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The Impact of Fiscal Policy Allocations in Education, Health, and ICT on Indonesia Human Development Index (HDI)

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Abstrak. *Peningkatan kualitas sumber daya manusia merupakan landasan fundamental untuk mendorong pembangunan manusia yang inklusif dan berkelanjutan. Di Indonesia, optimalisasi kebijakan fiskal yang diarahkan pada sektor-sektor strategis seperti pendidikan, kesehatan, dan Teknologi Informasi dan Komunikasi (TIK) menjadi semakin penting mengingat kompleksitas tantangan pembangunan dan ketimpangan antardaerah. Penelitian ini bertujuan untuk menganalisis pengaruh parsial dan simultan kebijakan fiskal di bidang pendidikan, kesehatan, dan TIK terhadap Indeks Pembangunan Manusia (IPM) di Indonesia. Kebijakan fiskal dalam penelitian ini diproksikan dengan pengeluaran pemerintah di masing-masing sektor. Metode yang digunakan dalam penelitian ini adalah pendekatan kuantitatif dengan data time series yang mencakup 34 tahun, dari tahun 1990 sampai dengan tahun 2023. Teknik analisis data yang digunakan adalah regresi linier berganda dengan model Autoregressive Distributed Lag (ARDL). Hasil penelitian menunjukkan bahwa, secara parsial, pengeluaran pemerintah untuk pendidikan berpengaruh positif dan signifikan terhadap IPM di Indonesia, baik dalam jangka pendek maupun jangka panjang. Sementara itu, pengeluaran sektor kesehatan berpengaruh negatif dan signifikan terhadap IPM dalam jangka pendek, tetapi negatif dan tidak signifikan dalam jangka panjang. Di sisi lain, belanja pemerintah untuk TIK memiliki pengaruh positif namun tidak signifikan terhadap IPM, baik dalam jangka pendek maupun jangka panjang. Sementara itu, belanja pemerintah di bidang pendidikan, kesehatan, dan TIK berpengaruh signifikan terhadap IPM di Indonesia.*

Kata kunci: *Kebijakan Fiskal; Pengeluaran Pemerintah; Indeks Pembangunan Manusia (IPM); Pendidikan; Kesehatan; Teknologi Informasi dan Komunikasi (TIK); Modus ARDL.*

Abstract. *Improving the quality of human resources is a fundamental foundation for promoting inclusive and sustainable human development. In Indonesia, the optimization of fiscal policy directed toward strategic sectors such as education, health, and Information and Communication Technology (ICT) has become increasingly important given the complexity of development challenges and interregional disparities. This study aims to analyze the partial and simultaneous effects of fiscal policy in the fields of education, health, and ICT on the Human Development Index (HDI) in Indonesia. Fiscal policy in this research is proxied by government expenditures in each respective sector. The method used in this study is a quantitative approach with time series data covering 34 years, from 1990 to 2023. The data analysis technique employed is multiple linear regression using the Autoregressive Distributed Lag (ARDL) model. The results show that, partially, government expenditure on education has a positive and significant effect on HDI in Indonesia, both in the short and long term. Meanwhile, health sector spending has a negative and significant effect on HDI in the short term, but negative and not significant in the long term. On the other hand, government expenditure on ICT has a positive but not significant effect on HDI, both in the short and long term. Simultaneously, government expenditures in the fields of education, health, and ICT significantly affect the HDI in Indonesia.*

Keywords: *Fiscal Policy; Government Expenditure; Human Development Index (HDI); Education; Health; Information and Communication Technology (ICT); ARDL Mode.*

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Abstract & Indexing

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Introduction

Economic development today is viewed not only as the growth of national income but as a multidimensional process encompassing social, human, and environmental factors. This evolution in the development paradigm has unfolded across three key phases: economic growth driven by industrialization (Todaro & Smith, 2020), human development focusing on quality of life (Haq, 1995), and sustainable development that integrates environmental concerns (Sach, 2015). In this context, Amartya Sen's Capability Approach (1999) underscores the importance of expanding individuals' capabilities to lead lives they value, beyond merely achieving economic growth. To measure development achievements comprehensively, the Human Development Index (HDI) serves as a principal indicator, encompassing three core dimensions: health, education, and standard of living (UNDP, 1990). In Indonesia, the HDI has been adopted by the Central Bureau of Statistics (BPS) since 1996, becoming a fundamental reference for formulating and evaluating national development policies (BPS, 2021).

Indonesia's HDI has shown an upward trajectory, rising from 70.81 in 2017 to 72.91 in 2022, although it experienced a significant slowdown during the Covid-19 pandemic (BPS, 2022). Despite this improvement, Indonesia's HDI remains below that of other ASEAN countries, such as Singapore, Brunei Darussalam, Malaysia, Thailand, and Vietnam. This is largely due to issues such as limited access to quality health and education services, inequality, and inadequate social infrastructure (UNDP, 2024). In response, the government has increasingly focused fiscal policy on sectors such as education, health, and Information and Communication Technology (ICT) in an effort to improve HDI. Budg*et al*locations for these sectors have grown dynamically in recent years. Previous studies indicate that spending in these areas positively impacts human development (Maryozi *et al*., 2022; Banik *et al*., 2023; Farooqi *et al*., 2020). However, other studies suggest that the effects of such spending may be negative or insignificant, often due to challenges in effectiveness, allocation efficiency, and distribution inequalities (Sulistiani & Setiartiti, 2023; Mongan, 2019; Karaman Aksentijević *et al*., 2021). The observed inconsistency between increasing fiscal allocations and the achievement of HDI highlights a data gap that warrants further exploration. This study, therefore, aims to analyze both the short-term and long-term effects of government expenditures in education, health, and ICT on the HDI in Indonesia. The research is intended to provide an empirical understanding of the effectiveness of fiscal policy in promoting sustainable human development. The central research question of this study is: How do fiscal policies, as reflected in government spending on education, health, and ICT, influence the HDI in Indonesia, both individually and collectively, in the short and long term?

Historically, development was primarily assessed through economic indicators such as Gross Domestic Product (GDP). However, this focus on economic measures has been criticized for overlooking the human aspects of development. As an alternative, the United Nations Development Programme (UNDP) introduced the Human Development Index (HDI) in 1990, aiming to measure quality of life through three main dimensions: life expectancy, education, and standard of living (UNDP, 1990). This approach aligns with Amartya Sen's Capability Approach (1999), which emphasizes the expansion of individuals' substantive freedoms through enhanced access to education, healthcare, and economic opportunities. In Indonesia, HDI is calculated based on indicators such as life expectancy, years of schooling, average years of schooling, and per capita income adjusted for purchasing power parity (BPS, 2023). Since 2010, the UNDP has utilized geometric averages to mitigate compensation among the dimensions, thereby providing a more accurate depiction of development progress (UNDP, 2010). Fiscal policy involves the strategic management of government revenues and expenditures to achieve economic stability and enhance public welfare (Mankiw, 2021; Samuelson & Nordhaus, 2019). In the realm of human development, government spending on education, health, and ICT is vital. Becker (1964) argues that investments in education and

health are key to enhancing human capital, thereby contributing to productivity and sustainable economic growth. Education expenditure is pivotal in developing skilled human resources, while health expenditures bolster workforce capacity and improve overall quality of life (Todaro & Smith, 2020). The ICT sector is equally crucial, as it supports the digital transformation of public services. Romer (1990), in his Endogenous Growth Theory, highlights that investments in innovation and technology serve as key drivers of long-term economic development. However, Norris (2001) in the Digital Divide Theory, warns that unequal access to ICT can exacerbate social inequality. Consequently, ICT spending should be viewed not just as a tool for economic development but as an integral part of a broader equitable development strategy (Nosratabadi *et al*., 2023). Based on the theoretical frameworks and empirical evidence reviewed, the following hypotheses are proposed for this study:

H1: Government expenditure in the education sector significantly contributes to the improvement of the Human Development Index (HDI) in Indonesia.

H2: Government spending in the health sector has a significant positive effect on the enhancement of HDI in Indonesia.

H3: Government expenditure in the ICT sector significantly influences the advancement of HDI in Indonesia.

H4: Government expenditures in the education, health, and ICT sectors collectively have a significant impact on HDI in Indonesia.

Research Methodology

This study was conducted in Indonesia starting in April 2025 and will continue until the completion of all research stages. The research utilizes a quantitative approach, employing time series data spanning from 1990 to 2023. The data used in this analysis is secondary and sourced from official institutions, namely the United Nations Development Programme (UNDP) and the Ministry of Finance of the Republic of Indonesia. The study focuses on one dependent variable Human Development Index (HDI) and three independent variables: government expenditure on education (PDK), government expenditure on health (PKS), and government expenditure on Information and Communication Technology (ICT) (PTIK). Data collection was carried out through the documentation method, which involves gathering information from official reports, statistical publications, and pertinent government policy documents (Sugiyono, 2017). For the data analysis, the Autoregressive Distributed Lag (ARDL) model was employed to examine both the short-term and long-term relationships among the variables (Pesaran *et al*., 2001). The ARDL model was selected due to its ability to handle time series data with a limited number of observations and its capacity to accommodate variables that are stationary at levels I(0) or first-order I(1). Before model estimation, several prerequisite tests were conducted to ensure the validity of the econometric model. In this study, several prerequisite tests were conducted to ensure the validity and reliability of the econometric model. First, a stationarity test using the Augmented Dickey-Fuller (ADF) test was applied to confirm that the data does not contain unit roots and remains stable over time (Gujarati & Porter, 2009).

Next, the optimum lag length was determined based on the information criterion, which helps identify the best model structure. The cointegration test (Bound Test) was then conducted to examine whether there is a long-term relationship among the variables in the ARDL model. Additionally, classical assumption tests were carried out, which included a normality test to assess the distribution of residuals, a heteroscedasticity test using the Breusch-Pagan method to detect variance inconsistency, an autocorrelation test using the Durbin-Watson statistic to check for serial correlation between residuals, and a model stability test using the Cumulative Sum (CUSUM) method to ensure that the model parameters remain stable throughout the observation period (Syafira, 2022). After performing these tests, the ARDL model was estimated to analyze both the short-term and long-term effects of the independent variables on the dependent variable. The specific ARDL model used for this analysis is:

$$\Delta IPM_t = \alpha_0 + \sum_{i-1}^{p} \beta_i \Delta IPM_{t-i} + \sum_{j=0}^{q} \gamma_j \Delta PDK_{t-j} + \sum_{k=0}^{r} \delta_k \Delta PKS_{t-k} + \sum_{m-0}^{s} \theta_m \Delta PTIK_{t-m} + \lambda_1 IPM_{t-1} + \lambda_2 PDK_{t-1} + \lambda_3 PKS_{t-1} + \lambda_4 PTIK_{t-1} + \epsilon_t$$

The next step is to test the hypothesis with two approaches, namely the t test (partial) and the F test (simultaneous). The t test is used to test the effect of each independent variable on HDI. The F test is used to determine whether the three independent variables together have a significant effect on HDI with a significance level of 5%.

Results and Discussion

Results

Stationarity Test

The stationarity tests were conducted using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) methods. The results indicate that all variables (HDI, PDK, MCC, PTIK) are non-stationary at the level, but they become stationary after the first difference. This fulfills the necessary conditions for estimating the ARDL model.

Table 1. Stationarity Test Results

Variable	Level	Method	t-Statistik	Critical Value 5%	Prob.	Description
IPM	Level	ADF	-1.7155	-2.9540	0.4144	Not stationary
IPM	1st Diff	ADF	-4.9653	-2.9571	0.0003	Stasionary
PDK	1st Diff	ADF	-4.9821	-2.9571	0.0003	Stasionary
PKS	1st Diff	PP	-7.0136	-2.9571	0.0000	Stasionary
PTIK	1st Diff	ADF	-5.4214	-2.9604	0.0001	Stasionary

Determining the Optimum Lag

The optimum lag length was selected using the Akaike Information Criterion (AIC). The ARDL (1,3,1,4) model was identified as the best, as it yielded the smallest error value and demonstrated the greatest stability in this study. The results of the lag selection test are presented in the following figure:

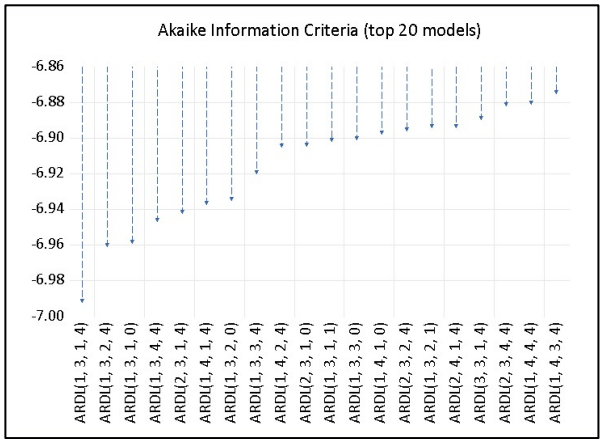

Figure 1. Optimum Lag Test Results

The results of the Cointegration Test (Bound Test) indicate a long-run relationship between the variables, as evidenced by an F-statistic of 7.9189. This value exceeds the upper bound at the 1%, 5%, and 10% significance levels, confirming that there is a stable long-term equilibrium relationship between the variables involved in the model. Such a finding is crucial for ensuring the validity of subsequent model estimations, particularly when evaluating the long-term effects of fiscal policy on human development indicators. Additionally, to validate the ARDL regression model as a Best Linear Unbiased Estimator (BLUE), several classical assumption tests were conducted. These tests are designed to check for common econometric issues such as multicollinearity, heteroscedasticity, and autocorrelation, which could potentially bias the results. The classical assumption test results provide further confirmation that the model is both valid and reliable for the analysis. Specifically, the normality test indicates that residuals are normally distributed, the autocorrelation test

reveals no issues with serial correlation, and the heteroscedasticity test confirms that variance is consistent across observations. These results support the robustness of the ARDL model, ensuring that it can be used to draw reliable inferences about the relationships between fiscal expenditure and human development.

Table 2. Classical Assumption Test Results

Type Of Test	Result	Description
Normalitas	JB = 0.403; p = 0.8175	Normally Distributed
Autokorelasi	DW = 1.9753	No autocorrelation
Heteroskedastisitas	Prob. Chi-Square = 0.3069	No heteroscedasticity
Stabilitas Model	CUSUM & CUSUMQ lines within critical limits	Parameterised stable model

The results of the data normality test, conducted using the Jarque-Bera (JB) statistic, show a value of 0.403 with a p-value of 0.8175, which is well above the 5% significance level. This suggests that the residuals of the regression model are normally distributed. In the autocorrelation test, the Durbin-Watson (DW) statistic of 1.9753 falls between the upper limit (du) and 4-du, indicating that the model is free from autocorrelation. This confirms that there is no serial correlation between residuals, ensuring that the coefficient estimates are unbiased. Additionally, the heteroscedasticity test, using the Breusch-Pagan-Godfrey method, yielded a Prob. Chi-Square value of 0.3069, which is greater than 0.05. This indicates that the residual variance is homogeneous (i.e., homoscedastic). The model stability test, conducted using the Cumulative Sum (CUSUM) method, shows that the CUSUM test line remains within the 5% critical limit throughout the observation period. This confirms that the ARDL regression model is parameter stable and does not undergo significant structural changes. This stability is crucial to ensure that the estimation results remain consistent and reliable over the long term. The results of the model stability test are presented in the following figure:

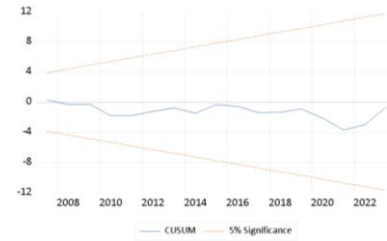

Figure 2. CUSUM Model Stability Test Results

Table 3. Short-Term Estimation Result

Variabel	Koefisien	t-statistik	p-value	Description
DLOG(PDK)	0.0152	2.4951	0.0232	Significant (+)
DLOG(PKS)	-0.0065	-2.3548	0.0308	Significant (−)
DLOG(PTIK)	0.0012	0.6386	0.5316	Not significant
CointEq(-1)	-0.4064	-6.9936	0.0000	here is a short-term correlation (ECT = 40.64%)

The short-term estimation results indicate that government expenditure in the education sector (DLOG(PDK)) has a positive and statistically significant effect on the Human Development Index (HDI), with a coefficient of 0.0152 and a p-value of 0.0232. This suggests that an increase in education spending during the current period directly contributes to improving the quality of life within the community. In contrast, government expenditure in the health sector (DLOG(MCC)) exhibits a significant negative effect on HDI, with a coefficient of -0.0065 and a p-value of 0.0308. This result suggests a delayed effect, where increased spending in the health sector does not yield immediate improvements, as it takes time to develop infrastructure, expand access, and enhance the quality of health services. Meanwhile, government expenditure in the Information and Communication Technology (ICT) sector (DLOG(PTIK)) shows a positive coefficient of

0.0012, but the effect is not statistically significant (p-value of 0.5316), indicating that ICT investments have not yet made a tangible contribution to HDI in the short term. Additionally, the coefficient of the Error Correction Term (CointEq(-1)) is -0.4064 with a p-value of 0.0000, signaling a significant adjustment mechanism toward long-term equilibrium. The annual adjustment rate of 40.64% indicates that when short-term imbalances occur, the system tends to return to a balanced state relatively quickly.

Table 4. Short-Term Estimation Result

Variabel	Koefisien	t-statistik	p-value	Keterangan
LOG(IPM(-1))	0.5936	3.8146	0.0014	Significant
LOG(PDK)	0.0152	2.1151	0.0495	Significant (+)
LOG(PKS)	-0.0065	-1.6530	0.1167	Not Significant
LOG(PTIK)	0.0012	0.5069	0.6187	Not Significant

The long-term estimation results from the ARDL model indicate that the lagged HDI variable (LOG(HDI(-1))) has a positive and statistically significant effect on the current HDI, with a coefficient of 0.5936 and a p-value of 0.0014. This suggests that past HDI achievements consistently contribute to its improvement in the present, reflecting the continuity of human development over time. Additionally, government expenditure in the education sector (LOG(PDK)) positively and significantly impacts HDI, with a coefficient of 0.0152 and a p-value of 0.0495. This finding highlights that, in the long term, an increase in the education budget can significantly enhance the quality of human development in Indonesia. Conversely, government expenditure on health (LOG(MCC)) has a negative coefficient of -0.0065, and while it is not statistically significant (p-value of 0.1167), this result suggests that spending in the health sector has not had a direct long-term impact on HDI. Possible explanations for this include inefficiencies in budg*et al*location or the extended time required for health interventions to produce measurable outcomes in human development. Similarly, government expenditure on ICT (LOG(PTIK)) does not show a significant effect, with a coefficient of 0.0012 and a p-value of 0.6187. This suggests that, despite the potential of the ICT sector to support development, its impact on HDI remains suboptimal in the long term, likely due to factors such as inequality in access, low digital literacy, or inadequate integration of ICT into key development sectors.

Table 5. Short-Term Partial Test Results (t)

Variabel	t-statistik	p-value	Description
DLOG(PDK)	2.4951	0.0232	Significant
DLOG(PKS)	-2.3548	0.0308	Significant
DLOG(PTIK)	0.6386	0.5316	Not Significant

The t-test results from the short-term ARDL model show that government expenditure in the education sector (DLOG(PDK)) has a t-statistic of 2.4951 with a p-value of 0.0232. This value is below the 5% significance level, indicating that DLOG(PDK) has a positive and statistically significant effect on the Human Development Index (HDI). This suggests that an increase in education spending in the current period directly contributes to enhancing the quality of life within the community. Additionally, government expenditure on health (DLOG(MCC)) also shows a statistically significant effect, with a t-statistic of -2.3548 and a p-value of 0.0308. Although the coefficient is negative, this result remains significant, reflecting an influence in the short term.

However, this negative effect may not necessarily result in a decrease in HDI, as there may be a delayed impact. On the other hand,

government expenditure on ICT (DLOG(PTIK)) has a t-statistic of 0.6386 and a p-value of 0.5316, which is well above the 5% significance threshold. This indicates that ICT expenditure does not have a statistically significant effect on HDI in the short run.

Table 6. Short-Term Partial Test Results (t)

Variabel	t-statistik	p-value	Description
LOG(PDK)	2.1151	0.0495	Significant
LOG(PKS)	-1.6530	0.1167	Not Significant
LOG(PTIK)	0.5069	0.6187	Not Significant

The t-test results for the long-run ARDL model indicate that government expenditure in the education sector (LOG(PDK)) has a significant positive effect on the Human Development Index (HDI), with a t-statistic of 2.1151 and a p-value of 0.0495, which is just below the 5% significance threshold. This suggests that, in the long run, an increase in the education budget consistently contributes to improving the quality of human development in Indonesia. In contrast, government expenditure on health (LOG(MCC)) produces insignificant results, with a t-statistic of -1.6530 and a p-value of 0.1167, which exceeds the 5% significance level. This implies that, although health expenditure has the potential to support human development, its effect has not been fully realized or optimized in the long term. Similarly, expenditure on information and communication technology (LOG(PTIK)) shows a t-statistic of 0.5069 and a p-value of 0.6187, which is also not significant. This indicates that ICT investment has not had a direct impact on HDI in the long term, possibly due to barriers in access, utilization, or integration of ICT within the education and health sectors—key components of HDI.

Table 7. Simultaneous Test Results

Statistik	Value
F-statistic	385.4161
Prob(F-statistic)	0.000000
Description	Significant (H_0 rejected)

The results of the simultaneous test (F-test) show that the F-statistic value is 385.4161 with a p-value of 0.000000, which is significantly below the 5% significance level ($\alpha = 0.05$). As a result, the null hypothesis (H_0) is rejected, indicating that the three independent variables in the model—government expenditure on education (PDK), health (PKS), and information and communication technology (PTIK) collectively have a significant effect on the Human Development Index (HDI). This finding demonstrates that, together, these three variables contribute substantially to explaining the variation in HDI values in Indonesia over the observed period. Consequently, the combined influence of fiscal policy on these sectors should be carefully considered in the formulation of national human development strategies.

Discussion

The results of this study show that government expenditure in the education, health, and Information and Communication Technology (ICT) sectors significantly affects Indonesia's Human Development Index (HDI), although with varying degrees of impact across sectors. Government spending in the education sector has a positive and significant impact on HDI both in the short and long term. This finding aligns with Becker's (1964) theory, which emphasizes that education is an investment in human capital that directly impacts productivity and quality of life. Increased educational spending can enhance skills and knowledge, which in turn improves the quality of life and social well-being, reflected in the increase in HDI, especially in health and education indicators (Mankiw, 2021). This study finds that every 1% increase in education spending raises Indonesia's HDI by 0.015190%, suggesting that education plays a significant role in human development. In contrast, health sector expenditure has a negative impact on HDI in the short term, although it is not significant in the long term. This finding supports Banik *et al.* (2023), who argue that health spending may have a negative effect if not managed efficiently

or if allocation is uneven. The negative short-term effect could be due to the imbalance in the allocation of health budgets, with more resources directed toward emergency health responses rather than preventive healthcare, which has long-term benefits on quality of life. Additionally, the long-term effect of health expenditure on HDI is insignificant, possibly due to the time required to build infrastructure and improve healthcare quality across Indonesia's regions (Mongan, 2019). On the other hand, government expenditure on ICT shows a positive but statistically insignificant effect on HDI, both in the short and long term. This contributes to the understanding proposed by Karaman Aksentijević *et al.* (2021), who state that although ICT has great potential to enhance human development, its impact in developing countries like Indonesia is often limited by issues of access and infrastructure. Indonesia's ongoing digital infrastructure development, coupled with low digital literacy, presents barriers for the population in fully leveraging technology to improve their quality of life (Norris, 2001).

Therefore, while ICT spending can improve access to information and public services, its impact on HDI will only be fully realized once digital infrastructure is strengthened and the population is trained to utilize technology optimally (Nosratabadi *et al.*, 2023). When considered simultaneously, the combined impact of education, health, and ICT spending on HDI is significant. This finding supports Farooqi *et al.* (2020), who argue that education, health, and ICT sectors work in synergy to enhance human development. While ICT has not yet had a direct, significant impact, the combination of quality education, improved health, and expanded access to technology can create a supportive ecosystem that leads to higher levels of human development. Therefore, even though the individual impacts of these sectors may vary, proper allocation and distribution of budget across these sectors are crucial to achieving better human development outcomes in Indonesia. Overall, these findings highlight the importance of integrated and results-based fiscal policies. For example, the government should prioritize education spending and ensure that health expenditure is allocated more efficiently, focusing on prevention and increasing access in underserved regions. In the ICT sector, strengthening infrastructure and improving digital literacy are key steps to ensuring that ICT spending has a more significant impact on human development (Becker, 1964; Sach, 2015). This indicates that to achieve sustainable improvements in HDI, fiscal policies should focus on balanced and synergistic investments in these three sectors.

Conclusion

The findings of this study conclude that government spending on education has a positive and significant effect on Indonesia's Human Development Index (HDI) in both the short and long term. This suggests that government investment in education directly enhances the quality of Indonesia's human resources. More specifically, the results show that every 1% increase in the education budget results in an improvement of 0.015190% in the country's HDI. This highlights the crucial role that education plays in shaping human capital and improving overall development. On the other hand, government expenditure on health exhibits a negative and significant effect on HDI in the short term, but its impact becomes negative and insignificant in the long term. Factors contributing to the negative short-term effect of health spending include inequalities in budget distribution, inefficiencies in allocation, and a focus on critical/emergency health responses rather than preventive and long-term health maintenance programs. These inefficiencies hinder the potential benefits of health expenditures in improving the overall quality of life and human development in Indonesia. Meanwhile, government spending on Information and Communication Technology (ICT) has a positive, yet statistically insignificant, effect on HDI in both the short and long term. Despite the positive influence ICT could have on human resource quality, its impact remains limited due to the early stage of ICT development in Indonesia. The country is still in the process of establishing foundational infrastructure, and the benefits of ICT are not fully realized by the public.

Issues such as low digital literacy, insufficient development of appropriate applications, and the lack of effective programs to maximize the benefits of technology have hindered the potential of ICT to significantly impact human development outcomes. Based on these findings, this study offers several policy recommendations for improving human development in Indonesia. The government needs to maintain consistent and high-quality spending in the education sector, given its proven positive effects on HDI both in the short and long term. Additionally, optimizing investment in the ICT sector is essential, particularly by focusing on the development of digital infrastructure, improving technological literacy, and integrating ICT into public services.

For the health sector, it is crucial to evaluate the budg*et a*llocation to ensure greater efficiency and target preventive measures, as these are likely to yield more effective long-term improvements in the quality of life and HDI growth. Finally, for future research, expanding the scope of analysis to regional or provincial levels, incorporating additional socio-economic variables such as unemployment or poverty rates, assessing the quality of public spending, and utilizing diverse methodological approaches would provide more in-depth and comprehensive insights into the factors influencing HDI. This broader approach could further guide policymakers in enhancing human development across Indonesia.

Acknowledgement

I hereby declare that this article is entirely my own work, and all the content presented in this article is original. It has not been previously published in any scientific journals or presented at any academic conferences. The article does not contain the work or opinions of others, except for those properly cited in the bibliography. If it is found in the future that this declaration is inaccurate, I am fully willing to accept the corresponding sanctions as per the relevant academic regulations.

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