



## Unveiling development gaps: A comprehensive analysis of human development index in Indonesia and Thailand

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### Abstract

The research from 1991 to 2021 compares human development progress in Indonesia and Thailand while analyzing factors influencing their Human Development Index (HDI). The study uncovers significant disparities by employing independent difference tests and Autoregressive Distributed Lag. Indonesia exhibits rapid economic growth yet faces health and educational inequalities. Thailand boasts a higher average HDI (0.70) than Indonesia's (0.63), signaling pronounced developmental gaps. ARDL analysis identifies distinct factors shaping HDI in each nation. Long-term impacts in Indonesia stem from increased life expectancy and education, while Thailand benefits from GDP and investment. Short-term effects reveal Indonesia's positive response to previous GDP changes, while Thailand experiences initial negativity but long-term positivity. Policy recommendations stress Indonesia's need to enhance investment, economic growth, health access, and education quality to narrow the HDI gap. Equitable wealth distribution and heightened investments in health and education are pivotal for achieving inclusive and sustainable human development.

**Keywords:** Human development index; Indonesia; Thailand; ARDL Model, JEL classification: E60, E62, E63

### Introduction

The Human Development Index (HDI) is a measure that assesses a country's development based on indicators such as health, education, and living standards. It provides a global comparison of human development progress over time and across countries. HDI is used to rank and categorize countries based on their HDI scores. HDI is essential for policymakers, development thinkers, and advocates to understand and track a country's human development profile (Cambel, 2020<sup>[3]</sup>; Comes, 2015<sup>[5]</sup>; Sarbu, 2015)<sup>[13]</sup>. The inequality in human development is visible between Indonesia and Thailand. Even though both countries have experienced increased HDI in the last decade, Thailand is still far ahead, with a score of 87.25 compared to Indonesia's 74.39 (UNDP, 2023). Several factors influence this gap. Higher life expectancy, longer average years of schooling, and greater GDP per capita contribute to Thailand's superiority.

The striking difference between Indonesia's and Thailand's Human Development Index (HDI) creates an urgent need for research on human resource investment to advance human development in Indonesia. These challenges are reflected in variations in critical dimensions of human development. One of the problems faced in human capital investment is inadequate total investment and irrational investment structures in rural areas, as highlighted by Zhang *et al.* (2011)<sup>[29]</sup>. Another problem is the widening gap between the number of health workers needed and their availability, especially in low- and middle-income countries, as mentioned by Patel and Gilbert (2018)<sup>[10]</sup>. Sawkins (2017)<sup>[14]</sup> discusses inequalities in employment opportunities and challenges faced by individuals with disabilities or lower intellectual abilities. Maiga (2023)<sup>[8]</sup> shows gaps and inadequate investment in education, training, health, and nutrition in Africa. Finally, human

resource development strategies in various countries highlight the need for improvement in achieving achievements commensurate with the country's potential.

Previous research shows that factors contributing to an increase in the Human Development Index (HDI) include economic growth, government spending on education, and reduced inflation (Nurlina *et al.*, 2023)<sup>[9]</sup>. These factors have been found to have a positive and significant effect on HDI in both the long and short term (Sukmawati, 2022)<sup>[17]</sup>. In addition, a decent standard of living has been identified as a dimension that significantly contributes to achieving HDI (Wasudewa, 2022)<sup>[24]</sup>. GRDP per capita has a positive relationship with HDI, while the prevalence of early marriage has a negative relationship with HDI (Christyadi *et al.*, 2020)<sup>[4]</sup>. Overall, stable economic growth and increased government spending on education and health are essential for increasing the HDI. This shows that various factors contribute significantly to increasing the Human Development Index (HDI). In Indonesia, stable economic growth, increased government spending on education, and addressing social problems such as early marriage are vital points that positively impact HDI.

In contrast, in Thailand, government spending on health, education, and infrastructure, along with labor force participation rates, life expectancy, and average school duration, are factors that support an increase in HDI. These findings suggest that improvements in these sectors will positively impact overall human development in both countries. Therefore, both countries' governments must continue to prioritize and allocate adequate resources in these areas to improve people's welfare.

The main contribution of this research is the comparative study conducted between Indonesia and Thailand regarding human resource investment and its impact on human development. This research provides in-depth insight into

the differences and similarities in human resource investment strategies that impact increasing HDI in the two countries through comparative analysis. By exploring variables such as economic growth and government spending on education and health, this research provides a better understanding of how each country can maximize human capital investments to achieve sustainable human development. The resulting policy implications include recommendations for increasing budget allocations in specific sectors and addressing social problems that may

affect HDI. In addition, academically, this research provides a basis for further studies in human resource investment and human development and is a valuable reference in scientific literature.

**Method**

This research uses two analytical methods: the independent difference t-test and the ARDL (Autoregressive *et al.*) model. The data and data sources used for ARDL analysis from 2001 to 2020 are shown in Table 1.

**Table 1:** Data and Data Sources

Variables	Definitions	Source
Human Development Index (HDI)	Benchmarks of achievement in health, education, and a decent standard of living.	UNDP Data, (2023).
Economic conditions (GDP)	Market price GDP: total value of goods/services produced by resident (domestic) producers, including production taxes, excluding some subsidies. Prices are constant in 2015, in USD.	World Bank Indicators, 2023
Government spending in the education and health sectors (invest)	Government expenditure on education and health sectors as a percentage of GDP.	World Bank Indicators, 2023
Life expectancy at birth (le)	The average number of years a newborn baby can be expected to live if the mortality patterns prevailing at birth remain constant for the remainder of its life.	UNDP Data, (2023).
Average Years of Schooling (mys)	The average number of years of formal education completed by the adult population (usually aged 25 and over) in a given country or region	UNDP Data, 2023

**1. Independent difference test**

This research analyzes two groups of data, namely Indonesia and Thailand, for the period 1991 to 2021. The variables tested include UNDP indicators, namely life expectancy at birth (le), expected length of schooling (eys), average length of schooling (mys), an income gross national per capita (GNI per capita) in U.S. dollars based on 2017 purchasing power parity (PPP\$). Table 2 presents a list of factors that are the focus of the analysis of HDI.

**Table 2:** Human Development Index Indicators

Variables	Symbol	Unit	Source
Life Expectancy at Birth	le	years	UNDP (2022)
Expected Years of Schooling	eys	years	UNDP (2022)
Mean Years of Schooling	mys	years	UNDP (2022)
Gross National Income Per Capita	PC	PPP\$	UNDP (2022)

In this research, researchers tested two hypotheses: the null and the alternative. The null hypothesis states no significant difference between the two data groups. In contrast, the alternative hypothesis states a significant difference between the two data groups. The independent t-test is a statistical test used to test whether there is a significant difference between two means of two unrelated data groups (Wooldridge, 2010)<sup>[27]</sup>. Mathematically, it can be written as follows:

$$t_{hitung} = \frac{X_1 - X_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Where

$X_i$	=	Average score/value of group i
$n_i$	=	Number of group data i
$s_i^2$	=	Group I score variance

**2. ARDL Model Specifications**

The ARDL model is a powerful econometric research tool capable of disentangling variable relationships in the short and long term. Its flexibility allows analysis of short time series data (Engle & Granger, 1987)<sup>[6]</sup> with variables of different integration orders (Pesaran, Hashem *et al.*, 2001)<sup>[11]</sup>. The advantage involves independence from strict pre-estimation assumptions (Maddala & Kim, 1998)<sup>[7]</sup> and the ability to handle autocorrelation and heteroscedasticity (Engle & Granger, 1987)<sup>[6]</sup>. This study estimates the relationship between the dependent variable (human development index) and the independent variables (GDP, investment in education and health, life expectancy at birth, average years of schooling). These variables can be expressed using mathematical notation as follows:

$$hdi = f(gdp, invest, le, my) \tag{1}$$

**Human Development Index Model in Indonesia (Model I)**

$$hdi_{idn_t} = \alpha_0 + \alpha_1 gdp_{idn_{t-i}} + \alpha_2 invest_{idn_{t-i}} + \alpha_3 le_{idn_{t-i}} + \alpha_4 mys_{idn_{t-i}} + \epsilon_t \tag{2}$$

**Human Development Index Model in Thailand (Model II)**

$$hdi_{tha_t} = \beta_0 + \beta_1 gdp_{tha_{t-i}} + \beta_2 invest_{tha_{t-i}} + \beta_3 le_{tha_{t-i}} + \beta_4 mys_{tha_{t-i}} + \epsilon_t \tag{3}$$

Where:

$hdi$	=	Human Development Index
$gdp$	=	Gross Domestic Income (USD)
$invest$	=	Government expenditure in education and health sectors (% of GDP)
$le$	=	Life expectancy at birth (years)
$mys$	=	Average Years of Schooling (years)

Parameters in Equations (2) and (3);  $\alpha_0, \alpha_1 \dots \alpha_4$  dan  $\beta_0, \beta_1 \dots \beta_4$  is the long-term elasticity coefficient of the independent variable on the dependent variable, while  $\epsilon_t$  is the error term. The symbol " $\Delta$ " in equation (4) indicates the first difference operator.

Parameters  $\alpha$  dan  $\beta$  represents the coefficients in the model while indicating the elasticity of the long-run relationship, and  $\delta$  refers to the remaining terms of the model—symbol  $n$  representing Indonesia or Thailand.

Long-Term Relationships in the ARDL Model of Indonesia and Thailand

$$\Delta hdi_{nt} = \gamma_0 + \sum_{i=1}^k \gamma_1 gdp_{nt-i} + \sum_{i=1}^k \gamma_2 invest_{nt-i} + \sum_{i=1}^k \gamma_3 le_{nt-i} + \sum_{i=1}^k \gamma_4 mys_{nt-i} + \gamma ECM_{t-i} + \epsilon_t \tag{4}$$

After ensuring a long-term relationship between the variables, the next step is to analyze the short-term relationship between the variables using an error correction model (ECM). ECM is used to measure how quickly these variables adjust to long-term equilibrium.

**Results**

**1. Independent Difference Test t-test**

The independent difference test t-test is a statistical test used to test whether the averages of two groups of data unrelated to each other are significantly different. Based on UNDP indicators, this test can test factors that influence the human

Development index (HDI). Before carrying out the t-test independent difference test, it is necessary to test the normality of the data for all variables to be tested. The data normality test was carried out to ensure the data was normally distributed. The t-test independent difference test can only be used if the data is usually distributed. In this case, the independent difference t-test is used to test whether the average of each HDI determining factor is significantly different.

Table 3 shows a comparison between Indonesia and Thailand using an independent t-test, which reveals significant differences in the human development index of the two countries—supported by differences in vital aspects. Indonesia's life expectancy (67.47 years) is lower than Thailand's (74.75 years). Similar disparities are seen in economic factors; Thailand's per capita national income (12,275 USD) is superior to Indonesia's (7,477 USD). The average length of study shows the educational gap for the Thai population, which is 0.9 years longer than Indonesia's. This significant difference opens the door to exploring the reasons behind it and the dominant factors that influence the human development index in each country. The results of the independent difference t-test are presented in Table 3.

**Table 3:** Independent Difference test results t-test

Variable	Normality Test	Mean b		t-count c	p-valued
		Indonesia	Thailand		
hdi	0.1636**	0.6348	0.7048	-4.3519	0.0001
le	Normal*	67.4685	74.7542	-11.8053	0.0000
ey	0.13**	11.6596	12.5924	-1.9000	0.0622
mys	Normal*	6.6364	6.8473	-0.5790	0.5648
gnipc	0.1167**	7,476.5620	12,275.1600	-7.0201	0.0000

Note: ap-value from normality test with two methods, \*Plot Data (qnorm),\*\* Skewness/Kurtosis tests,bDiff: mean (Indonesia) - mean (Thailand) ct-table = 2.039 (sig. 5%), d \*\*\*represent statistical significance for a 99% level, \*\* represent statistical significance for a 95% level, \*\*\* represent statistical significance for a 90% level.

**2. Model Testing: Data Stationarity and Optimal Lag Determination**

In this study, the factors tested were gross domestic product (GDP), government spending on education and health (invest), life expectancy at birth (L.E.), average length of schooling (MYS), and their influence on the Human Development Index (HDI). Table 4 shows exciting differences between fluctuations in economic variables in Indonesia and Thailand. The standard deviation per average (%) for the variables HDI, GDP, and Indonesia's investment

in education and health appears more volatile compared to Thailand. At the same time, Thailand's life expectancy and unemployment rate show higher volatility. Next, unit root testing was carried out on the research data. Maddala & Kim (Maddala & Kim, 1998) [7] explained that in the ARDL model, the unit root test is essential to carry out because this model assumes that all variables analyzed have the same order of integration. If one variable is not stationary, then the ARDL model will not be able to produce accurate estimates.

**Table 4:** Descriptive Statistics

Variable	Std. Dev/mean (%)		Min		Max	
	Indonesia	Thailand	Indonesia	Thailand	Indonesia	Thailand
hdi	5,394	5,843	0.604	0.664	0.716	0.804
gdp	30,199	20,057	4.09E+11	2.29E+11	1.05E+12	4.60E+11
invest	6,386	2,648	1.52E+00	1.916323	1.93E+00	2.125108
le	1,815	2,823	65.7503	72.6127	70.5184	79.2739
mys	8,100	9,701	6.22714	6.044813	8.55651	8.69712

Based on the unit root test results contained in Table 5, it can be concluded that most of the economic variables tested are not stationary at the level for the two countries but become stationary after differentiation once. This shows that

Econometric models involving these variables should use differentiated data to avoid biased estimates. Next, the lag order criteria are selected.

**Table 5:** Unit Root test results

Model	ADF at level	ADF at first diff	DF-GLS at level	DF-GLS at first diff	P.P. at level	P.P. At first, it was diff
	t-stat	t-stat	t-stat	t-stat	Adj. t-statistics	Adj. t-statistics
<b>Indonesia</b>						
hdi	3,153***	-1,487	-0.65	-3,404***	6,201***	-1,922

gdp	-0.537	-0.937	-1,796	-1,676	7,573***	-0.974
invest	1,457	-3,212***	-1,515	-3,036***	1,327	-6,640***
le	1,051	-3,426***	-0.958	-3,620***	0.835	-5,180***
mys	1,877	-2,457**	-3,003	-3,144***	2,759***	-2,969***
<b>Thailand</b>						
hdi	3,268***	-1,742*	-0.259	-3,654***	5,342***	-2,663
gdp	1,354	-1,412	-1,101	-2,148	3,310***	-1,765
invest	-0.155	-4,789***	-2,171	-4,163***	-0.263	-8,894***
le	2,850***	-1,311	-0.231	-4,204***	6,794***	-1,419
mys	1,781*	-2,692***	-0.203	-3,240***	3,418***	-2,573**

Note: \*\*\* represents statistical significance for a 99% level, \*\*represent statistical significance for a 95% level,\* represent statistical significance for a 90% level

Selection of lag order in ARDL analysis is one of the essential steps in building an accurate and valid model. An appropriate lag order can help prevent biased estimation problems, improve computational efficiency, and ensure the

model can be applied to new data or different conditions. Based on the model's lag selection criteria results, lag order four was chosen because it produces the most accurate and efficient parameter estimates.

**Table 6:** Lag selection criteria

lag	L.L.	L.R.	df	p	FPE	AIC	HQIC	SBIC
<b>Indonesia</b>								
0	-365.22				8.60E+13	46.2775	46.2899	46.519
1	-281,336	167.77	25	0	6.60E+10	38,917	38.9912	40.3656
2	-217,427	127.82	25	0	2.0e+09*	34.0534	34.1894	36.7091
<b>Thailand</b>								
0	-352,193				1.70E+13	44.6492	44.6615	44.8906
1	-293.75	116.89	25	0	3.10E+11	40.4687	40.5429	41.9173
2	-224,049	139.4	25	0	4.6e+09*	34.8811	35.0171	37.5369

Table 6 shows that various evaluation criteria can explain the choice of lag order 2 for the ARDL model in Indonesia and Thailand. Based on the FPE criteria, lag order 2 shows the lowest value (23.8154 for Indonesia and 31.5131 for Thailand), indicating optimal model accuracy. The AIC and BIC criteria also show that the lag two order has a lower value, indicating good accuracy and lower complexity. In addition, a lag order of 2 can minimize the overfitting problem and improve computational efficiency. With these considerations, lag order 2 is a reasonable choice for the ARDL model in both countries.

**3. ARDL Model Analysis**

ARDL bounds test cointegration analysis tests whether there is a long-term cointegration relationship between the variables in the ARDL regression model. This analysis was carried out using limits on the regression coefficients. Positive results from this analysis indicate a stable long-term relationship between these variables. These relationships can provide a basis for a better understanding of economic dynamics between variables and improve the accuracy of regression models. Table 7 reveals a significant relationship between economic variables in Indonesia and Thailand.

**Table 7:** ARDL bound test cointegration (time series models)

Country	Value F-statistic (k)	Significance (%)	I(0)	I(1)
Indonesia	8,054 (4)	10	2.45	3.52
		5	2.86	4.01
		2.5	3.25	4.49
		1	3.74	5.06
Thailand	5.103 (4)	10	2.45	3.52
		5	2.86	4.01
		2.5	3.25	4.49
		1	3.74	5.06

Table 7 shows positive results for Indonesia and Thailand, at a significance level of 5%, indicating the existence of long-term cointegration between the model variables. Assuming stationary at the level and first difference, these variables have a stable relationship, allowing changes in one variable to influence the others in the long term. This could pave the way for in-depth understanding and constructing more accurate regression models.

**Long-Term and Short-Term Estimates**

The long-term estimation results of the ARDL model for Indonesia and Thailand reveal striking differences in the impact of the independent variables on the dependent variables. For Indonesia, there is no significant impact of changes in GDP (coefficient: -5.67E-14) and investment (coefficient: 0.0020712) on the dependent variable (human development index). However, increasing life expectancy (coefficient: 0.0267284) and education level (coefficient: 0.0252815) positively and significantly impact. The constant (coefficient: -0.7458222) also significantly affects the dependent variable. Meanwhile, for Thailand, changes in GDP (coefficient: 1.67E-12) and investment (coefficient: 0.0169521) have a positive and significant impact. Increasing life expectancy (coefficient: -0.0222756) has a significant negative impact. Although the education level (coefficient: -0.0471788) is insignificant, the constant (coefficient: 1.961703) positively and significantly impacts the dependent variable. These significant differences reflect the unique characteristics of economic dynamics and determinant factors in the two countries. These results can be seen in full in Table 8.

**Table 8: ARDL Model Long-Term and Short-Term Estimates**

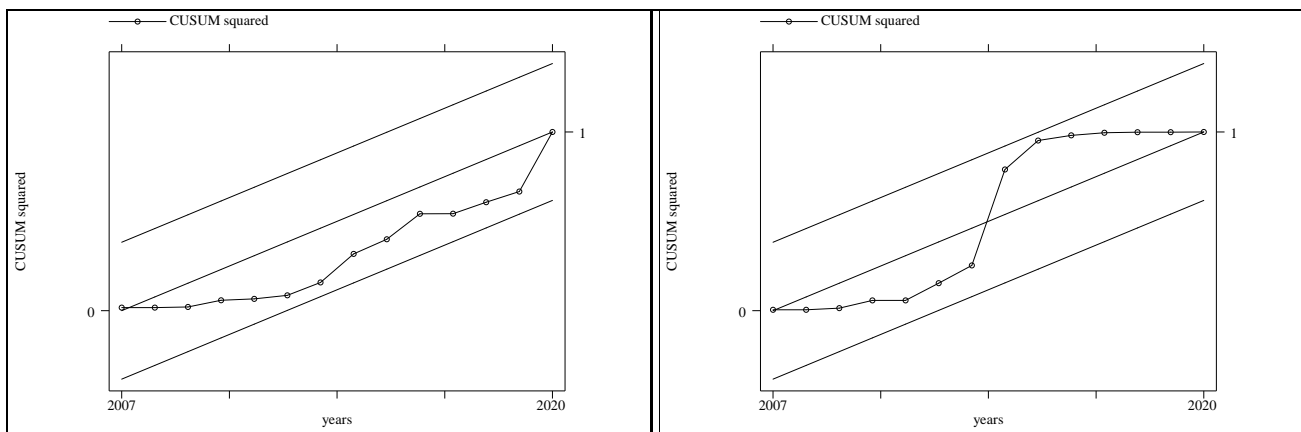
Long-run estimations								
Variables	Indonesia (ARDL : 1 1 0 1 1)				Thailand ( ARDL : 1 2 0 0 1)			
	Coefficient	Std. Errr	t-stat	Prob	Coefficient	Std. Errr	t-stat	Prob
gdp	-5.67E-14	4.36E-14	-1.3	0.234	1.67E-12	5.66E-13	2.95	0.016
invest	0.0020712	0.002066	1	0.349	0.0169521	0.0071871	2.36	0.043
le	0.0267284	0.0060953	4.39	0.003	-0.0222756	0.0114096	-1.95	0.043
mys	0.0252815	0.0064268	3.93	0.006	-0.0471788	0.027881	-1.69	0.125
C	-0.7458222	0.2174768	-3.43	0.011	1.961703	0.6790592	2.89	0.018
Short-run estimations								
Variables	Coefficient	Std. Errr	t-stat	Prob	Coefficient	Std. Errr	t-stat	Prob
D (gdp(-1))	9.39E-14	3.50E-14	2.68	0.031	-9.25E-13	3.24E-13	-2.85	0.019
D (gdp)	-	-	-	-	-1.05E-12	3.57E-13	-2.92	0.017
D(le(-1))	-0.0082253	0.0030656	-2.68	0.031	-	-	-	-
D (le)	-0.0055017	0.0015986	-3.44	0.011	-	-	-	-
D (my (-1))	0.0044944	0.0019137	2.35	0.051	0.015215	0.0120707	1.26	0.239
D (my)	0.0044944	0.0016395	2.09	0.074	-	-	-	-
ECM (-1)	-0.5605439	0.1495373	-3.75	0.007	-0.9287742	0.2377084	-3.91	0.004
Robustness indicators: Indonesia					Thailand			
$\chi^2$ Normal	3,067	0.68964			10,343	0.06608		
$\chi^2$ Serial	5,137	0.0766			3,855	0.1455		
$\chi^2$ ARCH	0.166	0.6841			7,503	0.0062		
$\chi^2$ Hetero	0.41	0.5213			1.52	0.2171		
$\chi^2$ Reset	12.76	0.0005			1.1	0.3868		

Note: Figures in parentheses [#] are estimated p-values.  $\chi^2$  Normal indicates the Kurtosis test for average residuals,  $\chi^2$  Serial is the Breusch-Godfrey LM test statistics for no serial relationship,  $\chi^2$  ARCH is the Engle's test statistics for no autoregressive conditional heteroskedasticity,  $\chi^2$  Hetero is the heteroskedasticity test based on the regression of squared residuals on squared fitted values, and  $\chi^2$  Reset is the test for functional form based on Ramsey's RESET test using the square of the fitted values.

- \*Refer to 10% significance level
- \*\* Refer to 5% significance level
- \*\*\* Refer to the 1% significance level

Table 8 also displays short-term estimation results. Comparative analysis of the two countries, Indonesia and Thailand, based on the ARDL model, shows significant differences in the impact of independent variables on the short-term human development index. In Indonesia, the previous change in GDP (D(gdp (-1))) has a significant positive impact with a coefficient of around 9.39E-14 and a probability of 0.031. However, in Thailand, the impact is more complex, with a coefficient D(GDP (-1)) of -9.25E-13 and a probability of 0.019, indicating a significant negative impact. Apart from that, an Error Correction Mechanism (ECM) in Indonesia with a coefficient of -0.5605439 and a probability of 0.007 indicates a correction of the imbalance in the short term. On the other hand, Thailand also shows the existence of an ECM with a coefficient of -0.9287742 and a probability of 0.004, confirming the adjustment toward long-term equilibrium after a disturbance in the

Model. These differences reflect the unique characteristics of the two economies and provide valuable insight into designing economic policy in each country. In Indonesia, changes in life expectancy have a significant negative impact on the human development index. This means that if life expectancy increases in the previous period, the HDI will decrease in the current period. Increasing the level of education also has a positive effect on HDI, although not significant. In Thailand, lagged changes in GDP and life expectancy have a significant negative impact on the dependent variable. This means that if GDP and life expectancy increased in the previous period, the dependent variable will decrease in the current period. Increasing the level of education makes a positive contribution, but not significant, for Indonesia and Thailand. Figure 1 shows the reliability of the model.



**Fig 1: Stability test of the ARDL Model**

Based on the model reliability test, this research model has several advantages that reflect its accuracy and relevance in analyzing short and long term relations in Indonesia and Thailand. Thus, these findings contribute to policy formulation and economic development in both countries.

**Discussion**

**1. Significant Differences in Human Development Index in Indonesia and Thailand**

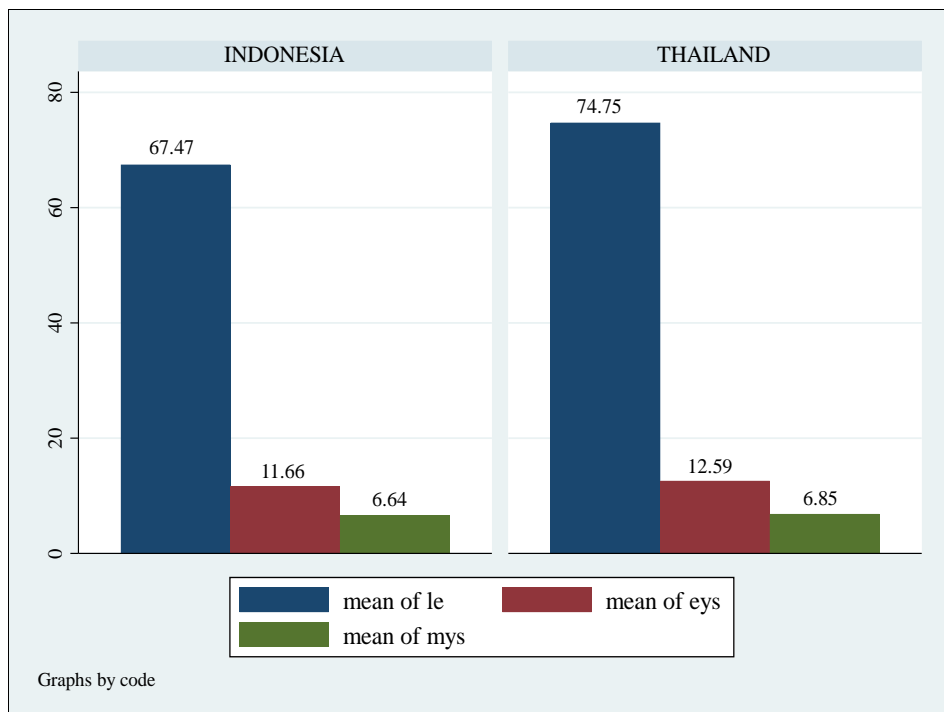
The findings reveal significant differences in human development indices between Indonesia and Thailand. Several vital aspects of education and health support this. Even though it has faster economic growth, Indonesia still needs to catch up in these factors. Life expectancy in Indonesia (67.47 years) is far below Thailand's (74.75 years), creating inequality in the health dimension. The education gap is reflected in the average length of study for the Thai population, which is 0.9 years higher than in Indonesia. At the same time, the health aspect also shows inequality, with Thailand's average score being almost 0.21 points higher. This research is also consistent with the findings of UNDP (2022), which places Indonesia in the 111th HDI ranking while Thailand is ranked 79th. Thus, concrete steps such as increasing equitable development, improving the quality of education and health, and increasing public awareness are very important to catch up and improve the quality of life of the Indonesian people. Figure 1 shows Indonesia and Thailand's average human development index indicators in education and health.

The difference in the Human Development Index (HDI) between Thailand and Indonesia reflects the inequality in the level of human development in the two countries.

According to data from UNDP (UNDP, 2023), Thailand's HDI reached 0.793, while Indonesia's HDI was 0.674, indicating that Thailand has a higher level of human development than Indonesia. Several factors can explain this difference based on the results of previous research. First, government spending on education and health is a significant factor. A World Bank (2018) study shows that higher government spending in these sectors can increase the HDI—Thailand has more significant expenditures than Indonesia in education and health.

Second, the level of social inequality also plays a significant role. A study by United Nations University (2017) shows that low social inequality supports human development. Thailand has lower levels of social inequality than Indonesia, providing more equal opportunities in access to education and health. Furthermore, GDP per capita can also influence HDI. Study Asian Development Bank (2022) [1] states that higher GDP per capita can increase HDI. With a higher GDP per capita than Indonesia, Thailand gives its people better purchasing power to access quality education and health services.

Finally, government policy also plays a role. Thailand has policies that favor human development, reflected in their commitment to increasing people's access to education and health and creating an environment that supports overall quality of life. In detail, higher government spending supports public access to quality services in education and health. Lower social inequality provides more equal opportunities for all levels of society. Higher GDP per capita increases people's purchasing power, while government policies focusing on human development also increase HDI.



**Fig 1:** Mean of Life Expectancy at Birth, Expected Years of Schooling, Mean Years of Schooling In Indonesia and Thailand, 2001-2020

These findings are based on the human development theory introduced by the UNDP, which emphasizes improving the quality of life through economic, health, and education aspects (UNDP, 2023). Previous research also supports

these findings, showing that Thailand's HDI is consistently higher than Indonesia's in terms of income, health, and education (Wijaya & Fitri, 2020) [26]. This significant difference highlights the importance of the Indonesian

government's efforts to improve the quality of life of its people. Appropriate health, education, and infrastructure investments can be the first step to bridging the gap with Thailand and fostering more inclusive and sustainable human development. With consistency in research, analysis, and implementation of appropriate policies, Indonesia has the potential to overcome backwardness and shape a brighter future for all its people.

## 2. Determining Factors of the Human Development Index in Indonesia and Thailand in the Long Term

Long-term analysis using the ARDL model reveals striking differences in the factors influencing the human development index (HDI) in Indonesia and Thailand. In Indonesia, increasing life expectancy and education levels positively and significantly impact HDI. These results align with the research findings of Widyastuti and Sulistyowati (2021)<sup>[25]</sup>, but changes in GDP and investment are not. In contrast, in Thailand, GDP and investment play a significant role in driving HDI; this finding is in line with research by Wijaya & Fitri (Wijaya & Fitri, 2020)<sup>[26]</sup> while increasing life expectancy has a negative impact and education level is not significant.

Theoretically, these results align with the UNDP human development theory, which emphasizes the importance of health, education, and the economy in improving the quality of life. Previous research also highlights that Thailand's higher HDI than Indonesia is associated with similar factors. These significant differences reflect the unique characteristics of the two countries. Indonesia, which is still struggling with low per capita income and limited access to health, finds that increasing HDI is based on health and education. With its better economic advantage, Thailand shows greater HDI dependence on these factors. The policy implications of these findings are clear. Indonesia needs to focus on increasing investment, economic growth, expanding access to health, and improving the quality of education to catch up with the HDI.

## 3. Determining Factors of the Human Development Index in Indonesia and Thailand in the Short Term

The short-term estimation results of the ARDL model for Indonesia and Thailand show significant differences in the impact of independent variables on the human development index (HDI). In the Indonesian context, changes in previous GDP ( $D(\text{gdp}(-1))$ ) are proven to have a significant positive impact on HDI, with a probability of around 0.031. Economic growth in Indonesia can positively contribute to increasing HDI in the short term. These results are based on the theory of human development put forward by Sen (1999), which emphasizes that human development aims to improve the overall quality of life, including economic, health, and educational aspects. Thus, economic growth in Indonesia, as reflected in GDP, has the potential to impact human welfare in general positively. This is in line with previous research emphasizing the positive impact of economic growth on human development (Bloom *et al.*, 2020<sup>[2]</sup>; Vicil & Konukman, 2022)<sup>[23]</sup>.

In Thailand, the analysis results show more complex dynamics. The impact of previous changes in GDP on HDI shows a negative trend in the short term but a positive trend in the long term. The interpretation of these findings is that economic growth in Thailand can positively contribute to

increasing HDI in the long term but requires time to absorb the negative impacts in the short term. This finding is in line with previous research, which noted consistent differences between the HDI of Indonesia and Thailand. Factors such as income levels, health, and education have been identified as determinants of these differences, reflecting the complexity of the relationship between economic growth and human development (Rittisorn, 2019<sup>[12]</sup>; Siswanto, 2023<sup>[16]</sup>; Taechangam *et al.*, 2008a<sup>[18]</sup>; Tinapop *et al.*, 2023<sup>[19]</sup>; Wijaya & Fitri, 2020)<sup>[26]</sup>.

An Error Correction Mechanism (ECM) in both countries indicates that the HDI tends to return to its long-term balance after experiencing short-term disturbances. These findings highlight the complex dynamics involving multiple factors in shaping human development indices. By considering these findings, the Indonesian government can strengthen its focus on increasing economic growth, expanding access to health, and improving the quality of education to increase HDI. It is also essential for the government to ensure that the benefits of economic growth can be enjoyed equally by all of society to achieve inclusive and sustainable human development. In addition, more significant investment in the education and health sectors must be made to improve the quality of human resources and increase national competitiveness in the long term.

## Conclusion

Research findings reveal significant differences between Indonesia and Thailand in several critical dimensions of human development. Although Indonesia shows more rapid economic growth, differences include life expectancy, gross domestic product, and government spending on education and health. Lower life expectancy in Indonesia creates health inequalities, while educational inequality is reflected in the lower length of study compared to Thailand. The importance of this difference is reinforced by the description of the Human Development Index (HDI) between the two countries. From 1991 to 2021, Thailand's HDI average was higher (0.70) than Indonesia's (0.63). This reflects significant differences in levels of human development.

The long-term and short-term analysis results using the ARDL model for Indonesia and Thailand reveal significant differences in the factors influencing the human development index (HDI) in the two countries. In the long term, Indonesia experienced a positive and significant impact on HDI through increasing life expectancy and education levels. In contrast, Thailand shows a positive impact of GDP and investment on HDI. In the short term, Indonesia found that previous GDP changes had a significant positive impact on HDI, while in Thailand, the impact was negative in the short term but positive in the long term. These results align with UNDP human development theory and previous research, highlighting differences in the HDI of the two countries related to income, health, and education. The policy implications show the need for Indonesia to focus on increasing investment, economic growth, expanding access to health, and improving the quality of education to catch up with the HDI. The government needs to ensure equitable distribution of the benefits of economic growth and increase investment in the health and education sectors to achieve inclusive and sustainable human development.

## References

- Asian Development Bank. Asian Development Outlook 2022: Asia's Pulse Recovers, 2022.
- Bloom DE, Houry A, Kufenko V, Prettner K. Spurring Economic Growth through Human Development: Research Results and Guidance for Policymakers (Issue 12964), 2020.
- Cambel RG. Construction of a Statistical Index as a Measure of a Country's Multidimensional Development. *Int J Sci Basic Appl Res (IJSBAR)*,2020;54(5):138–47.
- Christyadi S, Satriya AMA, Goejantoro R. Pemodelan Indeks Pembangunan Manusia (IPM) Menggunakan Analisis Regresi Probit (Studi Kasus: Indeks Pembangunan Manusia (IPM) di Pulau Kalimantan Tahun 2017). *J EKSPONENSIAL*,2020:11(2).
- Comes C-A. HSDSI Analysis for EU 28 Countries. *Procedia Econ Finance*,2015;32(15):154–9. doi:10.1016/s2212-5671(15)01377-5.
- Engle RF, Granger CWJ. Co-integration and error correction: Representation, estimation, and testing. *Econometrica*,1987;55(2):251–76.
- Maddala GS, Kim I-M. Unit roots, cointegration, and structural change. Cambridge University Press,1998.
- Maiga YM. Impact of Human Capital Index on Economic Growth in Africa. *Int J Soc Sci Res Rev*,2023;6(6):287–96. doi:10.47814/ijssrr.v6i6.1240.
- Nurlina N, Ridha A, Asnidar A. Analisis Determinan Indeks Pembangunan Manusia di Indonesia Tahun 1990-2021. *J Samudra Ekonomi Dan Bisnis*,2023;14(2):239–50. doi:10.33059/jseb.v14i2.7287.
- Patel D, Gilbert S. Investment in human resources improves eye health for all. *Community Eye Health*,2018;31:37–9.
- Pesaran HM, Shin Y, Smith RJ. Bounds testing approaches to the analysis of cointegration. *J Appl Econom*,2001;16(3):289–326.
- Rittisorn N. Influence of Human Capital On Retirement Preparation: Empirical Evidence From Thailand. National Institute of Development Administration, 2019.
- Sarbu M-R. Dimensions of Multinational Enterprises. *CES Work Pap*,2015;7(3):751–8.
- Sawkins S. The Development Of Human Resources; A Country's Asset, A Corporation's Liability, The Fallacy Of Equality, And The Future. *ICONSS*,2017:191–9.
- Sen A. Development as Freedom. Anchor Books, 1999.
- Siswantoro. Does Local Government's Spending Effective in Improving Human Development Index? Study in Underdeveloped Region. *Salus Cultura: J Pembangunan Manusia Dan Kebudayaan*,2023;3(1):57–67.
- Sukmawati A. Analisis Determinan Indeks Pembangunan Manusia di Indonesia Tahun 2019 dengan Spatial Error Model (SEM). *Semin Nas Off Stat*,2022;1:1305–14. doi:10.34123/semnasoffstat.v2022i1.1532.
- Taechangam S, Pinitchun U, Pachotikarn C. Development of nutrition education tool: healthy eating index in Thailand. *Asia Pac J Clin Nutr*,2008;17 Suppl 1:365–7.
- Tinapop Pattana, Somboon Sirisunhirun. The Development of Social Measurement for Cultural and Integrity Behaviour of Gross National Integrity Index. *J Namib Stud*,2023;33:1450–66. doi:10.59670/jns.v33i.796.
- UNDP. Human Development Report: The Inequality Challenge, 2022.
- UNDP. Human Development Report, 2023.
- United Nations University. Inequality and Human Development: New Insights from the Human Development Index, 2017.
- Vicil E, Konukman A. The Effect of Fiscal Policy and Selected Macroeconomic Indicators on Human Development Index: The Case for OECD Countries. In: *Ekonomik Yaklasim*,2022;33:123. doi:10.5455/ey.22003.
- Wasudewa AANG. Indeks Pembangunan Ekonomi Inklusif Berwawasan Lingkungan di Indonesia. *J Reg Rural Dev Plann*,2022;6(3):262–75. doi:10.29244/jp2wd.2022.6.3.262-275.
- Widyastuti E, Sulistyowati E. Analisis Determinan Indeks Pembangunan Manusia di Indonesia. *J Ilm Mahasiswa FEB*,2021;10(1):1–12.
- Wijaya AD, Fitri A. Perbandingan Indeks Pembangunan Manusia Indonesia dan Thailand Tahun 2010-2019. *J Ilm Ekonomi Dan Bisnis*,2020;15(1):1–12.
- Wooldridge JM. *Econometric analysis of cross section and panel data*. 2nd ed. MIT Press, 2010.
- World Bank. *Investing in Education and Health: Achieving Universal Basic Services*, 2018.
- Zhang J, Yu J, Chen Y. Investment Problems of China Rural Human Capital. *J Northeast Agric Univ (Engl Ed)*,2011;18(4):77–83. doi:https://doi.org/10.1016/S1006-8104(12)60029-4.