (RLS), Life Expectancy (UHH), and Poverty Line (GK). Meanwhile, the Open Unemployment Rate (TPT) variable did not show a significant influence on the HDI because the calculated t value was smaller than the t table.

This study shows that increases in variables that significantly influence the HDI tend to have a positive impact, particularly in education and health. The higher the expectations, average years of schooling, and life expectancy, the higher the HDI value in a region. Conversely, an increase in the poverty line has a negative impact on the HDI, making poverty alleviation efforts crucial.

The suggestions for this research are:

a) The addition of other relevant variables, such as labor force participation rate, per capita expenditure, or economic growth, can be considered in subsequent research.
b) Use of data over a longer time span to provide more comprehensive and dynamic results;
c) The use of other analysis methods, such as panel data regression or logistic regression with each variable adjusted

References

Anastashya, M., Putri, AE, Pinaringan, GA, & Hendrawati, T. (2023). Factors Influencing the Human Development Index in Indonesian Provinces. Proceedings of the National Seminar on Actuarial Statistics, 2(1), 150-156.doi:https://doi.org/10.1234/snsa.v2i1.349

Arum, PR, Fitri, Y., & Arum, PR (2023). Analysis of Factors Influencing the Human Development Index by Regency/City in Central Java. J Statistika: Scientific Journal of Statistics Theory and Application, 16(1), 424–433. https://doi.org/10.36456/jstat.vol16.no1.a7079.

BPS. (2025). Human Development Index (HDI) according to Indicators in Samarinda City, 2022-2024. https://samarindakota.bps.go.id/id/statistics-table/2/MTA0IzI=/-metode-baru-indeks-pembangunan-manusia-ipm-menurut-indikator-di-kota-samarinda.html

Dwi, NC, Muchtolifah, & Sishadiyati. (2021). Factors of the Human Development Index in East Java Province. Jambura Economic Education Journal, 3(2), 93–101.

Daniya, T., Geetha, M., Santhosh Kumar, B., & Cristin, R. (2020). Least square estimation of parameters for linear regression. International Journal of Control and Automation, 13(2), 447–452.

Alkhoiriyah, F., & Sa'roni, C. (2021). The Effect of Human Development Index (HDI) and Unemployment on Economic Growth in Banjarmasin City. Journal of Economics and Development, 4(2), 299–309.

Fitriyah, Z., Irsalina, S., K, ARH, & Widodo, E. (2021). Analysis of Factors Influencing HDI Using Multiple Linear Regression. Lebesgue Journal: Scientific Journal of Mathematics Education, Mathematics and Statistics, 2(3), 282–291. https://doi.org/10.46306/lb.v2i3.86

Hasibuan, SL, Rujiman, & Sukardi. (2020). Analysis of the Determinants of the Human Development Index (HDI) in Indonesia. Journal of Social and Humanitarian Education Research, 5(2), 139–141.

Maharadja, AN, Maulana, I., & Dermawan, BA (2021). Application of Multiple Linear Regression Method to Predict State Losses Based on Corruption Crime Cases. Journal of Applied Informatics and Computing (JAIC), 5(1), 95–102.

Mardiatmoko, G. (2020). The Importance of Classical Assumption Testing in Multiple Linear Regression Analysis (A Case Study of Allometric Equations for Young Canaries [Canarium Indicum L.]). Barekeng: Journal of Applied Mathematics and Sciences, 14(3), 333–342. https://doi.org/10.30598/barekengvol14iss3pp333-342

Montgomery, D. C., Peck, E. A., & Vining, G. G. (2021). Introduction to Linear Regression Analysis. John Wiley & Sons.

Puspitasari, MTS, Susanti, Y., & Handajani, SS (2021). Robust Regression Model for Human Development Index in East Java with M. PRISMA Estimation, Proceedings of the National Mathematics Seminar, 4(01), 659–665.

Susanti, I., & Saumi, F. (2022). Application of Multiple Linear Regression Analysis Method to Overcome Multicollinearity Problems in the Case of Human Development Index (HDI) in Aceh Tamiang Regency. Gamma-Pi: Journal of Mathematics and Applied Mathematics, 4, 10–17.

Wahyudi, H., Naufal, F., Pongoh, FW, & Amelia, R. (2023). Analysis of Factors Influencing the Human Development Index in East Kalimantan. Semiotics: National Seminar on Information Technology and Mathematics, 2, 121–135.