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The role of human resource investment in increasing the human development index: Comparative study of Indonesia and Vietnam

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Abstract
The research aims to compare human development progress in Indonesia and Vietnam during the 1990-2021 period. Independent difference tests and multiple linear regression were used as the analysis method. The research results show that Vietnam has achieved more rapid progress, with an average HDI growth of 1.22%, while Indonesia was 0.93%. Economic growth and government spending in the education and health sectors are the two main factors that influence HDI. On average, Vietnam's economic growth (6.662%) is higher and more significant than Indonesia's (4.699%). Vietnam also has higher government spending in the education (4.623% of GDP) and health (4.653% of GDP) sectors than Indonesia (3.152% and 2.898% of GDP). This research highlights the gap in human development progress between Indonesia and Vietnam. To accelerate HDI growth, Indonesia needs to increase investment in human resources, especially in the education and health sectors. This can be done by increasing the government budget, equalizing access to services, carrying out educational reforms, and improving health services. Indonesia can also learn from Vietnam's best practices in human resource investment. This research makes a significant contribution to improving human development in Indonesia.

Keywords: Human investment, economic growth, HDI, government expenditure

Introduction

A high Human Development Index shows that the people in that country have a good quality of life, which is reflected in prolonged life expectancy, a high level of education, and decent economic prosperity (UNDP, 2022; World Bank, 2023). A critical factor in increasing HDI is investment in human resources. Human resource investments can be made through education, training, and health. Several research results have shown that investment in education and health positively influences HDI. For every additional 1% of government spending in the education sector, the HDI will increase by 0.01 to 0.02 points. Meanwhile, for every 1% additional government spending in the health sector, the HDI will increase by 0.01 to 0.02 points (Anh & Thuy, 2021 [5]; Putri & Kusdiana, 2023) [29].

Indonesia and Vietnam are two Southeast Asian countries that can potentially increase HDI. Both countries have large populations and a high productive age. However, both countries still need help increasing HDI, one of which is the low quality of human resources. Provisional figures for 2023 show that Indonesia's HDI reaches 0.729, while Vietnam's has 0.728. These two countries have an HDI above the average for ASEAN countries, namely 0.707(Badan *et al*., 2023a [6], 2023b [7]; United *et al*., 2022). However, compared with developed countries, Indonesia and Vietnam's HDI still needs to catch up. These disparities can be attributed to differences in the quality of education and health, economic growth, and development policies. Sustainable investment in both, especially education, is the key to catching up and bringing better prosperity to Indonesia and Vietnam.

Existing studies have examined the impact of government spending on human development in ASEAN countries. This study has found that government spending, especially in education, health, and welfare, is essential in enhancing socioeconomic development and raising living standards (My-Linh *et al*., 2019 [22]; Sagarik, 2017) [32]. The optimal level of government spending for economic growth in ASEAN countries has been identified as 21.05% of GDP (Buracom, 2016) [10]. Additionally, government spending has been found to positively impact the Human Development Index (HDI), contributing to improvements in education, health, and economic dimensions (Pahlevi, 2017 [28]; Rahmawati & Nur Intan, 2020) [31]. However, some factors can influence the effectiveness of government spending, such as institutional capacity. Overall, this study highlights the importance of government spending in promoting human development in ASEAN countries.

Overall, the picture emerges that investment in education and health, both from the government and the private sector, has a crucial role in increasing HDI in ASEAN. However, their effectiveness may vary depending on factors such as the type and quality of investment, as well as the socioeconomic context of each country. Further research with a more specific focus and multidimensional approach is needed to understand how these investments can be optimally utilized to encourage sustainable human development throughout ASEAN. Comparing the HDI of Indonesia and Vietnam is like examining two sides of the Southeast Asian development coin. Even though they are both developing countries with large populations and rapid economic growth, they have striking differences. Indonesia is superior in population, and Vietnam is more resilient in fighting poverty and inequality. Research that links the HDI of the two countries is like a bridge of knowledge, uncovering the factors behind their differences and illuminating effective development policies. From here, the governments of both countries can learn from each other, formulate effective strategies to raise HDI, and create a brighter future for their people.

The main contribution of this research is analyzing the role of HR investment in Indonesia and Vietnam as a form of comparative study. Although these two countries share similar economic growth and social change characteristics, differences in HR investment policies and implementation can provide valuable insights regarding their impact on HDI. A comparative study between Indonesia and Vietnam will provide an in-depth understanding of the contribution of education and health investment to increasing HDI in each country. By analyzing the latest data and policies, this research aims to provide a more comprehensive view of how HR investment strategies can improve community welfare and human development in both countries. The results of this research can provide relevant policy recommendations for the government, policymakers, and other stakeholders to improve HDI and society's quality of life sustainably.

Literature Review

This theory, initiated by the United States economist Theodore Schultz in 1960, states that human capital can be increased through education, training, and health investment. Schultz argued that these investments increased productivity and individual income, ultimately driving economic growth (Schultz, 1961) [34]. Figures such as Gary Becker, Jacob Mincer, and George Stigler, Nobel Prize winner in Economics, helped strengthen the foundation of this theory by exploring cost, risk, and labor market efficiency factors (Becker, 1964 [9]; Mincer, 1975 [20]; Stigler, 1975) [37]. For the government, the implications of this theory can be explained through adequate budg*et al*locations for the education and health sectors. By prioritizing education and health, we invest in people's most robust capital: themselves.

All research attention is focused on countries in the Southeast Asian region with high human development, namely Indonesia and Vietnam (based on UNDP indicators, 2023). The human development index (HDI) allows comparisons between countries and regions, providing insight into the level of human development in various fields (Urzua, 2023). It is helpful for governments and international organizations to identify national characteristics and develop effective strategies to improve population conditions (Celemín, 2022) [11]. The HDI can also assess a country's economic condition, reflecting education, health, and income (Javaid & Akbar, 2020) [14]. HDI plays a vital role in understanding and promoting human development worldwide.

Research in Vietnam and Indonesia highlights the positive impact of education and health investments on human development. Vietnam shows a positive correlation between investment and economic growth and reducing poverty rates. Investment in education increases labor productivity and people's income, while investment in health reduces health expenditure and improves the overall health condition of society (D. Nguyen *et al*., 2022) [23]; it even shows that these two factors play a role in reducing income inequality in Vietnam (T. *et al*., 2020). Indonesia also reaps similar benefits. StudyAndini *et al*. (2022) [3] and Soejachmoen *et al*. (2021) [36] found that investment in education and health increases productivity and income. Education investments improve the skills and knowledge of the workforce, while health investments improve workers' health and stamina. This, as shown by Supartono *et al*. (2020) [38], contributes to improving the overall welfare of society.

In general, these studies highlight the crucial role of education and health investment in driving sustainable human development in Vietnam and Indonesia. This investment increases productivity and income and contributes to reducing poverty rates, reducing income gaps, and improving community welfare. However, further research with a more specific and multidimensional approach is needed to understand how these investments can be maximized for optimal impact.

Method

This research used two analytical methods: the independent difference t-test and the multiple linear regression model. These two analyses aim to see the differences between the two countries (Indonesia and Vietnam) and analyze the relationship between independent variables, such as economic growth and government spending in the education and health sectors, with the dependent Variable, the Human Development Index (HDI). Multiple linear regression is used to assess the extent to which independent variables can explain variations in HDI in Indonesia and Vietnam during the 1990-2021 period. Table 1 represents the data and data sources used

Table 1: Data and Data Sources

Variables	Definitions	Source	Relationship Expectations
Human Development Index (HDI)	Measures of achievement in health, education, and a decent standard of living.	UNDP Data, 2023	-
Economic growth (GDP growth)	The annual GDP growth rate in local currency, expressed in U.S. dollars at constant 2015 prices, includes value-added taxes and excludes subsidies, depreciation, and resource depletion.	World Bank Indicators, 2023	(+)
Government expenditure in the education sector (Educ)	Government expenditure in the education sector as a percentage of GDP, including international transfers.	World Bank Indicators, 2023	(+)
Government spending in the health sector (health)	Government spending on health, a percentage of GDP, involves annual goods and services.	World Bank Indicators, 2023	(+)

Independent difference test t-test

In this research, there are two data groups, namely the Indonesian group and the Vietnamese group. The variables tested are the determining factors for the human development index based on UNDP indicators, namely Life Expectancy at Birth (le), Expected Years of Schooling (eys), and Mean Years of Schooling (mys) in years. Also, Gross National Income Per Capita (2017 PPP$). Apart from that, other additional variables tested were the level of economic growth (GDP growth) and investment in education (educ) and health (health). Table 2 shows the determinants of the analyzed human development index.

Table 2: Human Development Index Indicators

Variables	Symbol	Unit	Period	Source
Life Expectancy at Birth	le	years	1990-2021	UNDP (2022)
Expected Years of Schooling	eys	years	1990-2021	UNDP (2022)
Mean Years of Schooling	mys	years	1990-2021	UNDP (2022)
Gross National Income Per Capita	gnipc	PPP$	1990-2021	UNDP (2022)

The hypotheses tested in this research are as follows:

Null hypothesis(H_0)	:	There were no significant differences between the two groups of data
Alternative hypothesis(H_1)	:	There are significant differences between the two groups of data.

The independent t-test tests whether a significant difference exists between two means from two independent data groups (Wooldridge, 2010). To test this hypothesis, the steps needed are determining the desired significance level, calculating the t-count value, and comparing the t-count value with the t-table value at the desired significance level. The following is the t-count calculation:

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

Where

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

Regression Model Specifications

Based on previous research, investment in education and health positively impacts HDI. Therefore, the multiple linear regression model that can be used to analyze this relationship is as follows:

$$hdi = \beta_0 + \beta_1\, country + \beta_2\, GDP\ growth + \beta_3\, educ + \beta_4\, health$$

Where

hdi	=	Human Development Index
$country$	=	Dummy variable, where 1 = Indonesia, 0 = Vietnam
$GDP\ growth$	=	Economic growth (%)
$Educ$	=	Government expenditure in the education sector (% of GDP)
$health$	=	Government expenditure in the health sector (% of GDP)

This model shows that HDI is influenced by four independent variables: differences between the two countries, economic growth, government spending in the education sector, and government spending in the health sector. Where shows the influence of differences between Indonesia and Vietnam on HDI, represents the impact of economic growth, reflects the effect of government education spending, and $\beta_1\beta_2\beta_3\beta_4$ illustrates the influence of government health spending on the Human Development Index.

To test the significance of this regression model, the t-test can be used for each regression coefficient. The F test can also be used to test whether the overall regression model is significant (Gujarati & Porter, 2009 [12]; Wooldridge, 2010). The reliability indicator of the multiple linear regression model can be measured using the coefficient of determination (R^2) and correlation coefficient (r). The regression model must also meet classical assumptions: normality, independence, homoscedasticity, and multicollinearity. If the classical assumptions are met, the regression model is reliable and can predict the dependent Variable. The overall research method is designed to provide an in-depth understanding of the factors that contribute to human development in Indonesia and Vietnam and to assess the effectiveness of policies that have been implemented.

Results

Independent Difference Test t-test: Determining Factors of the Human Development Index

The independent difference t-test is a statistical test used to test whether the average of two independent data groups is significantly different. This test can be used to test the human development index (HDI) determining factors based on UNDP indicators. Before testing, a data normality test was carried out for all variables, and it was found that all data were normally 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 is a summary of the results of the independent t-test.

Table 3: Independent Difference test results t-test

Variable	Normality Test	Mean b		t-count c	p-valued
		Indonesia	Vietnamese		
le	0.004	67,335	72,746	12,176	0,000
eys	0.023	11,610	11.40995	-0.527	0.600
mys	0.001	6,530	6,569	0.104	0.918
gnipc	0.051	7374.237	4237.138	-5,950	0,000
GDP growth	0,000	4,681	6,620	2,683	0.009
educ	normal*	3,152	4,623	9,286	0,000
health	normal*	2,898	4,653	18,609	0,000

Note: Shapiro-Wilk W test, *Plot Data (norm), bDiff: mean (Vietnam) - mean (Indonesia) ct-table = 2.021, d***represent statistical significance for a 99% level, ** represent statistical significance for a 95% level, *** represents statistical significance for a 90% level

Table 3 shows the analysis results of the human development index (HDI) determining factors between Indonesia and Vietnam, revealing significant differences. Life expectancy at birth and investment in the health and education sectors show Indonesia lagging. Indonesia's life expectancy is 67.3 years, lower than Vietnam's 72.7 years. This is also influenced by lower health investment, 2.898% of GDP, compared to 4.653% of GDP in Vietnam. Likewise, Indonesia's lower investment in education, 3.152% of GDP compared to Vietnam's 4.623% GDP, also contributes to education inequality.

Even though Indonesia excels in higher gross national income per capita (GNI per capita) and faster economic growth rate (GDP growth), disparities in health and education are crucial aspects that need to be addressed immediately. Increasing investment and a development strategy focusing more on health and education will be the key for Indonesia to catch up and increase the overall HDI.

Multiple Linear Regression Analysis: The Effect of Economic Growth and Government Expenditure on the Human Development Index

Multiple regression analysis is a statistical method used to test the influence of two or more independent variables on one dependent variable. In this research, the independent Variables are dummy two countries (country), economic growth (GDP growth), government spending in the education sector (educ), and government spending in the health sector (health). Table 4 shows the results of the analysis.

Table 4: Results of multiple linear regression analysis

Dependent Variable = hdi Independent Variable	Coef	Std. Errr	t	P>|t|
cons	0.601***	0.060	10.00	0,000
country	0.045**	0.022	2,070	0.049
GDP growth	-0.004**	0.002	-2,310	0.029
educ	-0.023***	0.006	-3,730	0.001
health	0.045***	0.011	4,100	0,000
R-squared	0.616			
Adj R-squared	0.554			
Goodness of Fit Model				
Skewness/Kurtosis tests	adj chi2(2) = 2.48	Prob > chi2 = 0.2889		
Breusch-Pagan test	chi2(1) = 0.01	Prob > chi2 = 0.9204		
White's test	chi2 = 18.85	Prob > chi2 = 0.4013		
Multicollinearity test	Mean VIF = 9.35			

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

Table 4 shows significant differences between Indonesia and Vietnam in determining the Human Development Index (HDI). On the other hand, the regression coefficient for the health variable is positive and significant; a 1% increase in government spending on health is associated with an increase of 0.045 points in HDI. The regression coefficient for the GDP growth variable is negative and significant, meaning that a 1% increase in economic growth rate is associated with a 0.004 point decrease in HDI. The education variable's regression coefficient is negative and significant, meaning that a 1% increase in government spending on education is associated with a 0.023-point decrease in HDI.

Overall, the results of the linear regression analysis have good model goodness. The R-squared value of 0.616 indicates that this model explains 61.6% of the Human Development Index (HDI) variance. The adjusted R-squared value of 0.554 indicates that this model explains 55.4% of the variance in HDI after considering the number of variables. These results indicate that this model can explain the relationship between the independent and dependent variables well. Model assumption tests (Skewness/Kurtosis, Breusch-Pagan, White, Multi collinearity) showed no problems in the model. This shows that this model is fine with the basic assumptions of linear regression. Overall, this linear regression analysis results show that this model is suitable for analyzing relationships between factors that influence HDI.

Discussion

Differences in Determining Factors of the Human Development Index in Indonesia and Vietnam

The findings related to different tests of determining factors for the Human Development Index (HDI) between Indonesia and Vietnam make us aware that Indonesia is still lagging. Life expectancy at birth in Indonesia is 67.3 years, lower than in Vietnam, where it is 72.7 years. This shows that Indonesian people have a higher risk of death than Vietnamese people. Several factors can cause this difference. First, there are differences in access and quality of health services. Indonesia still needs more access to quality health services. Based on previous research results, healthcare access and utilization in rural areas could be better due to high levels of unmet healthcare needs, low healthcare utilization rates, distance, cost, and scarcity of services (Anggraini, 2023) [4]. Despite gains in maternal health services in urban areas, poor urban women still lag behind non-poor urban women in both the quantity and quality of services received (Liyanto *et al*., 2022) [17]. Additionally, research by Mentari Susilawati (2022) [19] shows that factors influencing access to health services in Indonesia include gender, distance from home to health facilities, transportation costs, domicile, people's views on health, service quality, income, and insight.

Second, there are differences in lifestyle and behavior patterns. For example, Indonesian people still have the habit of smoking and consuming unhealthy foods, which can increase the risk of non-communicable diseases, such as heart disease, stroke, and cancer. For example, Indonesian people who smoke have a 20-30% higher risk of death than people who do not smoke (Central Statistics Agency, 2023b). The Global Health Observatory Data Repository report from WHO shows that the percentage of the Indonesian population with unhealthy eating patterns reached 56.9%, higher than the global average of 44.7%. (World Health Organization (WHO), 2023). Figure 1 shows the average human development index indicators in education and health in Vietnam and Indonesia.

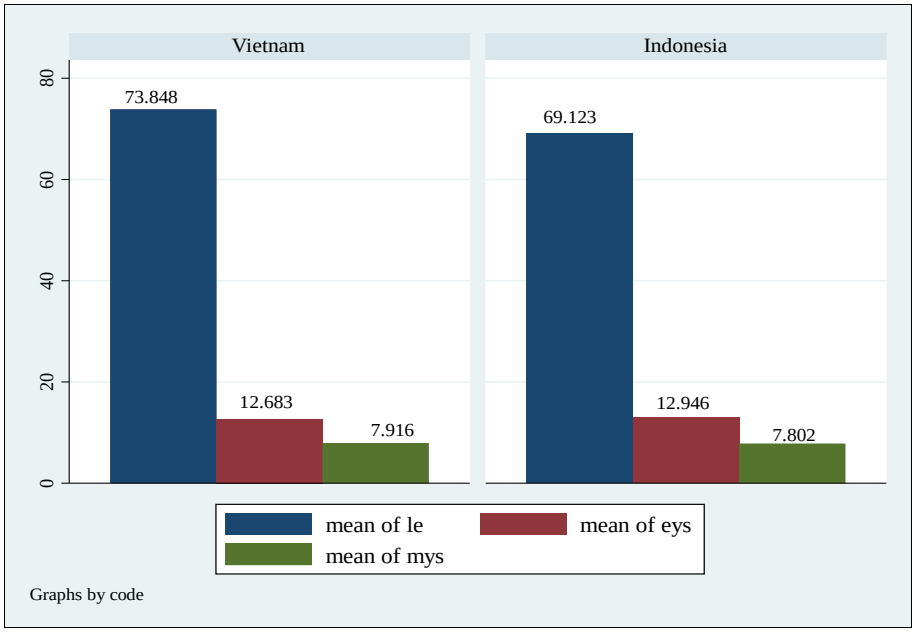

Fig 1: Mean of Life Expectancy at Birth, Expected Years of Schooling, Mean Years of Schooling in Vietnam and Indonesia, 2007-2021

Meanwhile, research results in Quan & Taylor-Robinson (2023) show that Vietnam's public healthcare system has undergone reforms to improve access and quality of care, including introducing user fees, health insurance, and financial autonomy for public hospitals. Despite these improvements, challenges remain, such as disparities in the distribution of healthcare professionals, lack of funding, and limited primary healthcare capacity (L. *et al. et al*., 2017). Efforts to address these challenges include using technology like telemedicine and mobile health apps to improve access to health services. Overall, Vietnam has made progress in expanding and improving health services, but further efforts are needed to ensure equitable and affordable access.

On the other hand, government spending on education and health in Indonesia is lower than in Vietnam. This shows that the Indonesian government needs to pay more attention to these two sectors. Government spending on education in Indonesia is 3.152% of GDP, while Vietnam is 4.623%. This shows that the Vietnamese government allocates a larger budget for education than Indonesia. This difference in education expenditure can hinder efforts to improve the quality of education and reduce the level of education inequality in Indonesia. This is because a lower budget can impact the quality of educational facilities and infrastructure, the quality of teaching staff, and the availability of educational access. Government spending on health in Indonesia is 2.898% of GDP, while Vietnam is 4.653%. This shows that the Vietnamese government allocates a larger budget for health than Indonesia. These differences in health spending could hamper efforts to increase the life expectancy of Indonesians. This is because a lower budget can impact the quality of health services, availability of medicines, and public access to health services. Figure 2 shows the average economic growth and government spending in the education and health sectors.

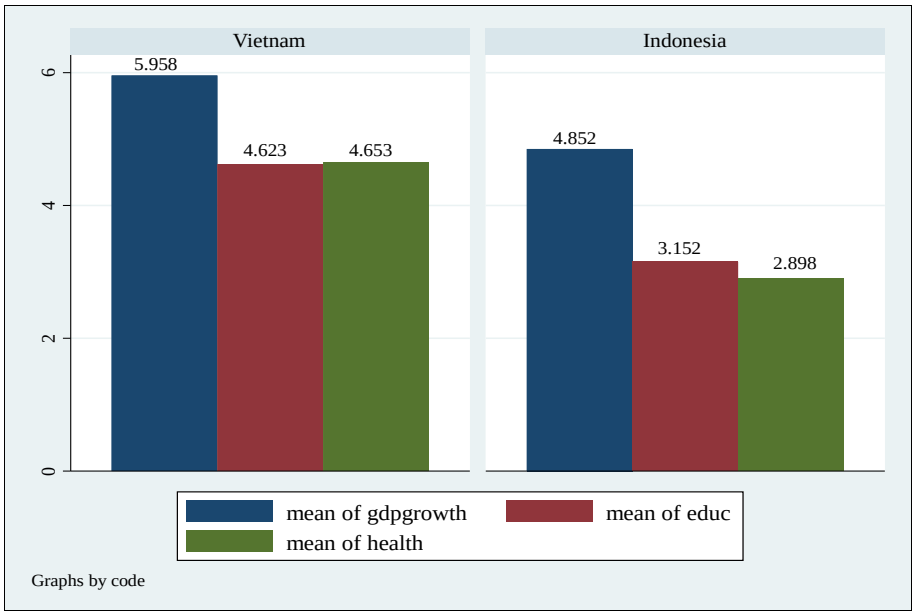

Fig 2: Average economic growth and government spending in Vietnam and Indonesia, 2007-2021

This inequality is not unreasonable. Vietnam has a more extended history of development and more people-focused policies. Geographical conditions that are more development-friendly also play a role. However, Indonesia does not need to focus on external factors. There are concrete steps that can be taken. First, increase investment in health and education. Larger budgets, efficient use of funds, and effective health education programs are essential. Second, ensure that access and quality of health and education services reach all levels of society. Build infrastructure, improve the quality of health workers and educators, and build public awareness. Third, pay attention to bureaucratic reform. Accountability, transparency, competence, and an innovative work environment are essential pillars. Catching up with HDI is more than chasing numbers. This is about building a healthier, brighter, prosperous future for Indonesians. Focusing on health and education is a solid first step. It is time to invest in people, and Indonesia will reap the rewards.

The Impact of Economic Growth and Government Expenditures on Education and Health in Indonesia and Vietnam

The findings show that the factors influencing the Human Development Index (HDI) are complex and interrelated. Several interesting findings were revealed. The state plays a vital role in determining HDI. Countries with a more conducive historical background, culture, and government system tend to have a higher HDI. This is in line with research Barro (1991) [8] found that a country's economic growth can be explained by factors related to the country, such as the quality of institutions and the legal system. Research by Knacks and Keefer (1995) [16] found that the quality of a country's institutions can influence economic growth and human development. Alkire and Santos (2010) [2] develop a multidimensional approach to human development that emphasizes the importance of non-economic factors, such as health, education, and political participation. Therefore, to increase HDI, efforts are needed to focus on economic growth and development in other areas, such as education, health, and equality.

In contrast to the results of previous research, which shows that economic growth has a positive and significant effect on the Human Development Index (HDI) (Jati & Iriani, 2023 [13]; Maknun, 2023 [18]; Nurfarkhana & Priadana, 2023) [27]. Increasing economic growth leads to increased HDI values, indicating a higher level of human development (Suprapto *et al*., 2022) [39]. The relationship between economic growth and HDI highlights the importance of equitable distribution of human development resources (Sanitra, 2021) [33]. In addition, the education index and public purchasing power index variables also have a positive and significant effect on economic growth, further emphasizing the role of human development in driving economic progress. HDI is influenced by various factors, including education expenditure, health expenditure, and people's income. These findings suggest that promoting economic growth and investment in human development is critical to increasing HDI and the overall well-being of a region or country.

Education investment is correlated with an increase in HDI, but based on research findings, this relationship is only sometimes linear. Large disbursement of funds may not significantly impact if the quality of education is low or the distribution is uneven. Incompetent teachers, irrelevant curricula, and a lack of educational facilities can prevent students from reaching their potential, minimizing the benefits of education for human development. The same situation applies to distribution. Limited access to education for poor and marginalized groups widens disparities and hinders overall human development. In line with these findings, the quality of education in Indonesia faces significant challenges, including poor scores in reading, mathematics, and science (Mustafa, 2023) [21]. Efforts to establish and maintain equity and quality in higher education have been limited, resulting in inaccessible universities to most students and questionable quality in teaching and research (Siahaan *et al*., 2023) [35]. Gaps in education quality are evident in international studies, where Indonesian students rank low in reading, mathematics, and science skills. The government has implemented policies such as establishing superior schools to improve the quality of education, but the results have been mixed (Kadir, 2022) [15]. The education system in Indonesia emphasizes rote learning and memorization, focusing on academic subjects and a heavy workload (Afifah *et al*., 2022) [1]. However, there are also advantages to the education system, such as a diverse and transparent education system and direct curriculum preparation by experts. Overall, there is a need for investment in teacher education programs, infrastructure, curriculum, and assessment system changes to improve the quality of education in Indonesia.

On the other hand, health investment shows a clear positive impact on HDI. Rising life expectancy, falling mortality rates, and higher labor productivity have contributed to increased HDI. Economic and social burdens are reduced with a healthier and more productive society, and the economy can grow faster, improving general welfare. This finding aligns with previous research stating the importance of quality education and health for human development. Sustainable investment in these two fields, improving quality and equitable distribution, is the key to increasing HDI and achieving sustainable human development. Policy recommendations that can be taken are improving the quality of education and health. Education and health are the basis for human development. Countries must invest in education and health to improve people's quality of life. They are strengthening a democratic and effective government system. A democratic and effective government system can promote equal distribution of income, equal access to public services, and environmental protection. They are developing a culture that supports human development. Culture can encourage society to invest in human development.

Conclusion

The role of human resource investment in increasing the Human Development Index in Indonesia and Vietnam shows exciting results. This research compares human development progress in Indonesia and Vietnam during the 1990-2021 period. The research results show that Vietnam has achieved more rapid progress, with an average HDI growth of 1.22%, while Indonesia was 0.93%. Economic growth and government spending in the education and health sectors are the two main factors that influence HDI. On average, Vietnam's economic growth (6.662%) is higher and more significant than Indonesia's (4.699%). This shows that faster economic growth can encourage an increase in

HDI. Government spending in the education and health sectors also significantly affects HDI. Vietnam has higher expenditure (4.623% of GDP) than Indonesia's education sector (3.152% of GDP). In the health sector, Vietnam shows greater priority (4.653% of GDP) and significantly differs from Indonesia (2.898% of GDP). This shows that investment in human resources, especially education and health, is the key to increasing HDI.

This research highlights the gap in human development progress between Indonesia and Vietnam. To catch up, Indonesia needs to increase investment in human resources, especially in the education and health sectors. This can be done by increasing the government budget and equalizing access to services. Key steps include education reform, improving health services, and stimulating inclusive economic growth.

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