

Impact of Poverty, Economic Growth, and Information and Communication Technology on Human Development

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ABSTRACT

Human development is one of the main problems in developing countries, as seen from the relatively low Human Development Index (HDI) level. This study examines how poverty, economic growth, and information and communication technology (ICT) influenced the quality of human development in Indonesia in 2014–2020. The research method used was panel data regression analysis with cross-sectional observations of 34 provinces. The study results show that poverty has a negative and significant impact on the quality of human development in Indonesia. Meanwhile, ICT has a positive and significant impact on the quality of human development. There is no significant evidence of the effect of economic growth on the quality of human development. The results of this study are helpful for the central and regional governments in making policies related to human development in Indonesia. This finding implies that coordination of poverty reduction efforts between central and local governments is essential for human development. In addition, the government needs to pay attention to the quality of the distribution of ICT availability between regions to improve the quality of human development in Indonesia.

ABSTRAK

Pembangunan manusia merupakan salah satu masalah utama di negara-negara berkembang, yang terlihat dari tingkat Indeks Pembangunan Manusia (IPM) yang relatif rendah. Penelitian ini menguji bagaimana kemiskinan, pertumbuhan ekonomi, dan teknologi informasi dan komunikasi (TIK) mempengaruhi kualitas pembangunan manusia di Indonesia pada tahun 2014-2020. Metode penelitian yang digunakan adalah analisis regresi data panel dengan observasi cross-sectional terhadap 34 provinsi. Hasil penelitian menunjukkan bahwa kemiskinan berpengaruh negatif dan signifikan terhadap kualitas pembangunan manusia di Indonesia. Sementara itu, TIK berdampak positif dan signifikan terhadap kualitas pembangunan manusia. Tidak ada bukti yang signifikan mengenai pengaruh pertumbuhan ekonomi terhadap kualitas pembangunan manusia. Hasil penelitian ini bermanfaat bagi pemerintah pusat dan daerah dalam membuat kebijakan terkait pembangunan manusia di Indonesia. Temuan ini mengimplikasikan bahwa koordinasi upaya pengentasan kemiskinan antara pemerintah pusat dan daerah sangat penting untuk pembangunan manusia. Selain itu, pemerintah perlu memperhatikan kualitas pemerataan ketersediaan TIK antar daerah untuk meningkatkan kualitas pembangunan manusia di Indonesia.

1. INTRODUCTION

The Human Development Index (HDI) measures a country's progress in human development (Maulana & Bowo, 2013; Dasic et al., 2020). The Human Development Index is used to designate countries as developed, developing, or underdeveloped based on how they attain development outcomes regarding income, health, and education (Kinnunen et al., 2019). The HDI is calculated using data on four components, i.e., life expectancy, which measures healthcare success; literacy rate and average school time, which measures

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educational performance; individual purchasing power for various basic needs; and the average cost per capita as the income approach, which measures development success for a decent life (Central Bureau of Statistics, 2021).

The HDI is a crucial indicator that can be used to measure the success of efforts to improve the quality of human life and can also be used to determine the classification or level of development of a region or country. Thus the human development index is indirectly related to human capital (Martínez-Vázquez et al., 2021; Nguyen, 2021; Qisthina et al., 2019). Human capital is combined knowledge, skill, innovativeness, and the ability of the individual to meet the task at hand (Wuttaphan, 2017; Zhou et al., 2019). There are two strategies for building or preserving human resources; namely, humans are used as labor because the quantity is quantitative, which means that the more people or labor, the higher the productivity and investment to increase; and maintain human resources (Doppelt, 2019). In addition, education and training in the community will improve their talents and abilities, resulting in increased output (Tchamyou, 2020; Tchamyou et al., 2019).

In assessing Indonesia's HDI level, Indonesia is rated 107th out of 189 countries (UNDP, 2020). In addition, Indonesia ranks sixth among ASEAN countries. Under these circumstances, Indonesia still needs and continues to improve its human development index. Indonesia's HDI score was 0.718 in 2019, which increased from 0.712 in 2018, meaning that a child born in Indonesia today will only be 54 percent as productive as she or he could be under the benchmark of complete education and total health (World Bank, 2019). The HDI in ASEAN can be seen in Figure 1.

Studies on the determinants of human development are scarce, although this indicator is essential for economic development. The existing literature generally examines the effect of human capital on economic growth (Diebolt & Hippe, 2019; Nguyen, 2022; Samargandi et al., 2015;). The only research that examines the determinants of human capital development is Imandojemu & Babatunde (2020). These two researchers examined the determinants of human capital development in Nigeria using the ARDL approach. Therefore, this study closes this research gap to make a new contribution to the literature by examining the determinants of human capital development, not their effects. This study aimed to explore the impact of poverty rate, economic growth, and information and communication technology (ICT) on Indonesia's quality of human development. It is urgent to investigate because it refers to the National Priorities in Government Work Plan for 2022, which is increasing quality and competitive human resources.

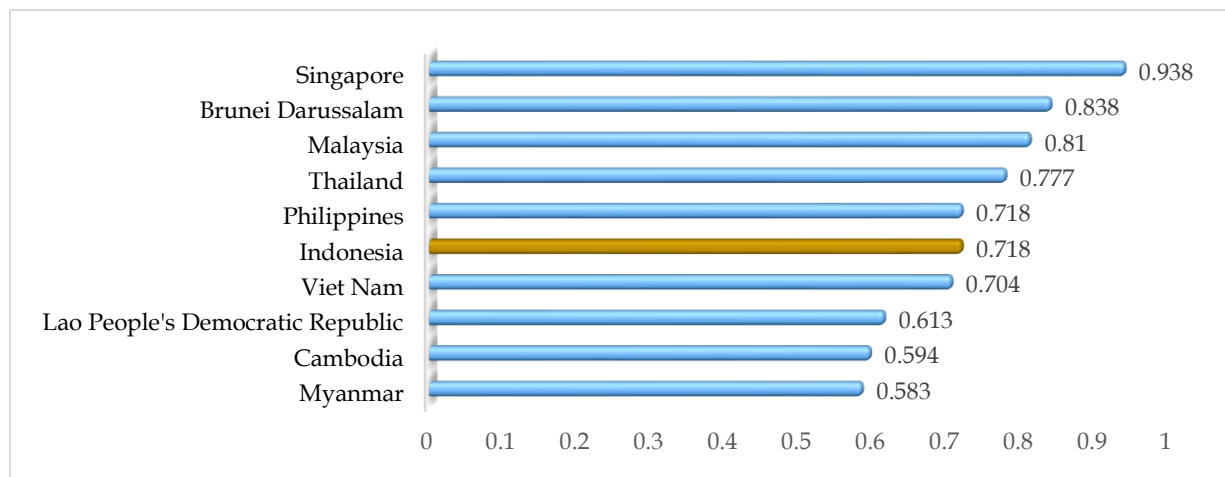


Figure 1 HDI for ASEAN in 2019 (UNDP, 2023)

2. THEORETICAL FRAMEWORK AND HYPOTHESES

Human Development Index (HDI)

Economic development aims to alleviate poverty, reduce income disparity, and increase work possibilities. Improving the quality of human resources is one of the most significant markers of economic development. According to the UNDP (2023), human development is increasing human options to improve education, health care, income, and work prospects. The HDI is one of the metrics used to assess the quality of human resources. The success of national development can be measured not only in terms of high economic growth but also in terms of human development. The HDI is a method for increasing the options open to individuals. According to the Central Bureau of Statistics, when measuring the quality of life for human development, the HDI of a region can be used. HDI explains how a population in an area can access development outcomes for income, health, and education to determine a region's or country's reach or level of development (Türk et al., 2021). Based on an explanation from the Central Bureau of Statistics, each HDI component is standardized with a minimum and maximum value before being used to calculate. HDI is calculated as the geometric mean of the health, education, and expenditure indices (Central Bureau of Statistics, 2021).

$$HDI = \sqrt[3]{I_{health} \times I_{education} \times I_{expenditure}} \times 100 \quad (1)$$

Poverty and Human Development Index (HDI)

The quality of human development is a measure to determine the level of economic development indicators, namely welfare, education, and economic indicators. The World Bank defines poverty as the inability of individuals to meet minimum living standards, such as survival, maintaining human dignity, and carrying out daily life (Al-Nasser & Al Hallaq, 2019). Poverty can be caused by limited human resources, both through formal and informal education, leading to low levels of informal education (Naveed & Sutoris, 2021; Silva-Laya et al., 2020). It can be seen from the relationship between poverty and the quality of human development that the higher the poverty level, the lower the quality of human development, while the lower the poverty level, the higher the quality of human development. However, the empirical impact of poverty on human development was inclusive. Several previous studies, such as Dewi et al. (2017) and Ningrum et al. (2020), show that poverty positively and significantly affects HDI. However, Al-Nasser & Al Hallaq (2019) and Simarmata & Sinaga (2023) prove a negative relationship between poverty and HDI. It can happen when low-income people spend more energy and time fulfilling their basic needs. The results of these studies make it clear that a higher population of poor people will suppress human development because people with low incomes have low purchasing power.

Economic Growth and Human Development Index (HDI)

Human development will influence economic growth since full economic development cannot be realized without long-term human development (UNDP, 2020). The development of physical and non-physical human resources implies an increase in the basic capabilities of the population. Economic growth and human development are related and mutually beneficial. Human resources or capital investment can create an external (positive) economy and increase productivity.

The success of economic development determines a person's income level. These individuals' high and low incomes will affect their access to education (Berg, 2016). The higher the income, the higher the education level (Coady & Dizioli, 2018). In other words, the higher the economic growth, the higher the individual income, increasing access to education and positively impacting the HDI. Maulana & Bowo (2013) explain that there is a positive influence between economic growth and HDI. However, Ningrum et al. (2020) show that economic growth has a positive but insignificant effect on HDI. This finding is also corroborated by Dewi et al. (2017), who found a negative relationship between economic growth and HDI in their study.

Information and Communication Technology (ICT) and Human Development Index (HDI)

ICT is increasingly a deciding element in the economies of many countries, including Indonesia. Massive demands and the use of digital gadgets in all aspects of human existence have resulted in many

technological advancements affecting nearly every country. The percentage of teenagers and adults aged 15 to 59 who possess information and computer technology abilities has increased significantly from year to year from 2014 to 2020 (Central Bureau of Statistics, 2021). This data demonstrates that the Indonesian population is making significant advancements in information technology and computers each year. ICT, including in Indonesia, can now become a determining factor in a country's economy. Massive demands and digital devices in all aspects of human life have created all kinds of changes in the field of technology, involving almost every country in the world. With increasing business value, ICT has become a new source of economic growth. It can be seen that using ICT can be applied to the production, distribution, and consumption of goods and services more efficiently and effectively.

Bankole et al. (2013) stated that ICT development significantly influences human development. Sabbagh et al. (2012) explained that digitalization supports better delivery of essential government services, such as public education. This study says that the impact of digitalization on HDI and sub-indices is more prominent in developing countries. According to Al-Mursyid (2020) and Murtadi (2019), technology has a positive impact on HDI, but Maulana & Bowo (2013) found that technology has a negative and minor impact on HDI. This relationship, however, is not based on inexperience, implying that many regions are experiencing rapid economic expansion and that human development is not being balanced. As a result, examining whether ICT impacts HDI based on existing ideas will be valuable.

3. RESEARCH METHOD

Explanatory research is the research method used in this study. Explanatory research is a study used to determine or test whether independent and dependent variables are related. This research looks at how poverty, economic growth, and information and communication technology can affect the quality of human development. The data used in this study is secondary data sourced from the Central Bureau of Statistics. This study uses panel data analysis. Panel data analysis combines time-series data (2014–2020) and cross-sectional data (34 provinces in Indonesia). This study uses 2014 as the basis for the research year because, since 2014, the Central Bureau of Statistics has started using a new method in calculating the human development index, including economic and technological growth variables. Meanwhile, the selection of 2020 as the final year of this research is due to a major phenomenon that has hit Indonesia, namely the COVID-19 pandemic. This pandemic has resulted in changes and declines in all aspects, including poverty and economic growth.

Based on the hypothesis and several literature studies, the variables that are thought to affect the poverty percentage in Indonesia are expressed in the following model:

$$HDI_{it} = \beta_0 + \beta_1 POV_{it} + \beta_2 EG_{it} + \beta_3 ICT_{it} + \varepsilon_{it} \quad (2)$$

Description:

HDI_{it} : Quality of Human Development in Province (i) year (t)

β_0 : Constant

$\beta_1 - \beta_3$: regression coefficient value of an independent variable

POV_{it} : Poverty in Province (i) year (t)

EG_{it} : Economic growth in the province (i) year (t)

ICT_{it} : ICT in Province (i) year (t)

t : Time Series (The year 2014-2020)

i : Cross Section (34 provinces in Indonesia)

ε : term error

Several basic methods are commonly used to estimate panel data regression models: The common effect model, the fixed effect model, and the random effect model (Gujarati, 2022). The best model was then chosen using the Chow, Hausman, and Lagrange multiplier tests. The Chow test is used to determine whether the common effect or the fixed effect is more significant; the Hausman test is used to determine whether the fixed effect or the random effect is more significant; and the Lagrange multiplier test is used to determine whether the general effect or the random effect is more significant (Hsiao, 2022).

4. DATA ANALYSIS AND DISCUSSION

A panel regression analysis was performed to see if the independent factors of poverty (POV), economic growth (EG), and information and communication technology (ICT) affected the dependent variable of the human development index (HDI). Three models will be chosen as the best models in panel data regression analysis. The Chow and Hausman tests were utilized to pick the model in this study. The advantages of using panel data are that the data used becomes more informative, the variability is more significant, and the collinearity is low. Thus, a greater degree of freedom will be produced, which is also more efficient (Gujarati, 2022). Panel data can better detect and measure impacts, but this cannot be done with cross-sectional or time-series methods. Panel data allow for more complex learning about the behavior in the model, so panel data testing does not require classic assumption tests (Gujarati, 2022). With the advantage of panel data regression, the implication is not having to test the classical assumptions in the panel data model. However, this study uses the classic assumption test, which consists of a data normality test and a multicollinearity test.

Table 1 shows the results of the normality and multicollinearity tests. The basis for determining whether or not the data is normal is that if the value of the Jarque Bera probability is greater than the alpha level of 0.05, then the data is normally distributed. However, the data is not normally distributed if it is smaller than the alpha level. The results above show the Jarque Bera probability value of 0.000, which is smaller than the alpha level of 0.05, so the data is not normally distributed.

Based on the results of the multicollinearity test in Table 1, it shows that there is no multicollinearity problem because the correlation coefficient produced in this study is smaller than 0.80. So it can be concluded that the panel data model in this study is free from multicollinearity problems.

Model Selection

The next step is to select the best panel data model: common effect (Pool Least Square), fixed effect, and random effect. The selection between a common effect and a fixed effect is evaluated using the Chow test, and the results are presented in Table 2. This table demonstrates that the probability value is 0.000, based on the results of the Chow test. The fixed effect model is more appropriate to apply because the value of 0.0000 is less than 0.05.

The selection of the appropriate model between fixed and random effects is evaluated using the Hausman test. Based on the results of the Hausman test presented in Table 3, it is shown that the probability value is 0.0000. Thus, the suitable model used in this study is the fixed effect model because the value of 0.0000 is less than 0.05.

Table 1. Normality and Multicollinearity test results

Normality test				
Jarque-Bera				51.4815
Probability				0.0000
Multicollinearity test				
	HDI	POV	EG	ICT
HDI	1.0000	-0.6628	-0.1546	0.7202
POV	-0.6628	1.0000	0.0277	-0.4122
EG	-0.1546	0.0277	1.0000	-0.3959
ICT	0.7202	-0.4122	-0.3959	1.0000

Table 2. Results of Chow test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	299.9071	(33,201)	0.0000
Cross-section Chi-square	932.1939	33	0.0000

Table 3. Results of Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	46.5120	3	0.0000

Descriptive Statistics

Table 4 of the descriptive statistics shows that HDI has a maximum value of 80.77, namely the HDI score for DKI Jakarta province in 2020, and a minimum value of 56.75, which is the HDI value for Papua Province in 2014. Poverty had a maximum value of 28.4, namely the poverty score for Papua Province in 2015, and a minimum value of 3.42, namely the Poverty value of DKI Jakarta in 2019. Economic growth has a maximum value of 21.76, namely the Economic growth value of West Nusa Tenggara province in 2015, and a minimum value of -15.75, namely the Economic growth value of Papua Province in 2019. ICT has a maximum value of 88.08, namely the ICT value of DKI Jakarta province in 2019–2020, and a minimum score of 9.8, namely the 2014 Papua Province ICT score. The variation in value is also seen in the standard deviation of each variable. The distribution of variables is said to be good if the standard deviation is smaller than the mean value. The results of the descriptive statistics show that the data is well distributed.

Hypothesis Testing Results

Table 5 shows the results of panel data regression analysis using the fixed effect model, which can be seen from the effect of poverty, economic growth, and ICT on HDI in Indonesia. Poverty harms the quality of human development in Indonesia, with a regression coefficient of -0.22287 and a probability value of 0.0000. This means that the poverty variable significantly influences the quality of human development in Indonesia. Economic growth positively influences the quality of human development in Indonesia, with a regression coefficient of 0.0075 and a probability value of 0.4564. It means that Indonesia's variable economic growth has no significant effect on its quality of human development. ICT positively influences the quality of human development in Indonesia, with a regression coefficient of 0.0724 and a probability value of 0.0000. It means the ICT variable significantly influences the quality of human development in Indonesia.

Table 5 shows the results of the F-Stat test of 887.9916 and the F-Stat probability value of 0.0000, which is smaller than the significance level of 0.05 or 5%. Based on the results of the F test, it can be concluded that poverty, economic growth, and ICT simultaneously significantly affect the quality of human development in Indonesia. The model has a coefficient of determination, as R-Squared reflects, with a value of 0.9938. These results indicate that the quality of human development in Indonesia can be strongly influenced by poverty, economic growth, and ICT, while other variables outside this model explain the remaining one percent.

Table 4. Results of Descriptive Statistic

	HDI	POV	EG	ICT
Mean	69.7114	11.0422	4.4132	39.8079
Median	69.7750	9.5100	5.1900	37.4300
Maximum	80.7700	28.4000	21.760	88.0800
Minimum	56.7500	3.4200	-15.7500	9.8000
Std. Dev.	4.1546	5.7639	3.6118	16.9010

Table 5. Panel Data Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	69.3219	0.530200	130.7467	0.0000
POV	-0.2287	0.041164	-5.55766	0.0000
EG	0.0075	0.008132	0.924581	0.3563
ICT	0.0724	0.002454	29.49470	0.0000
R-squared	0.9938			
F-statistic	887.9916			
Prob(F-statistic)	0.0000			

The Effect of Poverty on the Quality of Human Development

The analysis shows that poverty has a negative and significant influence on the quality of human development in Indonesia. The results of this study are supported by Simarnata (2019). As a result, as poverty rises, Indonesia's human development quality declines. The quality of human development is a metric used to determine the level of economic development indicators such as welfare, education, and economic indicators (World Bank, 2019). Poverty can be caused by a lack of human resources, which can be accessed through formal and informal education channels, resulting in low levels of informal education. Poverty is a person's inability to meet educational, welfare, and economic standards. According to UNDP (2020), good education, welfare, and economic indicators are required to achieve optimal performance on HDI. This finding supports Al-Nasser & Al Hallaq (2019) and Simarmata & Sinaga (2023), proving that poverty will lead to a lower HDI.

In Indonesia, human development is synonymous with poverty reduction, education, and health investment. The provision of low-cost education and health care will significantly boost production and, as a result, income, implying that human development has not been carried out optimally because it has solely focused on poverty reduction. Although primary education is widely considered essential for reducing poverty, there is emerging evidence that secondary and tertiary education is more significant in increasing long-term growth rates and income levels because they play a crucial role in creating and applying new knowledge and technological advances. Thus, when the poverty rate in an area decreases, HDI increases, supported by increased community abilities, skills, and insights so that they are more productive in socio-economic activities.

The Effect of Economic Growth on the Quality of Human Development

The results also show that economic growth has a positive but insignificant effect on Indonesia's quality of human development. The results of this study are supported by research conducted by Ningrum et al. (2020). The relationship between human development and economic development is two-way because each is reflected negatively and positively on the other, and economic growth occurs through increasing human capabilities (Cabralles, 2011; UNDP, 2020). Increased economic growth indicates additional investment in human development through education, health, and skills. However, this can be an insignificant relationship because the impact of economic growth is utilized for various sectors and not specifically for human development, such as infrastructure development. It may be the case for Indonesia since Jokowi's presidency in 2014 focused on infrastructure development, such as toll roads and airports.

Theoretically, when an economy grows, its quality of human development will also improve. In light of the facts mentioned above, human development and raising the quality of human resources are critical components of national development policy. According to the new economic growth theory (endogenous growth) by Todaro & Smith (2008), public and private investment (government) in resources or human capital can generate an external economy (external positive) and boost productivity. Natural inclinations are capable of compensating for the magnitude of the economic collapse. Put another way, the government's engagement in human development is required to boost economic growth and productivity.

However, the economic growth in this study had insignificant results. According to data obtained from the Central Bureau of Statistics (2021), economic growth has insignificant results because the percentage data for Indonesia's economic growth in 2014–2019 is at a stagnant level at around five percent, even dropping drastically in 2020 due to the impact of the COVID-19 pandemic. As a result, economic growth in Indonesia does not substantially impact the quality of human development in the 2014–2020 period. In addition, human development can have a threshold effect in that a country must reach a certain level of HDI before future economic growth can occur sustainably. The emphasis at this level distinguishes human development from human capital in endogenous growth theory. While changes in human capital and the quality of the workforce are most important for endogenous growth, the level of human development determines a country's sustainable growth path (Qisthina et al., 2019; Udoh et al., 2015).

The Effect of ICT on the Quality of Human Development

According to the findings, ICT has a favorable and significant impact on Indonesia's quality of human development. As a result, as ICTs improve, so will the quality of human development in Indonesia (Al-

Mursyid, 2020; Murtadi, 2019). Furthermore, Bahrini & Qaffas (2019) note that ICT has become a determining factor in a country's economy. A country's growth and development can be accelerated by utilizing technology. ICT has become a catalyst for economic growth, as seen by the widespread use of applications that make processes more efficient. Todaro & Smith (2009) present an efficient ICT theory that claims that technology is one of the foundations of economic development, one of which strives to increase human resources.

The Central Bureau of Statistics computes the ICT development index at the national and provincial levels. The ICT development index is a composite index with weights calculated from 11 indicators and three sub-indices: access and infrastructure, usage, and knowledge. The three sub-indices of Indonesia's ICT development index followed the same trend in 2019 and 2020, with the highest score being the expertise sub-index, the access and infrastructure sub-index, and the usage sub-index. On a scale of 0 to 10, the skills sub-index in 2020 will be 5.92, the access and infrastructure sub-index will be 5.67, and the usage sub-index will be 5.34.

ICT is predicted to have a more significant impact in the future. This impact is widely regarded as positive, particularly at the macro level. ICT has a substantial and positive impact on human development, with claims that ICT has become the foundation for most social and economic advancement in both rich and developing countries (Jayaprakash & Pillai, 2021; Karaman Aksentijević et al., 2021). These findings suggest that ICT is vital for human growth in less developed, low-income countries. Less developed countries have more room for development through ICT implementation. Regarding the impact of ICT, the estimation results are broadly in line with expectations and show that ICT is necessary for human development and has a positive impact on HDI in the case of developing countries (middle and low-income countries), which means that development policies and strategies must take investment in ICT into account.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

This study aimed to explore the impact of the poverty rate, economic growth, and ICT on Indonesia's quality of human development. Poverty has a negative and significant influence on the quality of human development in Indonesia. This means that the increase in poverty will affect the decline in the quality of human development in Indonesia. Furthermore, economic growth has an insignificant effect on the quality of human development in Indonesia. ICT has a positive and significant influence on the quality of human development in Indonesia. It means that increasing ICT will improve Indonesia's human development quality.

Based on the analysis and discussion findings, it is vital to coordinate poverty reduction measures between the center and the regions because poverty in Indonesia is increasing due to the COVID-19 pandemic. Regarding economic priorities, the government needs to start paying attention to the quality of human development. Strategic economic policies must focus on improving human resource indicators so that higher economic growth can considerably improve human development quality. Furthermore, a curriculum involving ICT must be implemented in schools to support ICT expertise. Increased demand for infrastructure that supports ICT items, such as computers and internet access, is also required. This study is built on the premise that the sustainable use of ICTs is highly dependent on various factors and aspects of society, which means there is a need for compatibility between the use of ICTs and national cultural values to achieve the desired human development. ICT values must be presented to the community according to their cultural values to ensure no conflicts. The absence of conflict can result in the effective utilization of ICT services and ensure the sustainable use of ICT projects.

The limitation of this research is that it focuses on the relationship between the variables of poverty, ICT, and economic growth on the quality of human development in Indonesia in the 2014–2020 research period with 34 cross-sections using the fixed effect model estimation analysis method. Future studies may extend the period covering the post-COVID-19 period to provide a better understanding of the impact of economic growth on human development. In addition, future studies may include variables that reflect each province's characteristics, such as provincial original income.

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