The Relationship between Human Capital and International Trade on the Dynamics of Poverty and Economic Growth in Indonesia

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Abstract
This research explores the influence of human capital and international trade on poverty levels and economic growth in Indonesia, using data from the World Bank covering the period from 2001 to 2020. The variables used include education and health as representations of human capital and exports and imports as representations of international trade, poverty, and economic growth. The analysis used the vector autoregressive model (VECM) to examine these variables' relationships. The research results show that improving the quality of human capital positively contributes to economic growth, with education and health having a significant impact. Education also proves to enhance international trade through exports and imports, but it also has a negative impact on poverty. Additionally, exports have a significant negative impact on poverty and a significant positive impact on economic growth. These findings support the hypothesis that increasing human capital and international trade reduces poverty and economic growth in Indonesia. Therefore, policymakers must develop investment strategies in human capital and balance international trade to achieve sustainable economic growth and reduce poverty.
Keyword : Education, Health, Export, Import, Poverty, Economic Growth.

Introduction
Human capital, exports, and imports are three interconnected economic factors that play an essential role in influencing the poverty level in a country (Rahman, Nepal, & Alam, 2021). Human capital drives productivity and economic growth, including the Population's skills, knowledge, and health (Bawono, 2021). Good education and practical training improve the quality of the workforce, while good health ensures that individuals can work optimally (Rieckert et al., 2021). This combination forms a strong foundation of human capital, enabling the country to compete globally and attract foreign investment. A quality education gives people the abilities and information required for various industry areas (Li, 2022). This includes technical skills, critical thinking, creativity, and adaptability all crucial factors in facing the ever-changing economic challenges. Meanwhile, practical training ensures that the workforce continues to develop and can meet the dynamic job market demands. This training can include technical skills training, leadership development, or even the enhancement of highly needed soft skills in the modern workplace (Hirudayaraj et al., 2021).
Good health also plays a vital role in human capital. Excellent health allows individuals to work productively and efficiently without being hindered by illness or other health conditions (Crawford et al., 2020). People with good physical and mental health can focus on their work, complete tasks more quickly and accurately, and contribute more to the company. Healthy employees take sick leave less often, which means they are more consistently present and actively participate in daily activities (Kaluza et al., 2021). Additionally, healthy individuals have higher energy levels, which improves their performance and boosts workplace morale and spirit (Jena, 2022). Employees who feel healthy and energetic tend to be happier and more motivated to give their best at work.

Policies to ensure easy and affordable access to quality healthcare services are crucial in maintaining the workforce's health (Warner et al., 2020). The Government can play a crucial role by providing adequate healthcare facilities, implementing preventive health programs, and ensuring that healthcare services remain affordable for all layers of society. Easy access to healthcare services allows individuals to receive the care they need promptly, avoid more serious illnesses, and improve recovery from diseases or injuries they have suffered (Simpson & Robinson, 2020).

Employees feel appreciated and cared for in a more upbeat and encouraging work atmosphere when health is prioritized (Rasool et al., 2021). This increases employee loyalty and retention and attracts the best talents to join the company. In the long term, investing in the workforce's health is an investment in the success and sustainability of the country's economy (Abubakar et al., 2022). We build a solid foundation for inclusive and sustainable growth and prosperity by ensuring everyone can access quality healthcare services. Human solid capital enables a country to compete globally and attract foreign investment (Kanval et al., 2024). When investors see that a country has a skilled and healthy workforce, they will be more interested in investing capital in that country. This foreign investment is crucial because it can create new jobs and increase national income (Magdalena & Suhatman, 2020). Foreign companies that enter will need local labor, which means job creation for the local Population. In addition, foreign investment also brings new technology, more efficient business practices, and capital flows that can help improve infrastructure and the quality of life for the community (Fernandez & Joseph, 2020).A good balance between exports and imports to achieve sustainable economic growth (Adewuyi & Awodumi, 2021). The Government must create policies that support the development of local industries while ensuring that imports are used strategically to support the sectors that need them. Wise trade policies can include incentives to boost exports, such as financial support for companies looking to enter international markets and import tariffs to protect domestic industries from unfair competition (Goldstein & Gulotty, 2021). At the same time, it is crucial to identify sectors where imports are essential and ensure that these imported products can support overall economic growth. By ensuring a balance between exports and imports, a country can maximize the economic benefits of international trade while minimizing the risks associated with excessive dependence on imports. This balanced approach strengthens the country's domestic economy, creates jobs, and reduces poverty. The right international trade policies can be a powerful tool for sustainable and inclusive economic development and bring greater prosperity to society (van Niekerk, 2020). This research aims to analyze the role of human capital and international trade in exploring the relationship between poverty levels and economic growth in Indonesia.

Research Methods
This research study explores the influence of human capital, exports, and imports on Indonesia's poverty rate and economic growth. The data used in this research is sourced from World Bank data covering the period from 2001 to 2020. The variables used are education and health as representations of human capital, exports and imports as representations of international trade, poverty, and economic growth. Furthermore, the analysis used is vector autoregressive in the VECM model to examine the relationship and influence of human capital, exports, and imports on the poverty and economic growth levels in Indonesia.

Table 1. Variabel Research

Variable	Description	Source	Unit Analysis
Education	This variable explains that the primary completion rate, also known as the gross intake ratio to the last grade of primary education, is calculated by dividing the number of new entrants (enrollments minus repeaters) in the final grade of primary education, regardless of age, by the population at the entrance age for the final grade of primary education.	World Bank	Percent
Health	This variable explain that the amount of money currently spent on health care relative to GDP. Health-related capital expenditures including buildings, equipment, IT, and vaccine stocks for pandemics or emergencies are not included in this index.	World Bank	Percent
Export	This variable shows how exports of products and services reflect the value of all commodities and other market services provided to the rest of the globe. These include cargo, insurance, travel, royalties, license fees, commodity prices, and other Government, financial, business, personal, and informational services.	World Bank	Percent
Import	This variable indicates that the value of all commodities and other market services purchased from the rest of the world is represented by imports of products and services.	World Bank	Percent
Poverty	This variable explain that the national poverty headcount ratio (s) is the proportion of the Population that lives below the national poverty line. National data are based on estimates of population-weighted subgroups from house surveys.	World Bank	Percent
GDP Growth	This variable explains the total gross value the nation's producers	World Bank	Percent

	contributed, deducting any unreported subsidies and adding product taxes. Natural resource exhaustion and depletion, as well as the depreciation of human-made assets, are not considered.		

$$EDU_t \quad = \beta_0 + \beta_1 HLT_t + \beta_2 EPT_t + \beta_3 IMP_t + \beta_4 POV_t \, \beta_5 GDP_t + e_t \qquad \text{eql 1}$$
$$HLT_t \quad = \beta_0 + \beta_1 EPT_t + \beta_2 IMP_t + \beta_3 POV_t + \beta_4 GDP_t + \beta_5 EDU_t + e_t \qquad \text{eql 2}$$
$$EPT \quad = \beta_0 + \beta_1 IMP_t + \beta_2 POV_t + \beta_3 GDP_t + \beta_4 EDU_t + \beta_5 HLT_t + e_t \qquad \text{eql 3}$$
$$IMP \quad = \beta_0 + \beta_1 POV_t + \beta_2 GDP_t + \beta_3 EDU_t + \beta_4 HLT_t + \beta_5 EPT_t + e_t \qquad \text{eql 4}$$
$$POV_t \quad = \beta_0 + \beta_1 GDP_t + \beta_2 EDU_t + \beta_3 HLT_t + \beta_4 EPT_t + \beta_5 IMP_t + e_t \qquad \text{eql 5}$$
$$GDP_t \quad = \beta_0 + \beta_1 EDU_t + \beta_2 HLT_t + \beta_3 EPT_t + \beta_2 IMP_t + \beta_2 POV_t + e_t \qquad \text{eql 6}$$

Description:
EDU   = Education
HLT   = Health Expenditure
EXP   = Export
IMP   = Import
POV   = Poverty
GDP   = Economic Growth
β   = The extent of causality's influence
e   = Error term

The statistical analysis technique called VAR simulates the dynamic relationships between several time variables. VECM is one of the research models that is part of VAR. Stationarity testing is necessary to ensure that the data does not contain trends or seasonal patterns that could distort the research results. Stationarity testing is the Augmented Dickey-Fuller test. (ADF). The optimal lag duration is then determined using information criteria such as the Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion. (SBC). Then, the VECM model can be used for further examination. The Granger causality test is then used to see if one variable can predict another variable. In addition, Impulse Response Function research provides a general review of the direct and long-term impacts of changes in one variable on another. (IRF). Finally, Variance Decomposition (VD) analysis was performed to determine the percentage of each variable's variability that may be accounted for by shocks to other variables. The analysis makes a more comprehensive understanding of the dynamic interactions between the variables studied possible.

H0: $\alpha = 0$
H1: $\alpha \neq 0$

Result and Discussion
The first step in testing the VECM method is to examine the research data through a stationarity test to ensure the data is stationary at the same level. In this study, the stationarity test uses the ADF test method, as described in Table 2.

Table 2. ADF Stationary Test

Variabel	Unit Root	Statistics for the Augmented Dickey Fuller	Probability	Description
Education (EDU)	Level	-1.772450	0.3816	No Stationary
	First Different	-5.011924	0.0010	Stationary
Health (HLT)	Level	-2.823312	0.0771	No Stationary
	First Different	-3.814618	0.0123	Stationary
Export (EPT)	Level	-3.061346	0.0471	Stationary
	First Different	-4.376864	0.0038	Stationary
Import (IMP)	Level	-1.808950	0.3650	No Stationary
	First Different	-6.103028	0.0001	Stationary
Poverty (POV)	Level	-0.927165	0.7564	No Stationary
	First Different	-4.053986	0.0067	Stationary
GDP Growth (GDP)	Level	-2.433556	0.1464	No Stationary
	First Different	-6.141843	0.0001	Stationary

Based on Table 2 above, the results of the stationarity test using the ADF method show that all research variables are stationary at the same level, so the testing continues to determine the lag criteria to be used, which will be shown in Table 3 below:

Table 3. Lag Length Criteria Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-202.4514	NA	136.3983	21.94226	22.24050	21.99273
1	-134.6797	85.60637*	5.981622*	18.59787*	20.68557*	18.95119*

The optimal lag test using the Lag Length Criteria method shown in Table 3 above indicates that the lag length is constant at the lag one category, so the determination of lag usage in this study is lag 1. Further testing is needed to ensure the use of the analysis model described in Table 4.

Table 4. Cointegration Trace Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.896437	94.75025	69.81889	0.0002
At most 1 *	0.704699	53.93396	47.85613	0.0121
At most 2 *	0.662100	31.97828	29.79707	0.0276
At most 3	0.461578	12.44817	15.49471	0.1367
At most 4	0.069890	1.304145	3.841466	0.2535

The results of the cointegration test in Table 4 above indicate the presence of cointegration. This is also supported by the trace test results, which show the presence of 3 cointegrations. Thus, the testing model is continued using the VECM model.

Table 5. VECM Test Result

	EDU	HLT	EPT	IMP	POV	GDP
EDU(-1)	0.698756	-0.018055	0.864363	0.558274	-0.066957	0.033302
	(0.27826)	(0.02497)	(0.84389)	(0.28136)	(0.08111)	(0.05453)
	[2.51120]	[-0.72315]	[1.02426]	[1.98423]	[-0.82553]	[0.61065]
HLT(-1)	-1.115496	0.347323	-6.240157	-4.810135	1.149174	1.214921
	(4.58125)	(0.41107)	(13.8939)	(4.63227)	(1.33538)	(0.89787)
	[-0.24349]	[0.84492]	[-0.44913]	[-1.03840]	[0.86056]	[1.35312]
EPT(-1)	0.008375	0.003710	0.458212	0.270032	-0.016501	0.060640
	(0.09600)	(0.00861)	(0.29115)	(0.09707)	(0.02798)	(0.01882)
	[0.08724]	[0.43068]	[1.57379]	[2.78180]	[-0.58967]	[3.22295]
IMP(-1)	-0.056110	-0.014891	-1.997370	-0.280526	0.207095	-0.026278
	(0.28887)	(0.02592)	(0.87608)	(0.29209)	(0.08420)	(0.05662)
	[-0.19424]	[-0.57450]	[-2.27990]	[-0.96042]	[2.45949]	[-0.46416]
POV(-1)	-0.160893	-0.071234	3.079145	1.413017	0.758512	0.123347
	(0.43517)	(0.03905)	(1.31976)	(0.44001)	(0.12685)	(0.08529)
	[-0.36973]	[-1.82430]	[2.33311]	[3.21131]	[5.97980]	[1.44625]
GDP(-1)	1.531951	0.052733	0.795127	1.879969	-0.652157	0.273218
	(1.21155)	(0.10871)	(3.67434)	(1.22504)	(0.35315)	(0.23745)
	[1.26446]	[0.48507]	[0.21640]	[1.53462]	[-1.84668]	[1.15064]
C	29.78061	4.713560	-68.30111	-45.28770	5.226240	-4.223107
	(29.5494)	(2.65145)	(89.6165)	(29.8785)	(8.61330)	(5.79133)
	[1.00782]	[1.77773]	[-0.76215]	[-1.51573]	[0.60676]	[-0.72921]

Based on Table 5 above. Human capital contributes to economic growth. Education (EDU) has a positive impact on economic growth (GDP) with a t-statistic value of [0.61065] affecting the coefficient value (0.05453). Additionally, health (HLT) also has a positive impact with a t-statistic value of [1.35312] affecting the coefficient value (0.89787). This explains that the improvement in the quality of human capital will contribute to increasing economic growth. Thus, these results support the hypothesis that human capital positively impacts economic growth in Indonesia. On the other hand, education (EDU) has a positive effect on exports (EPT) t-statistic value of [1.02426] being more significant than the coefficient value. (0.84389).

Education (EDU) also affects imports (IMP) with a t-statistic value of [1.98423] influencing the coefficient value (0.28136). This result explains that improving education within the context of human capital will enhance international trade through exports and imports. Education (EDU) has a negative impact on poverty (POV) with a t-statistic value of [-0.82553] influencing the coefficient value (0.08111). This result explains that education within the context of human capital has impact on poverty, meaning that an improvement in the quality of education will reduce poverty. The

results of this test support the hypothesis that the improvement in the quality of human capital has a significant negative impact on poverty in Indonesia.

The contribution of international trade to the poverty rate and economic growth can be seen based on the results of the relationship between variables. Based on Table 5, exports (EPT) have a significant negative impact on poverty (POV) with a t-statistic value of [-0.58967] affecting the coefficient value (0.02798). An increase in exports will reduce the poverty rate, thus supporting the hypothesis that an increase in international trade has a negative impact on poverty in Indonesia. Additionally, exports (EPT) has a positive influence on economic growth (GDP) with a t-statistic value of [3.22295] affecting the coefficient value (0.01882). This result explains that an increase in exports will boost economic growth. Furthermore, the research findings support the hypothesis that international trade positively impacts economic growth in Indonesia.

Table 6. Granger Causality Test

Null Hyphothesis :	Obs	F-statistic	Prob
HLT does not Granger Cause EDU	19	1.17793	0.2939
EDU does not Granger Cause HLT		0.11900	0.7346
EPT does not Granger Cause EDU	19	0.01991	0.8896
EDU does not Granger Cause EPT		1.10326	0.3092
IMP does not Granger Cause EDU	19	0.03935	0.8453
EDU does not Granger Cause IMP		1.43939	0.2477
POV does not Granger Cause EDU	19	0.46896	0.5033
EDU does not Granger Cause POV		0.13824	0.7149
GDP does not Granger Cause EDU	19	3.90777	0.0656
EDU does not Granger Cause GDP		0.09234	0.7651
EPT does not Granger Cause HLT	19	0.02332	0.8805
HLT does not Granger Cause EPT		1.35286	0.2618
IMP does not Granger Cause HLT	19	1.48963	0.2400
HLT does not Granger Cause IMP		0.73627	0.4035
POV does not Granger Cause HLT	19	4.50243	0.0498
EPT does not Granger Cause POV		0.55592	0.4667
GDP does not Granger Cause HLT	19	0.12801	0.7252
EPT does not Granger Cause GDP		2.00130	0.1763
IMP does not Granger Cause EPT	19	0.21369	0.6501
EPT does not Granger Cause IMP		2.15825	0.1612
POV does not Granger Cause EPT	19	2.49939	0.1335
EPT does not Granger Cause POV		0.37334	0.5498
GDP does not Granger Cause EPT	19	2.02439	0.1740
EPT does not Granger Cause GDP		13.6774	0.0019
POV does not Granger Cause IMP	19	6.03931	0.0258
IMP does not Granger Cause POV		3.63425	0.0747
GDP does not Granger Cause IMP	19	0.10473	0.7504
IMP does not Granger Cause GDP		0.00859	0.9273
GDP does not Granger Cause POV	19	0.63194	0.4383
POV does not Granger Cause GDP		0.04328	0.8378

The Granger test results in Table 6 show that there is only a one-way reciprocal relationship between exports (EPT) and economic growth (GDP) with a probability

value of 0.0019. The Impulse Response in Figure 1 will depict a more detailed illustration of the influence between variables for each period.
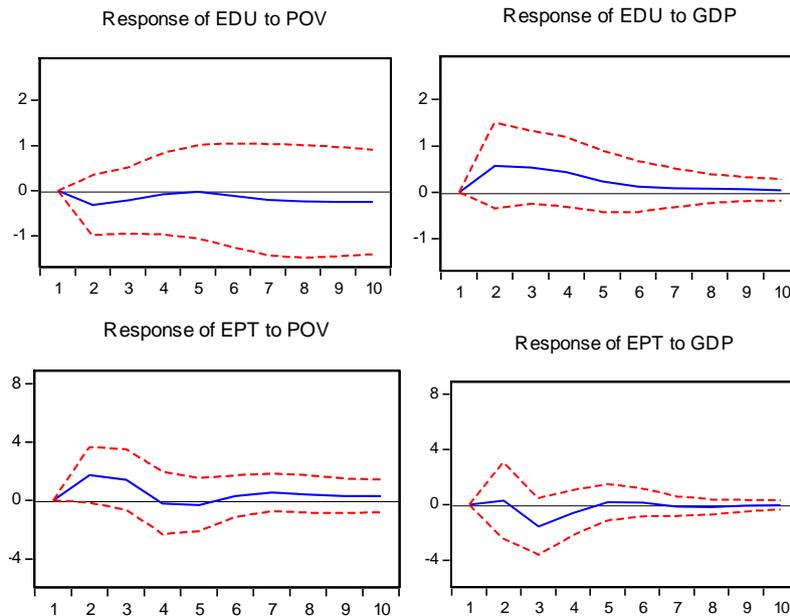

Fig 1. Impulse Response

The relationship between all research variables experiences a change in response when there is a disturbance in one of the variables, as explained in Fig 1. The education variable (EDU) response to the poverty variable (POV) appears stable, with a slight decrease in the second period, which is not significant, and an increase again in the third period. This response only changes a little in the tenth period. The education variable (EDU) response to the economic growth variable (GDP) shows a significant increase in the second period, with a gradual decrease occurring from the third to the sixth period. The export variable (EPT) response to the poverty variable (POV) experiences fluctuations, with significant increases in the second and third periods. The fourth period sees a significant decrease, and the relationship in the subsequent periods fluctuates until the tenth period. The export variable (EPT) response to the economic growth variable (GDP) also fluctuates, with a drastic decrease occurring in the second to third periods. However, in the subsequent period, it increased again until the fifth period and remained stable until the tenth period.

Table 7. Variance Decomposition Test

Period	S.E.	EDU	HLT	EPT	IMP	POV	GDP
1	0.642537	3.986994	2.472098	5.400785	0.201232	87.93889	0.000000
2	0.985682	4.212694	1.309613	11.44255	8.176437	68.69324	6.165470
3	1.160742	4.123175	2.699550	14.68796	8.265475	64.57924	5.644593
4	1.307456	3.367993	3.348782	16.54403	7.819499	63.46932	5.450370
5	1.430880	2.812857	3.745459	17.17741	7.646883	63.25878	5.358617
6	1.539082	2.444697	4.051698	17.73592	7.689290	62.87646	5.201932
7	1.636961	2.213107	4.222408	18.52737	7.659043	62.41760	4.960478
8	1.727189	2.086164	4.220572	19.35500	7.523178	62.09909	4.716003
9	1.810216	2.020475	4.122957	20.04197	7.369746	61.93369	4.511156
10	1.886196	1.979277	4.004084	20.59151	7.245522	61.83425	4.345356

The relationship and contribution of the research variables in explaining their respective variabilities through the Variance Decomposition test are explained in Table 7. The

poverty variable (POV) contributes 87.93% in explaining its variability in the first period. The value decreased until the tenth period with a value of 61.83%. The education variable (EDU) contributed to explaining the variability of the poverty variable (POV) in the first period by 3.98%, which decreased to 1.97% in the tenth period. The health variable (HLT) contributed to explaining the variability of the poverty variable (POV) by 2.47% in the first period, which increased to 4.00% in the tenth period. The export variable (EPT) contributed 5.40% in the first period to explain the variability of the poverty variable (POV), which increased to 20.59% in the tenth period. The import variable (IMP) contributed 0.20% in the first period to explain the variability of the poverty variable (POV), which increased to 7.24% in the tenth period. Lastly, the economic growth variable (GDP) contributed 6.16% in the second period to explain the variability of the poverty variable (POV), which decreased to 4.34% in the tenth period. This shows that the poverty variable is significantly crucial in explaining its variability. The contribution of other variables also influences the explanation of the poverty variable, such as education, health, exports, imports, and economic growth.

Conclusion
The analysis indicates that the enhancement of the quality of human resources is beneficial to the economy. Education and health is strongly positively correlated to economic growth, thus supporting the theory of human capital being a contributor to economic growth of Indonesia. Furthermore, education enhances international trade through exports and imports. Education improves the situation of poverty to a great extent, that is, the level of education determines the extent of poverty. This supports the hypothesis that increase in human capital is a huge contributor to the reduction of poverty in Indonesia. As for the impact of international trade and poverty with economic growth, the results indicate that exports are detrimental to poverty and beneficial to economic growth. More exports lead to a reduction in poverty and increase economic growth which supports the hypothesis that international trade is beneficial to economic growth and detrimental to poverty in Indonesia. Therefore, the government needs to formulate policies to invest in human capital with proper regulations on international trade to sustain economic growth and poverty reduction which will contribute to the growth of the economy in Indonesia.

Limitation and Originalitas
This research was conducted from 2001 to 2020 to uncover the relationship between human capital through education and health, international trade through exports and imports, poverty levels, and economic growth in Indonesia. This research has a limitation in that it uses an extended period, so the study's results do not explain the dynamic changes that occur outside the measured period. Furthermore, this research focuses on the interaction of variables occurring in Indonesia, thus limiting the generalization to a broader Population scope. This research fills the gap in the existing literature regarding analyzing the influence of human capital through education and health, international trade through exports and imports, poverty levels, and economic growth in Indonesia. Policymakers are expected to use the findings of this research as vital information to evaluate policies that support those findings. Thus, this research provides new insights into the relationship between these variables and offers a strong foundation for better decision-making in reducing poverty levels and contributing to economic growth in Indonesia.

Suggestion and Policy Contribution

This research is expected to contribute scientific insights in explaining the relationship between education and health in human capital. The limitations of this study are expected to allow for more complex analytical explorations in future research, resulting in more comprehensive outcomes. Thus, this research provides new insights into the relationship between these variables and offers a strong foundation for better decision-making in strategies to enhance human capital and international trade in reducing poverty levels and contributing to economic growth in Indonesia.

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