
Determinants of Economic Growth: A Review of Local Governments on Sumatera Island

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ABSTRACT

This study seeks to analyze the impact of health expenditure, education expenditure, capital expenditure, the Human Development Index, and the unemployment rate on economic growth in the local governments of regencies and cities on the island of Sumatera. Economic growth serves as a significant metric for assessing the economic vitality of a nation or region. Factors impacting this may encompass health expenditure, education expenditure, capital expenditure, the Human Development Index, and the unemployment rate. This study's population comprises 154 local governments from regencies and cities on the island of Sumatra. It utilized a saturated sampling strategy and a panel data approach during a four-year observation period, yielding 616 research samples from 2020 to 2023. The employed data analysis technique is panel data regression, with a significance threshold of 5%. The study's findings reveal that health expenditure does not significantly influence economic growth, indicating that health spending has not effectively enhanced labor productivity through improvements in public health. Moreover, educational expenditure positively impacts economic growth, suggesting that education can improve skills and labor productivity, thus augmenting economic production. The study concludes that capital expenditure adversely impacts economic growth, suggesting that it diminishes economic growth despite proper allocation, demonstrating inefficiency and lack of productivity in its execution. The Human Development Index (HDI) does not influence economic growth, indicating that the HDI, which includes factors like education, health, and living standards, has not evolved adequately to impact economic growth. The unemployment rate does not affect economic growth, indicating that labor market conditions and structural variables, such as the alignment of skills and knowledge, may impede economic growth in a region. Not all governmental expenditure or socio-economic metrics yield the anticipated effect on economic growth. The effectiveness of resource distribution, policy emphasis, and the overarching economic environment significantly influence the effects of these diverse elements. Additional investigation may be necessary to comprehend the dynamics behind these findings.

Keywords: Capital Expenditure; Economic Growth; Education Expenditure; Health Expenditure; Human Development Index

INTRODUCTION

Economic growth is a vital metric for assessing a nation's advancement, indicating the pace of augmentation in creating commodities and services that enhance societal welfare. An essential aspect of economic progress is infrastructure. Robust infrastructure, encompassing road development, electricity supply, and access to potable water, facilitates economic endeavors, draws investment, and generates employment opportunities. Consequently, a strong correlation exists between infrastructure and sustainable economic growth, enhancing social and economic development.

Qutb and Shennawy (2016) assert that economic growth is essential for economic and social development. Diverse elements, including foreign direct investment, capital goods allocation, and human capacity development, interrelate to propel economic growth. Investment in human capital, encompassing formal education and informal skills, is fundamental to developing a productive workforce. This condition indicates that enhancing skills and knowledge is crucial for fostering sustainable economic growth.

The economic growth theory formulated by Robert Merton Solow and Trevor Winchester Swan, which emphasizes production functions, offers a framework for comprehending how the

substitution between capital and human resources influences long-term output levels (Umeji et al., 2023; Mukaromah et al., 2022). The caliber of human resources, assessed through the Human Development Index (HDI), is a significant predictor of a nation's economic advancement. Consequently, the government must enhance regional expenditure to guarantee that infrastructure investment stimulates economic growth and balances community welfare (Ratnasari & Meirini, 2022). Government expenditure towards infrastructure development is anticipated to stimulate growth and mitigate economic decline within the community, enhancing the appeal for investment and exports (Anochiwa et al., 2019; Chen et al., 2022). Insufficient infrastructure development will impede economic activity, particularly in regions that need fundamental facilities such as educational institutions, healthcare facilities, bridges, and roadways. The advantages of augmenting regional expenditure allocations encompass sustainable economic growth, enhanced public welfare, and optimal access to health and education services. (Gamon, 2022; Sijabat, 2022).

Education and health are two critical factors that positively influence community output. Kushwaha and Tiwari (2019) assert that investment in education can diminish unemployment rates and promote economic stability. A subsequent study indicates that

optimal health positively influences productivity. Consequently, enhancing the quality of education and public health elevates individual productivity and contributes to comprehensive economic growth at both regional and national scales (Baidybekova et al., 2022; Mehmood et al., 2024). The effects of economic expansion extend beyond macroeconomic factors and can be examined from numerous viewpoints of individuals' daily lives. Economic growth typically generates increased employment opportunities, decreasing unemployment rates and enhancing individual welfare (Lupu et al., 2018; Nistor et al., 2018). Moreover, developing high-quality infrastructure, including robust transportation networks and efficient telecommunications systems, can enhance regional connectivity, which is crucial for facilitating the movement of goods and individuals and promoting sustainable economic growth (Hota & Acharya, 2023).

In Indonesia, particularly on Sumatra Island, economic prosperity is anticipated to propel advancement across various locations, encompassing both provincial and district/city government levels. Table 1 illustrates the economic growth of Sumatra Island in percentage figures.

Table 1. Economic Expansion in Provinces of Sumatra Island

N o.	Provi nsi	201 9	202 0	202 1	202 2	202 3
1	Aceh	4.14 %	- 0.37 %	2.81 %	4.21 %	4.23 %

2	Sumat era Utara	5.22 %	- 1.07 %	2.61 %	4.73 %	5.01 %
3	Sumat era Barat	5.01 %	- 1.61 %	3.29 %	4.36 %	4.62 %
4	Sumat era Selata n	5.69 %	- 0.11 %	3.58 %	5.23 %	5.08 %
5	Riau	2.81 %	- 1.13 %	3.36 %	4.55 %	4.21 %
6	Kep. Riau	4.83 %	- 3.8 %	3.43 %	5.09 %	5.2 %
7	Bengk ulu	4.94 %	- 0.02 %	3.27 %	4.31 %	4.26 %
8	Jambi	4.35 %	- 0.51 %	3.7 %	5.12 %	4.66 %
9	Lamp ung	5.26 %	- 1.66 %	2.77 %	4.28 %	4.55 %
10	Bangk a Belitu ng	3.32 %	- 2.29 %	5.05 %	4.4 %	4.38 %

Source: Central Statistics Agency (BPS) (2025)

According to the economic growth data presented in Table 1, the provinces on the island of Sumatra exhibited oscillations in economic growth from 2019 to 2023. In 2020, economic growth underwent a substantial contraction due to the Covid-19 epidemic, which impacted multiple economic sectors. From 2021 to 2023, economic growth resumed, propelled by the agricultural, trade, and mining industries and enhanced infrastructure construction. This condition aligns with Keynesian theory, which posits that government intervention in regional financial

management is necessary to address substantial economic repercussions (Rizky et al., 2023). Health expenditure is a contributing factor to economic growth. Optimal health enhances job productivity, diminishes medical care expenses, and prolongs individual working life, stimulating regional economic activity. The health state of the population is influenced by multiple aspects, including environmental health, socio-economic status, economic development, and environmental quality (Dritsaki & Dritsaki, 2024). Consequently, investment in the healthcare industry enhances public welfare and serves as a significant catalyst for sustained economic growth. Healthcare expenditure plays a pivotal role in enhancing labor productivity, generating employment, stimulating consumption, and fostering innovation, all of which facilitate sustained economic growth (Hu & Wang, 2024). The components encompass the acquisition of medical equipment, enhancement of health infrastructure, vaccination initiatives, remuneration of medical staff, and research and development of pharmaceuticals. An appropriate health budget enhances public access to health care, improving workforce welfare and productivity and eventually fostering national economic growth (Ogunjimi & Adebayo, 2019). The ratio of the old population influences the money required for healthcare expenditures (Chipunza & Nhamo, 2023). A study by Atuahene et al. (2020) identified a substantial correlation

between health expenditure and economic growth, reinforcing the idea that socioeconomic stability enhances the contribution of health investment to growth. The beneficial effect is seen in enhancing health facilities, providing emergency vaccines, and fortifying a healthier and more productive workforce (Vysochyna et al., 2023). Consequently, health expenditure is not merely a component of social welfare but also a strategic investment capable of propelling a nation's economic growth and development (Alwago, 2022).

Numerous research has indicated that healthcare expenditure positively influences economic growth. Research by Lupu et al. (2018) indicates that health expenditure significantly contributes to economic growth. Comparable conclusions were articulated by Sijabat (2022); Vysochyna et al. (2023); Haini (2020); Alwago (2022); Hu & Wang (2024); Nurvita et al. (2022); Dritsaki & Dritsaki (2024); and Can & Aslan (2023). Nonetheless, studies by Gamon (2022) and Aulia et al. (2024) revealed contrasting findings, indicating that health expenditure adversely affected economic growth. Education is a fundamental component of human capital theory, as it is the primary method for cultivating the knowledge and skills of the workforce (Qutb & Shennawy, 2016). Public investment in education yields long-term advantages for economic growth, while the effects may not be immediately apparent. High-quality education will yield a

proficient, skilled, and competitive workforce in the global marketplace, foster innovation, and generate new enterprises. Moreover, educational expenditure enhances accessibility, quality, and equity in education, particularly for disadvantaged households (Nistor et al., 2018). Education can significantly propel economic progress by establishing infrastructure, educator training, and student advancement.

Investment in education correlates with enhancements in workforce quality, encompassing both physical and mental health, hence increasing productivity and efficiency (Can & Aslan, 2023). Countries investing in education will cultivate a progressively skilled workforce, ultimately benefiting the economy. Investment in education can promote economic growth by facilitating efficient labor mobility and knowledge spillover effects (Zhu, 2024). Nonetheless, these beneficial effects materialize only if the rise in educational expenses does not restrict access for students, particularly those from impoverished backgrounds. Should the government offer inexpensive educational facilities, more people may pursue higher education and enhance economic growth (Kushwaha & Tiwari, 2019; Mekdad et al., 2014). Fundamental to advanced education is crucial for maintaining economic stability by providing a skilled workforce (Mammadov & Gumus, 2019). Education enhances workforce skills and production while diminishing social inequality and elevating

individual welfare. This research establishes that investment in human capital is the primary determinant of long-term economic growth (Qutb & Shennawy, 2016). The study's findings indicate that only regular education expenditure substantially benefits long-term economic growth. However, capital education expenditure appears to have no meaningful impact in either the short or long term (Ayeni & Omobude, 2018).

Numerous studies have demonstrated the beneficial impact of educational expenditure on economic growth. Research by Qutb & Shennawy (2016), Mammadov & Gumus (2019), Kushwaha & Tiwari (2019), Ayeni & Omobude (2018), Haini (2020), Zhu (2024), Can & Aslan (2023), Lupu et al. (2018), Ayeni & Omobude (2018), and Nurvita et al. (2022) indicates that educational expenditure significantly enhances economic growth in contrast to the study by Aulia et al. (2024), which demonstrated that educational expenditure does not influence economic growth.

Capital expenditure refers to the funds allocated for the local government's acquisition, enhancement, or maintenance of fixed assets, significantly fostering economic growth by advancing efficiency, productivity, and innovation in production processes (Ogunjobi et al., 2022). The government can generate employment, enhance individual income, and broaden economic prospects across several industries through capital spending. Moreover, investment

in tangible assets, like real estate, infrastructure, and technology, contributes to the establishment of enduring income streams (Basumatary, 2022). Capital expenditure transcends mere spending; it is a long-term developmental plan that facilitates the acquisition of new facilities, repairs, and enhancements to existing infrastructure, yielding enduring advantages alongside advancements in the quality of public services (Collins et al., 2019).

While capital investment positively affects economic growth, its efficacy is significantly affected by natural resource utilization, government spending efficiency, and a developed financial system (Bekele et al., 2024). In several nations, particularly in Sub-Saharan Africa, inadequate resource allocations for foreign investment have deteriorated economic growth outcomes (Agyeman et al., 2022). Consequently, the equilibrium between capital expenditure and economic growth, both in the short and long term, must focus on the preservation and enhancement of physical assets, including real estate, manufacturing facilities, technology, and industrial machinery, to augment capital and income over the long term (Al-Sharif & Bino, 2019; Onifade et al., 2020).

Capital spending is intricately linked to tax revenue, as consistent tax payments influence the viability of development initiatives (Collins et al., 2019). Delays in tax remittances can impede infrastructure initiatives, including the construction of buildings and public facilities, thus

hindering economic progress. The efficacy of capital spending is significantly contingent upon proficient asset management and purposeful governmental investment, ensuring optimal positive effects on economic growth (Basumatary, 2022; Nur et al., 2020).

Numerous studies have investigated the correlation between capital spending and economic growth. Research by Basumatary (2022), Collins et al. (2019), Aulia et al. (2024), and Nur et al. (2020) indicates that capital expenditure positively influences economic growth. Nonetheless, various additional research, like those by Agyeman et al. (2022), Nguyen and Bui (2022), and Bekele et al. (2024), revealed that capital expenditure adversely affects economic growth.

The Human Development Index (HDI) is a significant metric for evaluating a nation's populace's welfare, capacities, and prospects, encompassing health, education, and income (Frankema et al., 2023). The Human Development Index (HDI), created by the United Nations Development Programme (UNDP), employs life expectancy as a health indicator, literacy rates and school enrolment as educational indicators, and Gross Domestic Product (GDP) per capita as a measure of economic welfare (Uddin, 2023). With its multidimensional methodology, the HDI offers a more holistic representation of a nation's progress than mere economic growth metrics.

The augmentation of HDI fosters economic progress by enhancing labor productivity and creativity (Appiah et al., 2019; Sofilda et al., 2023; Nurvita et al., 2022). Investment in education and health, political stability, and economic frameworks that enhance industrial efficiency are crucial determinants of human growth (Uddin, 2023). Economic instability, wealth inequality, and structural inefficiencies may hinder enhancements in quality of life. Singh (2020) asserted that economic growth alone inadequately represents societal welfare, thereby highlighting the necessity of investment in the social sector. Certain nations undergo swift economic expansion yet maintain a low quality of life, whilst other nations with moderate GDP growth achieve superior welfare (Kruss et al., 2020). Consequently, HDI is a significant metric that delineates the correlation between economic expansion and social well-being. Research by Appiah et al. (2019), Sofilda et al. (2023), Arifin & Fadllan (2021), Prasetyo & Dinarjito (2021), and Nurvita et al. (2022) concluded that the Human Development Index is positively correlated with economic growth.

The unemployment rate pertains to those who are economically engaged yet lack employment while possessing qualifications and actively seeking work. GDP growth is anticipated to enhance employment and diminish unemployment. In practice, economic development is not directly related to reduced

unemployment, influenced by factors such as rapid population expansion and the misalignment of workforce skills with industrial requirements (Conteh, 2021). Furthermore, numerous nations depend more on capital intensity than on labor, resulting in economic growth not consistently leading to substantial job creation (Mihajlović, 2020; Muin, 2020; Conteh, 2015).

The unemployment rate is correlated with Okun's law, which posits a negative relationship between unemployment fluctuations and economic output growth. Nonetheless, research indicates that this relationship is not consistently symmetrical, influenced by structural factors and national policies (Mihajlović, 2020). Jamal et al. (2021) asserted that the unemployment rate can be diminished by implementing effective job development strategies, particularly for the youth. Ahmad et al. (2020) highlighted that workforce growth is significantly disproportionate to job availability, resulting in a persistent rise in the unemployment rate. Consequently, suitable economic policies are essential to guarantee that economic expansion effectively enhances employment prospects. Numerous studies, like those by Mihajlović (2020), Muin (2020), Arifin & Fadllan (2021), and Conteh (2015), have indicated that the unemployment rate adversely and significantly impacts economic growth. Conversely, the studies by Jamal et al. (2021) and Purwanti and Rahmawati (2021) indicated that the unemployment rate positively influences

economic growth. Given the background and the outlined conceptual framework, the researcher deems it essential to investigate the impact of health expenditure, education expenditure, capital investment, human development index, and unemployment rate on economic growth.

METHOD

This research was conducted on local governments from districts and cities in provinces on the island of Sumatra with a time horizon from 2020-2023. With secondary data types (quantitative), the data comes from the Central Statistics Agency (BPS) and the Directorate General of Fiscal Balance (DJPK), namely the Budget Realization Report (LRA), Gross Regional Domestic Product (PDRB), and the Human Development Index (HDI).

The population in this research is all districts/cities that are part of the province on the island of Sumatra, totaling 154 districts/cities. Considering the perfection of research representation, the census method is used as a sampling method in this research, which means that all elements in the population will be taken as samples with an observation period of 4 years from 2020-2023, totaling 616 samples.

In this research, there are 2 (two) types of variables used, namely dependent variables and independent variables. The dependent variable in the research uses the economic growth variable,

which is measured by the ratio of the economic growth rate. The independent variables in the research are 4 (four) independent variables. First, the health spending variable is measured by the amount of health spending realization. Second, the education spending variable is calculated by the amount of education spending realization. Third, the capital spending variable is measured by the total realization of capital spending. Fourth, the Human Development Index (HDI) variable is measured by the percentage level of HDI achievement, and the fifth variable, the unemployment rate variable, is measured by the percentage level of the unemployment rate each year. Based on the exposure of the type of data, observation period, and variables used, this research can use panel data (a combination of cross-sectional and time series) in its data nature. With these considerations, this research will use data analysis with panel data regression. Mathematically, panel data regression in this research can be seen as follows:

$$EG = \beta_0 + \ln HE_{1it} + \ln EE_{2it} + \ln CE_{3it} + HDI_{4it} + UR_{5it} + e_{it}$$

Description:

Y : Economic growth

β_0 : Constant value (if X = 0)

β_1 - β_5 : Regression coefficient

$\ln HE_{1it}$: Log linear health expenditure

$\ln EE_{2it}$: Log linear education expenditure

$\ln CE_{3it}$: Log linear capital expenditure

HDI_{4it} : Human development index

UR_{5it} : Unemployment rate

eit : Interfering variables (error terms)

According to the mathematical equation of the aforementioned panel data regression, there are three techniques for predicting or estimating the regression model: Fixed Effect Model (FEM), Common Effect Model (CEM), and Random Effect Model (REM). The subsequent step in determining the most suitable regression model is selecting the optimal estimation model. Three tests will determine the optimal estimating model: the Chow Test (comparing the CEM model with the FEM), the Hausman Test (comparing the FEM model with the REM), and the Lagrange Multiplier (LM) Test (comparing the REM model with the CEM). The three tests adhere to sequential steps; if the results of a test preclude progression to the subsequent test, the completed test will determine the model employed for data analysis in this research utilizing Stata 17 software.

RESULTS and DISCUSSION

The descriptive statistics results of this research, encompassing all local governments from districts and cities in Sumatra Island, are based on 616 sample observations collected over four years from 2020 to 2023, as presented in Table 2.

Table 2. Descriptive Statistical Analysis

	N	Minimum	Maximum	Mean	Deviation Std.
EG	616	-0.99996	0.095590722	-0.182738592	0.364975075
HE	616	40,429,615,307	1,942,999,746,608	281,207,042,053	187,299,752,339
EE	616	81,657,168,594	1,186,040,661,428	361,879,018,492	206,154,620,526
CE	616	32,739,382,912	1,617,535,812,652	228,129,740,823	174,729,265,750
HDI	616	61.09000	86.69000	71.37924	4.50038
UR	616	0.26000	13.64000	4.88968	2.23872

Source: Research Data, 2025

Table 2 presents the descriptive statistics for the data utilized in this investigation, comprising 616 observation samples, including 154 samples from local governments in regencies and cities on the island of Sumatra. The Economic Growth (EG) variable (Y) yielded a mean of -0.18274 with a standard deviation of 0.36498. The peak value of economic growth, -0.09559 (9.559%), was recorded in Lebong Regency in 2021. The minimum economic growth value of -0.99996 (-99.996%) was recorded in Batam City in 2021. The mean economic growth is less than the minimum number, indicating that the average economic growth in the sample is poor. The Health Expenditure (HE) variable (X₁) was derived with a mean value of 281,207,042,053 and a standard deviation of 187,299,752,339. In 2023, Medan City recorded the most significant health spending, amounting to 1,942,999,746,608. In 2021, West Nias Regency recorded the lowest health expenditure, 40,429,615,307. The mean health expenditure exceeds the minimum value, indicating that the average health cost in the sample is elevated. The Education Expenditure (EE) variable (X₂) yielded a mean of 361,879,018,492 and a standard deviation 206,154,620,525. Deli Serdang Regency achieved the most significant education spending, totaling 1,186,040,661,428, in 2023. In 2021, West Nias Regency recorded a minimum health expenditure of 81,657,168,594. The mean education expenditure exceeds the minimum value, indicating that the average education spending within the sample is substantial.

The Capital Expenditure (CE) variable (X₃) yielded a mean of 228,129,740,823, exceeding a standard deviation of 174,729,265,750. Medan City recorded

the most significant capital expenditure value of 1,617,535,812,652 in 2022. In 2020, Solok City recorded the lowest health expenditure value of 32,739,382,912. The mean capital expenditure exceeds the minimum value, indicating that the average capital expenditure in the sample is elevated. The HDI variable (X_4) yielded a mean of 71.37924, with a standard deviation of 4.50038. Banda Aceh City had the highest Human Development Index (HDI) rating of 86.69000 in 2023. The minimum HDI value of 61.09000 was recorded by the Mentawai Islands Regency in 2020. The mean value of the HDI is less than the minimum value, indicating that the average HDI in the sample is low.

The Unemployment Rate (UR) variable (X_5) yielded a mean of 4.88968 and a standard deviation of 2.23872. Padang City recorded the highest unemployment rate of 13.64000 in 2020. West Pakpak Regency recorded a minimum unemployment rate of 0.26000 in 2022. The mean unemployment rate exceeds the minimum value, indicating a high average unemployment rate within the sample.

The subsequent stage involves selecting the appropriate regression model for data analysis in this study utilizing panel data regression, namely from the Common Effect Model (CEM), Fixed Effect Model (FEM), or Random Effect Model (REM). The optimal model selection should commence with the Chow Test, followed by the Hausman Test, and if that is satisfied, proceed to the Lagrange Multiplier (LM) Test. The Chow Test in this research is presented in Table 3.

Table 3. Results of the Chow Test

Source	SS	df	MS	Number of obs	=	616
Model	124.292329	158	.786668312	F(158, 457)	=	0.81
Residual	442.007617	457	.967193911	Prob > F	=	0.9374
				R-squared	=	0.2195
				Adj R-squared	=	-0.0504
Total	566.299946	615	.920812921	Root MSE	=	.98346

EG	Coefficient	Std. err.	t	P> t	[95% conf. interval]
InHE	.0020336	.1917574	0.01	0.992	-.3748021 .3788692
InEE	.6985838	.355013	1.97	0.050	.0008434 1.396164
InCE	-.5537059	.3088023	-1.79	0.074	-1.160554 .0531427
HDI	-.0200282	1.346992	-0.02	0.988	-2.667886 2.626246
UR	-3.081897	2.71477	-1.14	0.257	-8.416877 2.253083
_cons	-1.492693	3.292697	-0.45	0.651	-7.963397 4.978011

F(153, 457) = 0.79
Prob > F = 0.9572

Source: Research Data, 2025

Table 3 shows the test results indicating a probability value > F of 0.9572 (> 0.05). The results indicate that the Chow test identifies CEM as the optimal model estimate in this research. The failure of the Chow test for the optimal estimate model, CEM, precludes the continuation of the subsequent Hausman test. Consequently, the regression model employed for data analysis in this study is the CEM regression model. The CEM regression model utilized for data analysis in this study is displayed in Table 4.

Table 4. Outcomes of the Common Effect Model (CEM) Regression Analysis

Source	SS	df	MS	Number of obs	=	616
Model	7.27951994	5	1.45590399	F(5, 610)	=	1.59
Residual	559.020427	610	.916426929	Prob > F	=	0.1612
				R-squared	=	0.0129
				Adj R-squared	=	0.0048
Total	566.299946	615	.920812921	Root MSE	=	.9573

EG	Coefficient	Std. err.	t	P> t	[95% conf. interval]
InHE	.0004693	.1482314	0.00	0.997	-.2906365 .291575
InEE	.5416474	.2493531	2.17	0.030	.0519527 1.031342
InCE	-.5081949	.2081663	-2.44	0.015	-.9170044 -.0993854
HDI	.1404223	1.035181	0.14	0.892	-1.892529 2.173373
UR	-2.227993	2.075324	-1.07	0.283	-6.303641 1.847654
_cons	-.1818908	2.209525	-0.08	0.934	-4.521089 4.157308

Source: Research Data, 2025

The findings of the panel data regression provided indicate that the regression outcomes with CEM can be expressed mathematically as follows:

$$EG_{it} = -1,819 + 0,0004 \ln HE_{1it} + 0,5416 \ln EE_{2it} - 0,5082 \ln CE_{3it} + 0,1404 HDI_{4it} - 2,2280 UR_{5it} + e$$

The regression's constant value is 1.819, indicating that if the independent variables—health expenditure, education spending, capital spending, HDI, and unemployment rate—are zero, economic growth will be -1.819. The F test results indicate a probability value of 0.1612 (> 0.05), suggesting that health expenditure, education expenditure, capital expenditure, HDI, and the unemployment rate do not together influence economic growth.

Table 4 presents the findings of the Adjusted R Square (R^2), which is recorded at 0.0048 (0.48%). This condition indicates that economic growth can be elucidated or affected by health expenditure, educational investment, capital allocation, Human Development Index (HDI), and the unemployment rate by 0.48%. In comparison, the remaining 99.52% is determined by various other factors not encompassed in this study.

The findings of this study indicate that the initial hypothesis (H_{11}) concerning the impact of health expenditure on economic growth lacks statistical validation. The study presented in Table 4 reveals a probability value of 0.997 (> 0.05), indicating that health expenditure does not significantly influence economic development. Consequently, the null hypothesis (H_{01}) is affirmed, whereas the alternative hypothesis (H_{a1}) is dismissed. This finding indicates that while the health sector is a crucial component of human development, health expenditures over this study period have failed to influence economic growth directly. Various elements that may elucidate this outcome include: (1) Insufficient development of medical infrastructure has hindered health expenditure from significantly enhancing labor productivity; (2) Inefficiency in the establishment of

medical reserves and distribution of health services may diminish the effectiveness of expenditures in this sector; and (3) Inadequate oversight of health service quality results in health sector investments not consistently contributing to productivity and economic growth. Nonetheless, the findings of this investigation are not wholly congruent with other prior discoveries. Research by Gamon (2022) and Aulia et al. (2024) corroborates this conclusion, indicating that health expenditure does not significantly influence economic growth. This study, however, contradicts the findings of several other studies, including those by Sijabat (2022), Vysochyna et al. (2023), Haini (2020), Alwago (2022), Hu & Wang (2024), Nurvita et al. (2022), Dritsaki & Dritsaki (2024), and can & Aslan (2023), which indicated that health expenditure positively influences economic growth.

The findings of this study demonstrate that the second hypothesis (H_2), which posits that education expenditure positively and significantly influences economic growth, is empirically validated. The analysis results in Table 4 reveal a probability value of 0.030 (< 0.05), indicating that education expenditure positively and significantly influences economic growth. Consequently, the alternative hypothesis (H_{a2}) is affirmed, whereas the null hypothesis (H_{02}) is dismissed. This discovery substantiates that education plays a crucial role in fostering economic progress. Education expenditure is both a supplementary conduit for human capital development and a potent tool for enhancing labor productivity and national competitiveness. High-quality education fosters a more proficient and innovative workforce, enhancing economic productivity. The relatively inelastic nature of education spending suggests that

augmenting the education budget does not inherently decrease the number of students utilizing educational services, ensuring the long-term relevance of investment in this area. Inconsistencies in policy, insufficient funding, and the risk of fund misappropriation might obstruct the effective allocation of educational expenditures in fostering economic growth. Consequently, a more holistic approach is required to administer the education budget to optimize its beneficial effects. The findings of this study corroborate the conclusions of numerous prior investigations, including those by Lupu et al. (2018), Ayeni & Omobude (2018), Qutb & Shennawy (2016), Mammadov & Gumus (2019), Kushwaha & Tiwari (2019), Zhu (2024), Haini (2020), Can & Aslan (2023), and Nurvita et al. (2022), all of which determined that educational expenditure positively influences economic growth.

The findings of this study demonstrate that the third hypothesis (H_3), which posits that capital expenditure adversely yet significantly impacts economic growth, is experimentally validated. The analysis results in Table 4 reveal a likelihood value of 0.015 (<0.05), indicating that health expenditure negatively and significantly impacts economic growth. Consequently, the alternative hypothesis (H_{a3}) is affirmed, whereas the null hypothesis (H_{03}) is dismissed. This conclusion suggests that capital expenditures, including infrastructure development, human resources, and technology, have failed to stimulate economic growth in the examined region successfully. Multiple potential explanations exist for this outcome. Inefficient or unwise capital spending might impede its beneficial effects on economic progress. The influence of capital expenditure on

economic growth is often long-term. In certain instances, capital investment requires an extended period before yielding tangible outcomes in enhanced productivity and economic competitiveness. Third, external factors, including economic instability, alterations in fiscal policy, or insufficient private investment that complements government capital spending, can influence the efficacy of capital investment on economic growth. The detrimental effect on economic growth may be exacerbated if capital expenditure is not aligned with suitable supporting policies, including meticulous planning and tight oversight. The conclusions of this study align with those presented by Bekele et al. (2024), Agyeman et al. (2022), and Nguyen & Bui (2022), all of whom similarly concluded that capital expenditure adversely and significantly impacts economic growth. This study, however, contradicts the studies of Basumatary (2022), Collins et al. (2019), Aulia et al. (2024), and Nur et al. (2020), which indicated that capital spending positively and significantly influences economic growth.

The findings of this study demonstrate that the fourth hypothesis (H_4), concerning the impact of HDI on economic growth, lacks empirical validation. The study presented in Table 4 reveals a likelihood value of 0.892 (>0.05), suggesting that HDI does not significantly influence economic growth. Consequently, the alternative hypothesis (H_{a4}) is dismissed, whilst the null hypothesis (H_{04}) is upheld. This conclusion suggests that while HDI represents the quality of education, health, and living standards, an enhancement in these variables does not inherently correlate with economic growth in the examined region. A contributing component to this

outcome is the inadequate degree of human development, which has hindered the optimization of universal health care and access to quality primary and secondary education. Flaws in the education and health systems can impede the enhancement of human resource quality, hence constraining the impact of HDI on economic growth. Moreover, the standard of living assessed through gross income per capita in purchasing power parity may be affected by the degree of relative poverty, which, in certain instances, indicates economic disparity rather than sustainable economic growth. Moreover, the findings of this study demonstrate that the HDI has exhibited suboptimal performance in the realms of intelligence and worker skills, rendering its contribution to economic growth negligible. An elevated HDI should indicate superior health, education, and income quality, enhancing the budgetary capacity for investment in human capital development. Under optimal conditions, enhancing the HDI can bolster fiscal decentralization and regional human capital capacity, thus facilitating accelerated economic growth. Nonetheless, within the framework of this study, this correlation remains unsubstantiated. The findings of this research diverge from those of Appiah et al. (2019), Sofilda et al. (2023), Arifin & Fadllan (2021), Prasetyo & Dinarjito (2021), and Nurvita et al. (2022), which assert that HDI positively influences economic growth.

The findings of this study demonstrate that the fifth hypothesis (H_5), concerning the impact of the unemployment rate on economic growth, lacks empirical validation. The research results in Table 4 reveal a likelihood value of 0.283 (>0.05), suggesting that the unemployment rate does not significantly

impact economic growth. Consequently, the alternative hypothesis (H_{a5}) is dismissed, whilst the null hypothesis (H_{05}) is upheld. This study suggests that while the unemployment rate signifies labor market conditions, it is not the primary factor influencing economic growth in the examined region. A contributing element to this outcome is the predominance of the service, industrial, and agricultural sectors within the economic framework, which exhibit a more robust link with private consumption and government expenditure than with the unemployment rate. In this setting, job creation is insufficient to enhance economic growth unless coupled with increased production capacity and labor productivity. The study's results indicate that economic growth is mainly driven by capital rather than labor intensity. In a technological and capital-driven economy, investment in infrastructure, innovation, and manufacturing efficiency frequently dictates economic development more than merely augmenting the workforce. Consequently, while elevated unemployment rates may pose social and economic difficulties, a reduction does not necessarily enhance economic growth. The conclusions of this study align with those of Mihajlović (2020), Muin (2020), Arifin & Fadllan (2021), and Conteh (2021), all of whom concluded that the unemployment rate does not significantly affect economic growth.

CONCLUSION

This study concludes that capital investment adversely affects economic growth, whereas education expenditure positively influences it. Conversely, health expenditure, unemployment rate, and Human

Development Index (HDI) have not been demonstrated to significantly influence economic growth for local governments in districts and cities on Sumatra Island. This study suggests that fiscal policy fostering economic growth must be more effectively structured by prioritizing expenditures that enhance productivity and economic competitiveness. The adverse effects of capital expenditure suggest potential inefficiencies in public investment management. In contrast, the beneficial effects of education expenditure imply that enhancing human resource quality contributes significantly to sustained economic growth. This work offers significant insights, yet numerous limitations warrant consideration. This study exclusively examines district and city governments on Sumatra Island. Hence, the findings may not apply to other places in Indonesia with distinct economic and social attributes. The four-year restricted analysis period may hinder this study's capacity to identify long-term trends and wider economic swings. This study exclusively examines specific macroeconomic variables, so failing to encompass the intricate array of elements that affect economic growth, including monetary policy, political stability, and external influences such as international commerce and foreign direct investment.

CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the study's design, data collection, analysis, interpretation, manuscript writing, or decision to publish the results.

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