Research article

Does Human Capital Matter for Indonesia's Economic Growth?

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A B S T R A C T

This study investigates the impact of human capital in the context of health and education on Indonesia's economic growth, which includes physical capital investment and trade openness as control variables. Using time series data from 1981 to 2022 and employing econometric techniques by applying the ARDL model. The findings reveal that education, investment, and trade openness have a positive and statistically significant impact on Indonesia's economic growth. Surprisingly, life expectancy has a negative and significant impact on Indonesia's economic growth. This unexpected result warrants further investigation to identify potential confounding factors or data limitations. Despite this finding, the study emphasizes the crucial role of health in human capital and long-run economic prosperity. Among the policy suggestions are enhancing nutrition, guaranteeing access to high-quality healthcare, and maximizing health transformation through the development of public health services. Concurrently, investments in education, particularly in improving quality, accessibility, and alignment with labor market demands, are essential. These findings underscore the need for a comprehensive approach to economic development that prioritizes human capital development while addressing the complexities of health-growth relationships.

A R T I C L E   I N F O

1. INTRODUCTION

Economic growth has been the focus of study since it was popularized by Solow (1956), especially in developing countries, with the aim of development analysis (Bunyamin, 2022). Many factors influence economic growth. One of them is the advancement of human resources (Ahsan & Haque, 2017; Sairmaly, 2023; and Teixeira & Queirós, 2016). An educated, technologically proficient, and physically and mentally healthy society is an efficient resource in economic activities. Quality knowledge and skills have the potential to increase the productivity and competitiveness of a country's economy. Over time, economists have identified various factors that can influence a country's economic growth. One factor that has received increasing attention is the role of human capital. Human capital, as measured by the level of education, health, and skills of workers, is considered an important asset in driving economic growth.

Human capital can be physical and non-physical in the form of health and education. Human capital can be formed through investments such as health programs, medical care, health insurance, rest and sports; education; job training; technology transfer; entrepreneurship; and research & development. Human capital can also be measured by the equitable distribution of health resources across regions for the efficiency of medical services (Liu & Huo, 2024). Investment in health and education in the context of human resource development creates a skilled and competent workforce that contributes to sustainable development (Sairmaly, 2023). Education, such as acquiring new skills, gaining experience, and utilizing new technologies, can enhance human capital. The human

capital with good education and health increases labor productivity, employment rates, and per capita income, which results in economic growth in developing countries (Harnani et al., 2022).

Indonesia will have an abundantly productive population from 2030 to 2040 (Ahmad et al., 2024). This implies that the large number of productive ages and the workforce's potential to drive the economy. A qualified human capital to compete competitively requires special programs to respond to changes in the global market. Education positively correlates with productivity, labor, and individual income (Adam & Negara, 2015; and Carillo, 2024). Indonesia must emphasize its human resource development agenda, especially health and education. Indonesia has implemented various programs to improve health and education through school participation rates and health insurance. Initially, the role of human resources in economic activities was debated by many experts due to differences in structure between developed and poor countries. However, this has been widely accepted both theoretically and empirically (Zhang & Wang, 2021). The human capital theory emphasizes that substantial investments in health and education can increase human development, accumulating productivity, and growth (Harnani et al., 2022). The study by Zhang & Wang (2021) to identify the need for human capital development with investments in health and knowledge. Knowledge can increase human specialization as a factor of production. Harnani et al. (2022) agree that measuring human capital can use basic education standards, length of schooling, fundamental skills, and cognitive and non-cognitive intelligence. The human capital theory highlights that substantial investments in health and education can increase human development, which will accumulate into productivity and growth (Harnani et al., 2022). Study by Sultana et al. (2022) describe human capital as a factor of production that can be defined in the form of health and education qualitatively and quantitatively.

The challenges in achieving consistent economic growth are constantly being scrutinized. One of the main questions is how to improve the quality of Indonesia's human resources. The main questions that arise are whether human resources have made a significant contribution to Indonesia's economic growth and whether investment in education and health care has a significant impact on productivity and economic growth. Study on the effect of human capital on economic growth has developed widely. Doré & Teixeira (2023) found evidence that human capital had a positive long-run impact on driving the Brazilian economy. Sultana et al. (2022), using panel data from 141 countries, discovered that health positively affected growth in developing countries. Ogundari & Awokuse (2018) also used panel data on Sub-Saharan African countries. They confirmed that the contribution of health was relatively more significant than the impact of education on economic growth. Zhang et al. (2023) revealed that improving human quality had been proven to increase economic activity in various provinces in China. Pelinescu (2015) emphasized that secondary education qualifications encouraged innovation and productivity in Europe, but education spending has not impacted increasing gross income. Meanwhile, Sairmaly (2023) concluded that quality education was one of the best investments because knowledge and skills would create technology and innovation, ultimately growing the economy. Liu & Huo (2024) found that provinces in China that have health investments had higher real incomes compared to provinces that invested less in health. A study by Harnani et al. (2022) in Indonesia also concluded that education, high-quality educational infrastructure, and a curriculum focused on improving cognitive skills contributed to economic growth.

Previous studies have shown a positive relationship between human capital and economic growth. However, the results of these studies often vary, depending on the country context and time period studied. In addition, the mechanism behind the relationship between human capital and economic growth is still an interesting topic for further study. However, research related to human capital development is still a hot topic of concern and debate that continues to this day. This study mainly examines the development of Indonesian human resources with two main variables, namely health and education, on economic growth by including physical capital investment and trade as control variables using time series data for the period 1981-2022. The contribution of this paper will enrich the research paradigm and theoretical framework of human capital on economic performance. Human capital is the main production factor in the economic function of a country. However, the condition of human resource quality in Indonesia still shows the quality of health and

education that must receive comprehensive attention. The Indonesian government needs a structured effort for human development programs to maximize the demographic bonus. This study emphasizes the importance of human resources through health and education measures as measures of human capital. The Solow growth theory emphasizes the role of human capital in economic growth with various supporting evidence from previous studies. The novelty of this study consists of the first theoretical gap, which proves the Solow growth theory. The second is the empirical gap, which estimates education and health in the economy. Meanwhile, most previous studies only have health or education variables. The third is the evidence gap on the use of long-term analysis. This study investigates the impact of health and education variables on Indonesia's economic growth using the ARDL model. The rest of this study is structured as follows: the second section describes the data and econometric methodology used in the analysis, the third section describes the results and discussion of the main findings; and finally, the last section provides a conclusion.

2. RESEARCH METHODS

2.1. Data

This research aims to estimate human capital's impact on Indonesia's economic growth. Human capital was proxied by health factors using the life expectancy variable and education using the school variable. Education could be measured by the total participation ratio of the population in the age group that officially corresponded to the education level that the government required. This study used the primary education variable, which provided children with basic reading, writing, and mathematics skills as well as a basic understanding of socio-culture. Furthermore, control variables used economic openness and investment. Using control variables to ensure minimal influence of other variables outside the estimated model. The data were time series for 1981-2022 with the ARDL model. The definition of operational variables is presented in Table 1 as follows.

Table 1. The Definition of Operational Variables

Variables	Description	Source
y	The annual growth rate of GDP per capita used constant (%)	World Bank
h	Life expectancy at birth (years)	World Bank
sch	The participation ratio to the number of residents was according to age groups officially with a certain level of education (school enrollment, primary, % gross).	World Bank
k	Net inflows into the economy were divided by GDP (% of GDP)	World Bank
$trade$	Total exports and imports for goods and services (% of GDP).	World Bank

2.2. Model Specification

This study refers to the growth model developed by Solow (1956) which emphasizes that gross domestic product per capita is determined by human capital, physical capital, technology, and labor. Additionally, the model compiled in this study follows the studies by Siddiqui & Rehman (2016); and Affandi et al. (2019), the equation model in this study is presented as follows.

$$\Delta y_{i,t} = f\left(h_{i,t}, sch_{i,t}, z_{i,t}\right) \tag{1}$$

Description for equation (1): $\Delta y_{i,t}$ is the growth of gross product per capita, $h_{i,t}$ denote the health of the community; sch is school enrollment, primary; and $z_{i,t}$ is control variables, such as the physical capital (k) and trade openness ($trade$).

The study model used was a development of previous studies such as Onisanwa (2014); Mendy & Widodo (2018); Ogundari & Awokuse (2018); He & Li (2020); and Bunyamin (2022), with the model in equation (2).

$$y_t = \beta_0 + \beta_1 h + \beta_2 sch_t + \beta_3 k_t + \beta_4 trade_t + \mu_t \tag{2}$$

ARDL model could be used to determine the long-run and short-run relationships between independent and dependent variables. The advantage of ARDL was that it could capture short-run dynamics and adjustments toward long-run equilibrium. The ARDL model was developed by Pesaran et al. (2001) the long-run estimation model in this research is as follows:

$$\Delta lny_t = \alpha + \beta_1 lny_{t-1} + \beta_2 h_{t-1} + \beta_3 sch_{t-1} + \beta_4 k_{t-1} + \beta_5 trade_{t-1} + \sum_{i=1}^{p} \delta_{1i}\Delta ln\, y_{t-1} +$$

$$\sum_{i=0}^{q} \delta_{2i}\Delta\, h_{t-i} + \sum_{k=0}^{q} \delta_{3k}\Delta\, sch_{t-k} + \sum_{m=0}^{q} \delta_{4m}\, \Delta k_{t-m} + \sum_{o=0}^{q} \delta_{5o}\Delta\, trade_{t-o} + \varepsilon_t \tag{3}$$

The parameters with symbols β_1, β_2, β_3, β_4, and β_5 showed the long-run coefficients. If cointegration existed, the next test, namely the error correction term (ECT), could be carried out. Estimation with ECT was carried out based on the following model:

$$\Delta lny_t = \alpha + \sum_{i=1}^{p} \theta_{1i}\Delta ln\, y_{t-1} + \sum_{j=1}^{q} \varphi_{1j}\Delta\, h_{t-j} + \sum_{j=1}^{q} \varphi_{2j}\Delta\, sch_{t-j} + \sum_{j=1}^{q} \varphi_{3j}\Delta\, k_{t-j} +$$

$$\sum_{j=1}^{q} \varphi_{4j}\Delta\, trade_{t-j} + {}^{Y}ECT_{t-1} + \varepsilon_t \tag{4}$$

The error correction term is an important parameter in measuring how rapidly variables in the model return to long-run equilibrium after experiencing shocks or changes. The ECT coefficient indicates the speed of short-run adjustment to long-run equilibrium.

3. RESULTS AND DISCUSSION

3.1. Results

Descriptive statistics provide an overview of the estimated data. The maximum growth (y) is 6.465% while the minimum growth is -14.475%. Indonesian economic development experienced a minus in 1982, 1998, 1999, and 2020. The maximum life expectancy (h) is 70.518 years, and its minimum is 59.138 years, with a standard deviation of 3.208. The life expectancy of Indonesian citizens is increasing, women generally have a longer life expectancy than men. The maximum school enrollment (sch) is 122.752%, and its minimum is 100.645% with a standard deviation is 5.050. More comprehensive descriptive statistics are presented in Table 2.

Table 2. The Result of Descriptive Statistics

Variables	Obs.	Mean	Stad.dev	Min.	Max.
lny	42	3.298	3.348	-14.475	6.465
h	42	66.018	3.208	59.138	70.518
sch	42	112.246	5.050	100.645	122.752
k	42	1.097	1.240	-2.757	2.916
$trade$	42	51.927	10.856	32.972	96.186

The first stage in testing time series data was stationarity testing. Research-based on time-series data assumed that the data was stationary if the variable had a constant mean and variance, and the *covariance* between the two periods only depended on the difference (lag) between the two periods. This research employed the Augmented Dickey-Fuller and the Phillips-Perron tests in stationarity testing. The test results indicated that all variables were stationary at the first difference, with the Augmented Dickey-Fuller and the Phillips-Perron tests. Only the growth and trade openness variables were stationary at the level and first difference. Table 3 explains the results of the stationarity test of the research data.

The best ARDL model with an optimal combination of lags was selected based on the Akaike Information Criterion (AIC). The ARDL test results revealed that the optimal lag was ARDL (2,4,0,3,4), which showed the time interval of the observation. The adjusted R-squared value is relatively high,

which is 0.855. This implies that the variation of the independent variables can explain 85.5% of the dependent variable. This is an early indication that this research model is feasible to use.

Table 3. The Results of Unit Root test

Variables	Augmented Dickey-Fuller				Phillips Perron			
	Level		1st Difference		Level		1st Difference	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept
lny	-4.902***	-4.846***	-	-	-4.893***	-4.839***	-25.099***	-24.982***
	(0.000)	(0.001)			(0.000)	(0.001)	(0.000)	(0.000)
h	-2.559	-1.001	-6.334***	-7.190***	-3.144**	-0.463	-6.337***	-7.887***
	(0.109)	(0.932)	(0.000)	(0.000)	(0.031)	(0.981)	(0.000)	(0.000)
sch	0.155	-2.495	-4.688***	-4.652***	-0.587	-2.971	-4.674***	-4.619***
	(0.966)	(0.328)	(0.000)	(0.000)	(0.862)	(0.152)	(0.000)	(0.003)
k	-2.434	-2.680	-6.123***	-6.042***	-2.570	-2.855	-6.123***	-6.042***
	(0.138)	(0.249)	(0.000)	(0.000)	(0.107)	(0.186)	(0.000)	(0.000)
$trade$	-3.043**	-3.225*	-9.509***	-9.416***	-3.107**	-3.294*	-10.264***	-10.337***
	(0.039)	(0.093)	(0.000)	(0.000)	(0.033)	(0.081)	(0.000)	(0.000)

Note: () denotes standard error; ***; **; and * are significant levels of 1%; 5%; and 10%, respectively.

Table 4 reports the ARDL Bound test, the next stage was the cointegration test between variables using the Bounds test. Pesaran et al. (2001) stated that in the ARDL model approach, the Boundscointegration test method did not question the variables in the model being I(0) or I(1). The F-statistic value obtained was 8.701, more significant than the I1 Bound value; hence, there was a long-run relationship. The test results answered the analysis of the cointegration relationship between human capital and economic growth. The results of the Bound test is presented in Table 4.

Table 4. The Result of ARDL Bound test

Test Statistic			
F-statistic = 8.701	**Critical value**	**I(0) Lower Bound**	**I(1) Upper Bound**
k = 4	10%	2.20	3.09
	5%	2.56	3.49
	2.5%	2.88	3.87
	1%	3.29	4.37

A long-run analysis was needed to discuss the economic approach. Table 5 displays the results of the long-run model estimation. The long-run ARDL estimation results showed that the investment variable had the most significant coefficient value, meaning that investment was the dominant factor influencing economic growth during the research period. According to Rahim et al. (2021), the characteristics of the entry of foreign direct investment targeted the labor-intensive industry and would shift to capital-intensive to trigger production of their economies.

We found that life expectancy has a negative sign and a significant effect on Indonesia's economic growth during the research period. The ongoing gap in access to health services in Indonesia could cause this fact. These findings differed from the research by Liu & Huo (2024) areas in China that focused on improving public health had higher real income per capita than areas that did not prioritize health. Economic development in China requires individual health and increasing labor and community productivity. Sultana et al. (2022) research also found that life expectancy indicated that quality of life positively impacted the economy in developing countries. However, different results occurred in developed countries with a relatively high old-age ratio; hence, they did not drive the economy. Additionally, education had a positive sign and significant effect on Indonesia's economic growth during the research period. This condition showed the success of the education improvement program in Indonesia. These findings were in line with research in Indonesia study by Bunyamin (2022), which found that formal education had boosted growth, especially in higher education. Han & Lee (2020) also concluded that a more productive, educated workforce had significantly contributed to economic growth; hence, policies were needed to expand investment in

education in Korea. Through education, the stock and quality of human capital increased in Brazil. Low education led to low wages and reduced quality of life (Doré & Teixeira, 2023). Carillo (2024) discovered that a workforce without adequate education caused slow technology transfer and low productivity and did not create economic innovation.

Table 5. The Estimated Result of Long and Shot-run Using the ARDL Model

Dependent variable = $\ln y$				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
Long run result				
Constant	-4.274***	1.054	-4.055	0.000
h	-0.270**	0.127	-2.118	0.046
sch	0.172**	0.068	2.493	0.021
k	2.059***	0.347	5.921	0.000
$trade$	0.067**	0.032	2.113	0.047
Short run result				
h	0.686***	0.156	4.392	0.000
sch	-0.745***	0.182	-4.088	0.000
k	3.584***	0.467	7.672	0.000
$trade$	-0.199***	0.035	-5.641	0.000
ECT(-1)*	-1.769***	0.219	-8.078	0.000
Goodness of fit				
Adj. R^2	0.855			
F-statistic	8.701***			
Diagnostic test	X^2	p-value		
Normality	0.500	0.778		
Serial LM	1.333	0.288		
Breusch-Pagan-Godfrey	1.098	0.416		

Note: () denotes t-statistics; ***; and ** are significant levels of 1%; and 5%, respectively.

Investment in physical capital has a positive sign and significant influence on Indonesia's economic growth in the long run, this indicates that investment in physical assets such as infrastructure, machinery, and production equipment plays an important role in driving economic growth. Increasing physical capital can increase productivity, efficiency, and production capacity in Indonesia. Investment in modern and efficient physical capital can increase labor productivity so that the output produced is greater with the same input. The last, trade openness had a positive sign and significant effect on Indonesia's economic growth during the research period. It emphasized that trade had an international reputation in the long run. Nguyen & Bui (2021) obtained similar results, namely that trade openness positively impacted ASEAN countries, although not optimal. These findings differed from those of Khalid (2016), who concluded that trade openness drives economic growth in Turkey only in the short run.

The error correction term (ECT) captures how quickly the system adjusts back to the long-run equilibrium after these short-run deviations occur. According to econometric rules, if ECT had a negative sign and significant effect, the ARDL model in the short run was robust. In addition, the ECT coefficient value was −1, indicating a strong and faster speed of adjustment towards equilibrium. The ECT coefficient value of 1.769 meant that the difference between economic growth and its equilibrium value was 1.7696, which would be adjusted within one year.

ARDL estimation required diagnostic tests and stability tests to ensure the accuracy of the model and its interpretation results following econometric rules. Diagnostic tests were carried out using normality, serial correlation, and heteroscedasticity tests (Table 5). The diagnostic test results showed that the model was free from normality problems, serial correlation, and homoscedasticity, namely that the residuals remained consistent throughout the range of independent variable values. For testing the stability of the model is presented in Figure 1, the CUSUM test results showed that the model was in a stable condition during the research period. The CUSUM of Squares results showed that the model was stable at alpha 0.05 but unstable in 2012-2014
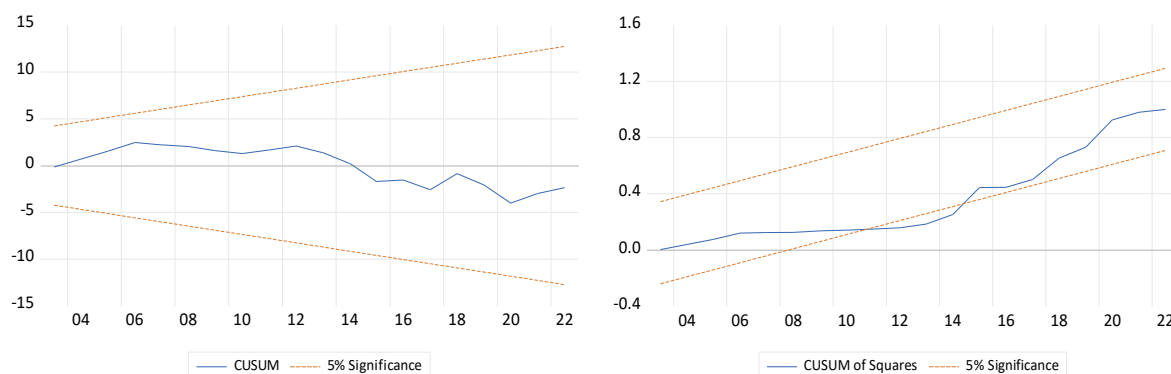
Figure 1. The Result of Stability test under CUSUM and CUSUMSQ

3.2. Discussions

The results of this study reveal that health status as a proxy for life expectancy has a significant effect on economic growth, but the coefficient is negative. According to economic principles, it could happen due to ineffectiveness in health investment. Then, the health investment portion would burden the country and slow down productivity (Zhao & Zhou, 2021). Indeed, it was contrary to the results of previous research such as Onisanwa (2014); Ogundari & Abdulai (2014); Atilgan et al. (2017); Sharma (2018); Ogundari & Awokuse (2018); and He & Li (2020), which stated that a healthier workforce had high productivity to drive economic growth. However, these research findings were similar to the results of the Bairoliya & Miller (2021); and Zhao & Zhou (2021), where health lowered income levels in China. The findings show that life expectancy has a negative sign and significant effect on Indonesia's economic growth. Life expectancy increases the aggregate ratio of savings to output and subsequently increases investment in physical capital and growth in per capita income. Survival rates are the main reason why the demographic transition has a strong positive impact on aggregate savings rates. Longevity increases balanced growth rates but is still seen as an exogenous variable (He & Li, 2020). This is what causes the estimation results to not be in accordance with the theory because there has been no serious attention to the influence of life expectancy on the economy. The next challenge is how these demographic conditions can be properly absorbed by the industry, for example by improving the quality of the population through health and education interventions, extending the working period, improving the quality of public services, and building a sustainable industry. This result was contrary to the studies of Liu & Huo (2024); and Sultana et al. (2022). Differences in facilities and services across provinces, especially in underdeveloped areas, created a sharp gap. Health is an indispensable investment for improving the quality of human resources. Countries with low levels of health have a greater challenge in achieving economic growth because it is assumed that if the community is healthy, production will increase and will lead to good economic growth.

As a large country, Indonesia has many health policies to improve health services and access, significantly reducing inequality. Several policies, such as refocusing and reallocating the health investment budget, are being implemented for social safety and national economic recovery. Countries with low levels of health have more significant challenges in achieving economic growth. Wang (2011) explains that other justifications are related to the different growth rates of each country so that health investment cannot effectively encourage the quality of human capital and instead burdens the economy. Gong et al. (2012) also explain that in developed countries, there has been an increase in health spending along with public awareness of the quality of life, as well as in developing countries that continue to improve services and equal access to health. In economic theory, human capital is included in the production function, which assumes output combines capital and skilled labor (Mankiw et al., 1992). Lucas (1988) explains that skilled labor is obtained through school to gain knowledge and skills.

We found that education has a positive sign and significant impact on economic output. Basic education aims to provide students with basic knowledge, skills, and ethics. The urgency of highlighting basic education is in line with the Indonesian government's program to revise the basic

education program up to secondary school level, and is complemented by various industry-oriented programs in the higher education sector. In 2023, the success of the education program can be seen from the achievement of the school participation rate for the 7-12 year and 13-15 year age groups above 95 percent. The achievement of the gross enrolment ratio for junior high school/equivalent, senior high school/equivalent, and tertiary levels has increased compared to the previous year. Through formal schools, human skills and abilities can be developed. Even Widarni & Bawono (2021) states that education places human capital at the highest level as a valuable and useful asset for sustainable development. The abundance of population in Indonesia is a significant investment capital in forming superior economic and social conditions. For poor households, completing education up to high school and then continuing to higher education is challenging endeavor. In this case, policy interventions must begin by providing financial and non-financial assistance and increasing parental awareness to send their children to school (Adam & Negara, 2015). All levels of education (primary, secondary, and tertiary) are equally important although Indonesia has a spectrum of jobs that are concentrated in labor-intensive areas, with many workers having low levels of education. Equalization of facilities and access to primary education is needed, especially in eastern Indonesia, which is still quite lagging behind compared to western Indonesia. For secondary and tertiary education levels, policies should focus on school participation rates, address educational issues, and provide adequate teaching platforms.

Education plays a pivotal role in generating economic growth. Ideally, higher education contributes more to economic growth, but results from various research indicated that those conditions differed based on economic capacity (Bunyamin, 2022). Developed countries demand a higher education level since their industries have advanced technology, but a lower education level is more beneficial in poor countries because their industries are typically simple and labor-intensive. This finding was also validated based on the results of previous research that education per worker had a positive and significant impact on economic growth (Afzal et al., 2011; Frini & Muller, 2012; Jalil & Idrees, 2013; Mariana, 2015; Mercan & Sezer, 2014; and Reza & Widodo, 2013), while the results of the Abdullah (2013); and Hamdan et al. (2020) stated that educational investment did not affect the economy. Knowledge becomes production input in the long run. Some research revealed that primary education is more beneficial compared to higher education, for example in Malaysia and Indonesia (Bunyamin, 2022). Human capital in Indonesian economic development has been dominated by primary and secondary education graduates. Demand for labor from primary and secondary education graduates in Indonesia is urgently needed equally. Workers who are skilled, productive, innovative, and committed play crucial roles in national development. According to the studies by Bunyamin (2022); Han & Lee (2020); Dore & Teixeira (2023); and Carillo (2024). Education is a leading sector in the development of the economy and modernization of a nation through skills, knowledge, and production capabilities. Education is an essential investment that contributes to increasing the standard of living, human quality, and national income. Education is a form of national investment to improve the quality of human resources needed for modern economic growth. Education is positively correlated with income. For poor households, completing education up to high school and then continuing to higher education is a very challenging endeavor. In this regard, policy interventions should begin with providing financial and non-financial aid and increasing parental awareness to keep their children in school (Adam & Negara, 2015). All levels of education (primary, secondary, and tertiary) are equally important although Indonesia has a spectrum of jobs that are concentrated in labor-intensive areas, with many workers having low levels of education. Equalization of facilities and access to primary education is needed, especially in eastern Indonesia, which is still quite lagging behind compared to western Indonesia. For secondary and tertiary education levels, policies should focus on school participation rates, address educational issues, and provide adequate teaching platforms.

The results of the study show that investment in physical capital has a positive and significant effect on economic growth. Investment brings in capital goods, raw materials, and finished goods, thus creating business opportunities and jobs. This finding was support and aligned with the study by Nguyen & Bui (2021), which highlighted the importance of investment in Asean-6 countries. Investment is an important source to help improve economic growth. It must be accompanied by

macroeconomic stability and a favorable investment environment. The results are aligned with previous studies from Nguyen & Nguyen (2021); and Dankyi et al. (2022). Endogenously, investment role contributes to determining the long-run economic growth. The concept of investment in a broad sense can be categorized into physical capital and human capital. Portion of the Indonesian economy is still dominated by the consumption sector. However, one of the investment components is aggregate expenditure, so the increase in investment will foster aggregate demand, national income, and employment opportunities. The addition of physical capital will increase production capacity, and a technology shifting process will follow. Domestic needs in Indonesia still depend on imported goods for production and export input that only relies on primary commodities. Of course, this becomes a challenge to use investment as a vehicle for procuring cheap domestic inputs, new ideas, and advanced techniques. Thus, in accordance with the explanation from Dankyi et al. (2022), investment can bridge the gap between investment needs and domestic savings.

Trade openness has a positive sign and a significant influence on Indonesia's economic growth, according to the results of Nguyen & Bui (2021). However, it was different from the study by Khalid (2016) result. In an era of increasingly integrated globalization, international trade has become a major focus in evaluating Indonesia's economic growth. In recent years, Indonesia has recorded a significant increase in international trade, with export and import values continuing to increase. International trade not only created opportunities to increase income through exports of goods and services but also allowed access to technology, capital, collaboration with trading partners, and global markets. It could increase human capacity and innovation in various economic sectors, which will ultimately support Indonesia's economic growth in the long-run. Trade openness is important because the positive impact of trade expansion on economic growth has been proven. Import and export growth can stimulate GDP growth through its beneficial impact in encouraging efficient resource allocation, greater capacity utilization, and international promotion. Nguyen & Bui (2021) explained that the impact of trade openness in the long run will make countries specialize according to their comparative advantages, allowing countries to develop profitable goods at lower costs compared to other countries. The Indonesian government has made many policies using international trade as an engine of growth for the economy, including expansion of the variety of export products, expansion of the destination countries market, and efficiency of import-export procedures. As explained by Nguyen & Nguyen (2021), trade openness promotes economic growth through trade partners can mutually benefit affects by providing access to advanced technology to enhance domestic production and enhancing total factor productivity.

4. CONCLUSIONS

Health and education investment are important elements in developing Indonesia's human capital. Health and education are benchmarks for the standard of human quality of life. The main findings provide new findings that raise debate. We find that education, trade openness, and investment have positive signs and significant effects on Indonesia's economic growth. However, life expectancy has a negative sign and significant effect on Indonesia's economic growth. The findings of this study have implications for development policies in Indonesia. Although investment in education and trade is proven to have a positive impact on economic growth, the surprising result is the negative effect of life expectancy on economic growth. This requires an in-depth evaluation of existing health policies. The government needs to conduct further studies on the factors that cause this negative relationship, whether other variables have not been captured in the model, or whether there is a misinterpretation of the data. We highlight that health policy reform is essential to advance the country's health through public health milestones. Health spending is an effective investment for health services in the long run. Health sector transformation is a key pillar in supporting the achievement of economic growth. The development of a resilient and responsive health system is needed to ensure that people live healthy and long lives by strengthening medical personnel, developing health services in villages, improving nutrition in the first 1,000 days of life, and providing effective and affordable health services. In addition, efforts to increase investment in education are also important points that can be carried out starting from basic education to higher education by ensuring its quality, providing adequate educational facilities and infrastructure, developing a

curriculum that is in accordance with the demands of the labor market, and increasing accessibility to information and technology. This aims to optimize the structure of human resource abundance in order to realize sustainable coordination of Indonesia's economic development.

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