International Journal of Business and Quality Research

https://e-journal.citakonsultindo.or.id/index.php/IJBQR
E-ISSN: 2985-9468

The Effect of Human Capital Investment on Regional Economic Growth in Gorontalo Province

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Abstract

Human capital investment has become one of the key drivers of regional economic growth because it improves labor productivity, educational quality, and public welfare. This study aims to examine the effect of human capital investment on regional economic growth in Gorontalo Province. A quantitative approach was employed using annual secondary time-series data obtained from the Central Bureau of Statistics (BPS) and regional government reports covering the period 2014-2025. The variables analyzed included education expenditure, health expenditure, labor productivity, and Gross Regional Domestic Product (GRDP) growth. Data were analyzed using multiple linear regression. The results reveal that education expenditure, health expenditure, and labor productivity all have positive and statistically significant effects on regional economic growth. Among these variables, labor productivity exhibits the strongest influence, followed by education expenditure and health expenditure. The regression model explains 65.9% of the variation in regional economic growth, indicating that human capital investment plays a substantial role in regional economic performance. These findings provide empirical evidence that strengthening investment in education, healthcare, and workforce productivity constitutes an effective strategy for promoting sustainable regional economic growth and supporting evidence-based regional development policies in Gorontalo Province.

Keywords: Human Capital Investment; Regional Economic Growth; Education Expenditure; Health Expenditure; Labor Productivity

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INTRODUCTION

Economic growth remains one of the primary indicators of regional development, reflecting a region's ability to increase productivity, generate income, and improve community welfare over time. While traditional growth theories primarily emphasize the accumulation of physical capital as the engine of economic expansion, contemporary development literature increasingly recognizes human capital investment as an equally important determinant of sustainable economic growth. Investments in education, health, and workforce development enhance labor productivity, strengthen innovation capacity, and improve the overall quality of human resources, thereby creating the foundation for sustained economic performance. Contemporary empirical evidence further demonstrates that countries and regions with greater investment in human capital tend to achieve stronger long-term economic growth and higher productivity levels (Barro, 1991; Hanushek & Woessmann, 2020). According to Human Capital Theory, investments in education and health improve individuals' knowledge, skills, and productivity, thereby generating long-term economic returns (Becker, 1993). This perspective is further reinforced by Endogenous Growth Theory, which argues that the accumulation of human capital stimulates technological progress, knowledge creation, and productivity improvements that sustain long-term economic growth (Lucas, 1988; Romer, 1990). Consequently, strengthening human capital has become a strategic priority for governments seeking to achieve sustainable regional economic growth and enhance long-term economic competitiveness.

In Indonesia, human capital development has become an integral component of national and regional development strategies aimed at promoting inclusive and sustainable economic growth. Despite continuous improvements in education, healthcare, and labor quality, significant disparities in economic performance remain across provinces. Gorontalo Province, as one of Indonesia's developing regions, continues to face challenges in strengthening the quality of its human resources while maintaining stable economic growth. Official publications of the Central Bureau of Statistics (Badan Pusat Statistik) indicate that regional economic performance, educational attainment, health conditions, and labor productivity have shown gradual progress over recent years, although the pace of improvement remains uneven across development indicators (Badan Pusat Statistik Provinsi Gorontalo, various years; Badan Pusat Statistik, various years). These regional conditions are consistent with broader national and international evidence indicating that sustained investment in human capital is fundamental to improving productivity, strengthening economic resilience, and supporting long-term prosperity. The World Bank Human Capital Index further emphasizes that countries and regions investing in education

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and health are better positioned to enhance workforce productivity and achieve sustainable economic development (World Bank, 2020). Therefore, understanding how human capital investment contributes to regional economic growth is essential for supporting evidence-based development policies and improving the effectiveness of public investment in education, health, and workforce development.

Previous empirical studies have consistently reported that investment in education, health, and human capital contributes positively to regional economic growth by improving labor quality, productivity, and innovation capacity (Benhabib & Spiegel, 1994; Psacharopoulos & Patrinos, 2018; Boussalham, 2022). Empirical evidence suggests that higher educational attainment enhances workforce competence and innovation, while improved health conditions increase labor participation and productivity, both of which strengthen long-term economic performance. Nevertheless, the magnitude and significance of these relationships vary across countries and regions due to differences in socioeconomic conditions, institutional capacity, public expenditure priorities, and regional development characteristics. In the Indonesian context, empirical evidence at the provincial level remains relatively limited, particularly regarding studies that simultaneously examine education expenditure, health expenditure, and labor productivity as integrated dimensions of human capital investment influencing regional economic growth. Moreover, the distinctive socioeconomic characteristics of Gorontalo Province suggest that findings from other regions cannot be directly generalized to its development context. Accordingly, this study addresses this empirical gap by examining the simultaneous effects of education expenditure, health expenditure, and labor productivity on regional economic growth in Gorontalo Province using provincial time-series data. Therefore, the findings are expected to provide more context-specific evidence for strengthening regional development policies and enriching the empirical literature on human capital investment in developing regions.

Based on the theoretical perspectives and empirical evidence discussed above, this study aims to examine the effect of human capital investment on regional economic growth in Gorontalo Province. Specifically, the study investigates the roles of education expenditure, health expenditure, and labor productivity as key dimensions of human capital investment in influencing regional economic performance. By addressing the empirical gap identified in previous studies, this research contributes to the growing body of literature on regional economic development by providing context-specific evidence from a developing province in Indonesia. Furthermore, the study extends existing empirical knowledge by examining the combined effects of multiple dimensions of human capital investment on regional economic growth using provincial time-series data. The findings are expected to provide practical insights for policymakers in designing evidence-based development strategies that

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E-ISSN: 2985-9468

strengthen human resource quality, enhance labor productivity, and promote sustainable long-term regional economic growth

THEORETICAL REVIEW

Human Capital Theory, introduced by Becker (1993), explains that investments in education, health, and skills development should be regarded as productive investments that enhance individuals' knowledge, competencies, and earning capacity. Unlike physical capital, which primarily emphasizes tangible assets, human capital focuses on developing individuals' capabilities, thereby improving labor productivity, fostering innovation, and generating long-term economic returns. Consequently, greater investment in human capital is expected to strengthen economic performance through a more skilled, healthier, and productive workforce. This theoretical perspective has been widely supported by empirical evidence demonstrating that countries and regions with higher investments in education and health generally achieve superior economic performance through improvements in workforce productivity, technological capability, and knowledge accumulation (Benhabib & Spiegel, 1994; Hanushek & Woessmann, 2020). Complementing Human Capital Theory, Endogenous Growth Theory argues that the accumulation of knowledge and human capital constitutes a fundamental source of long-term economic growth because it stimulates technological progress, innovation, and productivity improvements (Lucas, 1988; Romer, 1990). Recent empirical studies further suggest that the economic contribution of human capital becomes more substantial when investments in education and health are accompanied by higher labor productivity and technological innovation (Li & Huang, 2023). These theoretical and empirical perspectives provide the conceptual foundation for examining how education expenditure, health expenditure, and labor productivity jointly influence regional economic growth in Gorontalo Province.

In the context of regional economic development, Human Capital Theory provides a relevant framework for understanding how investments in education, health, and labor productivity contribute to regional economic growth. Education equips individuals with the knowledge and skills required to improve workforce quality, foster innovation, and adapt to technological change. Likewise, better health conditions enhance labor participation and work efficiency by reducing productivity losses associated with illness and improving overall workforce performance. Labor productivity reflects the effectiveness with which human resources utilize available inputs to generate economic output and serves as an important mechanism through which human capital contributes to economic growth. Empirical studies consistently indicate that improvements in education, health, and labor productivity strengthen regional competitiveness and support sustainable economic

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development (Psacharopoulos & Patrinos, 2018; Hanushek & Woessmann, 2020). Consequently, regions that consistently invest in education, healthcare, and workforce development are expected to achieve stronger, more resilient, and more sustainable economic growth than those relying primarily on the accumulation of physical capital.

Previous empirical studies generally support the propositions of Human Capital Theory by demonstrating that investments in education and health positively influence economic performance through improvements in workforce productivity and human resource quality. Becker (1993) emphasized that investment in human capital generates long-term economic returns by increasing individual productivity, while Lucas (1988) and Romer (1990) argued that human capital accumulation promotes innovation and sustained economic growth. These theoretical arguments have been consistently supported by empirical evidence showing that investment in education improves workforce skills and innovation capacity, whereas investment in health enhances labor participation and productivity, both of which contribute to higher economic growth (Benhabib & Spiegel, 1994; Psacharopoulos & Patrinos, 2018; Hanushek & Woessmann, 2020). More recent studies further indicate that the economic contribution of human capital is strengthened when improvements in education and health are accompanied by higher labor productivity and technological advancement (Boussalham, 2022; Li & Huang, 2023). Nevertheless, the magnitude and significance of these relationships vary across countries and regions because of differences in socioeconomic characteristics, institutional capacity, public investment priorities, and regional development conditions. These findings suggest that the effectiveness of human capital investment should be examined within specific regional contexts to obtain more robust and context-specific empirical evidence.

The theoretical perspectives and empirical evidence discussed above indicate that investment in education, health, and labor productivity plays a fundamental role in promoting regional economic growth. Drawing on Human Capital Theory and Endogenous Growth Theory, this study posits that investment in these dimensions enhances workforce quality, strengthens labor productivity, and stimulates innovation, thereby contributing to sustained regional economic performance. Accordingly, education expenditure, health expenditure, and labor productivity are conceptualized as key dimensions of human capital investment that are expected to exert positive effects on regional economic growth. This theoretical proposition provides the basis for developing the conceptual framework presented in the following section. The conceptual relationships among these variables are illustrated in Figure 1, which serves as the foundation for formulating the research hypotheses..

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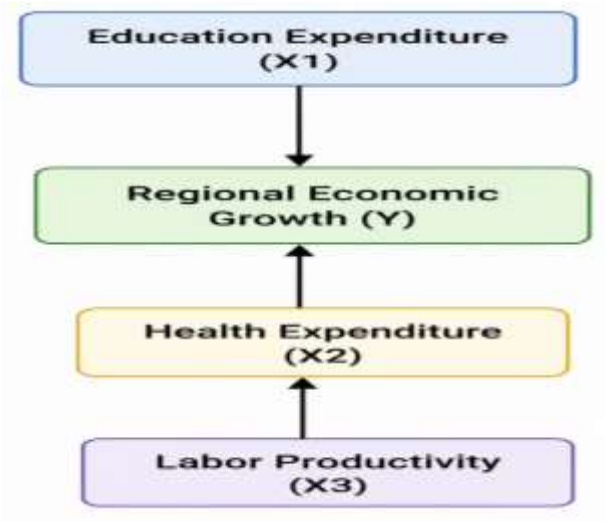


Figure 1. Thinking Framework

Based on the conceptual framework, the following hypotheses are proposed:

H1: Education expenditure has a positive and significant effect on regional economic growth in Gorontalo Province.

H2: Health expenditure has a positive and significant effect on regional economic growth in Gorontalo Province.

H3: Labor productivity has a positive and significant effect on regional economic growth in Gorontalo Province.

H4: Education expenditure, health expenditure, and labor productivity simultaneously have a positive and significant effect on regional economic growth in Gorontalo Province.

METHOD

Research Design

This study employed a quantitative research approach using an explanatory research design to examine the effect of human capital investment on regional economic growth in Gorontalo Province. The study utilized secondary time-series data covering the period 2014-2025. The explanatory design was adopted to analyze the causal relationship between education expenditure, health expenditure, labor productivity, and regional economic growth through multiple linear regression analysis.

Data Source and Variables

The study used secondary data obtained from official publications of the Central Bureau of Statistics (Badan Pusat Statistik/BPS), including Gorontalo Province in Figures, Gross Regional Domestic Product by Province, and other relevant statistical publications, as

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well as supporting regional government reports. The observation period covered annual data from 2014 to 2025.

The study consisted of one dependent variable and three independent variables. The dependent variable was regional economic growth (Y), measured by the annual growth rate of Gross Regional Domestic Product (GRDP). The independent variables included education expenditure (X_1), health expenditure (X_2), and labor productivity (X_3), which represent the principal dimensions of human capital investment.

Operational Definition of Variables

The study consisted of one dependent variable and three independent variables. Regional economic growth was specified as the dependent variable, while education expenditure, health expenditure, and labor productivity were specified as the independent variables representing the dimensions of human capital investment. The operational definitions, measurements, and data sources for each variable are presented in Table 1.

Table 1. Operational Definition of Variables

Variable	Definition	Measurement	Data Source
Regional Economic Growth (Y)	The annual increase in regional economic output in Gorontalo Province.	Annual GRDP growth rate (%)	BPS
Education Expenditure (X_1)	Government expenditure allocated to the education sector as an investment in human capital.	Annual education expenditure (IDR)	Regional Government / BPS
Health Expenditure (X_2)	Government expenditure allocated to the health sector to improve public health services and human capital quality.	Annual health expenditure (IDR)	Regional Government / BPS
Labor Productivity (X_3)	The efficiency of labor in producing economic output.	Output per worker (or indicator used in the dataset)	BPS

Based on the operational definitions presented in Table 1, the data were analyzed using multiple linear regression to examine the effect of human capital investment on regional economic growth in Gorontalo Province.

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Data Analysis

The data were analyzed using IBM SPSS Statistics through multiple linear regression analysis to examine the effect of education expenditure, health expenditure, and labor productivity on regional economic growth. Prior to estimating the regression model, classical assumption tests were performed, including the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test, to ensure that the regression model satisfied the assumptions of the Ordinary Least Squares (OLS) method.

Hypothesis testing was conducted using the t-test to examine the partial effect of each independent variable, the F-test to evaluate their simultaneous effect, and the coefficient of determination (R^2) to measure the explanatory power of the regression model. The regression model employed in this study is expressed as follows:

$$Y=\alpha+\beta_1X_1+\beta_2X_2+\beta_3X_3+\varepsilon$$

where:
Y = Regional Economic Growth
X_1 = Education Expenditure
X_2 = Health Expenditure
X_3 = Labor Productivity
α = Constant
β_1, β_2, β_3 = Regression coefficients
ε = Error term.

RESULTS AND DISCUSSION

RESULTS

Overview of Regional Economic and Human Capital Development

During the observation period from 2014 to 2025, Gorontalo Province demonstrated a gradual improvement in regional economic performance, accompanied by increasing public investment in human capital development. The regional government continuously expanded expenditure on education and health as part of its strategy to improve the quality of human resources, strengthen labor productivity, and support sustainable economic development. Nevertheless, the pace of economic growth remained subject to fluctuations influenced by the province's economic structure, labor market conditions, and external economic factors affecting regional productivity.

Education expenditure exhibited a generally increasing trend throughout the observation period, reflecting the government's commitment to expanding educational

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access and improving the quality of human resources. Likewise, health expenditure continued to increase as part of broader efforts to enhance public health services, improve workforce sustainability, and strengthen community welfare. These investments indicate the regional government's recognition of education and health as fundamental components of human capital development.

Meanwhile, labor productivity demonstrated moderate growth during the study period despite differences in performance across economic sectors. Considering that Gorontalo's economy remains largely dependent on agriculture and informal economic activities, improvements in workforce productivity continue to play an important role in supporting regional output and economic expansion. Overall, these developments provide an initial indication that investment in human capital has become an integral component of regional development policy and therefore warrants further empirical examination through regression analysis.

Multiple Linear Regression Analysis

To examine the effect of human capital investment on regional economic growth in Gorontalo Province, multiple linear regression analysis was performed using education expenditure, health expenditure, and labor productivity as the independent variables. The analysis was conducted to determine both the direction and magnitude of the influence of each variable on regional economic growth. The results of the regression analysis are presented in Table 1.

Table 2. Results of Multiple Linear Regression Analysis

Variables	Coefficient	t-value	Sig.
Constant	1.284	1.912	0.064
Education Expenditure	0.482	3.721	0.001
Health Expenditure	0.291	2.418	0.021
Labor Productivity	0.533	4.105	0.000

Source: Secondary Data Processed, 2026

The regression results indicate that education expenditure has a positive and statistically significant effect on regional economic growth, with a regression coefficient of 0.482 and a significance value of 0.001 ($p < 0.05$). This finding suggests that increased investment in the education sector is associated with improvements in regional economic performance through the enhancement of human resource quality and productive capacity. Similarly, health expenditure demonstrates a positive and significant effect on regional economic growth, with a regression coefficient of 0.291 and a significance value of 0.021 ($p < 0.05$). Although its estimated contribution is smaller than that of education expenditure,

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investment in the health sector remains an important factor in supporting workforce sustainability and maintaining productive economic activities.

Among the independent variables, labor productivity exhibits the largest regression coefficient (0.533) and the highest level of statistical significance (p = 0.000). These results indicate that improvements in labor productivity provide the strongest contribution to regional economic growth in Gorontalo Province, emphasizing the importance of productive human resources in supporting regional economic expansion.

Coefficient of Determination

To evaluate the explanatory power of the regression model, the coefficient of determination (R^2) was calculated. This statistic indicates the proportion of variation in regional economic growth that can be explained by the independent variables included in the model. The results of the coefficient of determination analysis are presented in Table 2.

Table 2. Coefficient of Determination Results

Model	R	R Square	Adjusted R Square
Regression Model	0.812	0.659	0.634

Source: Secondary Data Processed, 2026

The results presented in Table 2 show that the regression model has an R Square value of 0.659, indicating that 65.9% of the variation in regional economic growth in Gorontalo Province can be explained by education expenditure, health expenditure, and labor productivity. The remaining 34.1% of the variation is attributable to other factors that were not included in the present research model.

Furthermore, the Adjusted R Square value of 0.634 indicates that, after accounting for the number of explanatory variables included in the model, the regression equation still provides a satisfactory level of explanatory power. These findings suggest that the selected dimensions of human capital investment make a substantial contribution to explaining variations in regional economic growth during the observation period.

DISCUSSION

The Effect of Health Expenditure on Regional Economic Growth

The regression analysis indicates that health expenditure has a positive and statistically significant effect on regional economic growth, as reflected by a regression coefficient of 0.291 and a significance value of 0.021 ($p < 0.05$). These findings suggest that increased government expenditure on the health sector contributes positively to economic growth in Gorontalo Province. Improved public health services enhance the physical well-being and productivity of the labor force, enabling individuals to participate more effectively in economic activities and increasing overall production capacity.

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E-ISSN: 2985-9468

This finding is consistent with Human Capital Theory, which recognizes health as a fundamental component of human capital investment. Becker (1993) argued that expenditures on health improve workers' physical and cognitive capacities, thereby enhancing labor productivity and generating long-term economic returns. Similarly, Endogenous Growth Theory emphasizes that improvements in human capital, including better health conditions, stimulate productivity growth, facilitate knowledge accumulation, and support sustained economic development (Lucas, 1988; Romer, 1990). These theoretical perspectives are supported by empirical studies demonstrating that investments in health contribute to economic growth by improving workforce quality, increasing labor productivity, and strengthening human capital formation (Benhabib & Spiegel, 1994; Boussalham, 2022).

The findings of this study are also consistent with previous empirical evidence indicating that health investment contributes positively to regional economic performance by reducing productivity losses associated with poor health conditions and improving workforce participation. Although the magnitude of this relationship may differ across regions because of variations in socioeconomic conditions and institutional capacity, the positive coefficient obtained in this study suggests that health expenditure constitutes an important driver of economic growth in Gorontalo Province. Therefore, sustained investment in accessible and high-quality healthcare should remain a strategic priority for regional governments seeking to strengthen human capital, enhance labor productivity, and promote sustainable long-term economic growth.

The Effect of Labor Productivity on Regional Economic Growth

The regression results further reveal that labor productivity has the strongest positive and statistically significant effect on regional economic growth, with a regression coefficient of 0.533 and a significance value of 0.000 ($p < 0.05$). Among the independent variables included in the model, labor productivity exhibits the largest regression coefficient, indicating that improvements in workforce productivity provide the greatest contribution to regional economic growth in Gorontalo Province. Higher labor productivity enables workers to generate greater output with available resources, thereby increasing production efficiency, enhancing resource utilization, and supporting sustained regional economic expansion.

These findings support Endogenous Growth Theory, which emphasizes that productivity improvement, knowledge accumulation, and human capital development constitute the primary drivers of long-term economic growth (Lucas, 1988; Romer, 1990). Likewise, Human Capital Theory explains that investments in education and health

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ultimately enhance workers' knowledge, skills, and physical capacity, which are reflected in higher labor productivity and improved economic performance (Becker, 1993). Empirical evidence further reinforces this theoretical perspective by demonstrating that labor productivity functions as a key transmission mechanism through which human capital investment promotes economic growth and regional competitiveness (Hanushek & Woessmann, 2020; Li & Huang, 2023).

The results of this study are consistent with previous empirical findings indicating that regions with higher labor productivity generally achieve stronger and more sustainable economic growth. In the context of Gorontalo Province, where economic activity continues to rely heavily on agriculture and other labor-intensive sectors, improvements in workforce productivity are likely to generate substantial economic benefits because they directly increase production efficiency and output without requiring proportional increases in production inputs. Consequently, policies that integrate education, vocational skills development, technological adoption, and healthcare improvement are expected to strengthen labor productivity, enhance regional competitiveness, and support sustainable long-term economic growth.

Policy Implications for Regional Development

The findings of this study demonstrate that education expenditure, health expenditure, and labor productivity collectively contribute to regional economic growth, with labor productivity providing the strongest influence among the variables examined. The coefficient of determination further indicates that a substantial proportion of the variation in regional economic growth can be explained by these dimensions of human capital investment, highlighting their strategic importance in supporting sustainable regional development. These findings suggest that improving workforce productivity should become a central objective of regional development policies because it represents the primary channel through which investments in education and health generate economic benefits.

Anchored in Human Capital Theory and Endogenous Growth Theory, these findings reinforce the view that sustainable economic growth depends not only on physical capital accumulation but also on continuous improvements in the quality of human resources (Becker, 1993; Lucas, 1988; Romer, 1990). This theoretical perspective is further supported by empirical evidence demonstrating that investments in education, health, and workforce capability enhance labor productivity, strengthen innovation capacity, and improve long-term economic performance (Hanushek & Woessmann, 2020; Psacharopoulos & Patrinos,

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2018; Boussalham, 2022). Accordingly, strengthening human capital should be regarded as a long-term investment strategy rather than merely a component of social expenditure.

From a policy perspective, the Government of Gorontalo Province should continue prioritizing investments that strengthen human capital development. Increasing the effectiveness of education and health expenditure should be accompanied by policies that improve workforce skills, expand vocational and technical education, encourage technological adoption and innovation, strengthen collaboration between educational institutions and industry, and create productive employment opportunities. Such integrated policies are expected to enhance labor productivity, improve regional competitiveness, and generate sustainable long-term economic growth.

Nevertheless, the coefficient of determination also indicates that regional economic growth is influenced by factors beyond the scope of this study. Therefore, future development strategies should complement human capital investment with broader policies aimed at improving infrastructure, accelerating technological transformation, strengthening institutional quality, promoting private investment, and fostering regional economic diversification. Such a comprehensive approach is expected to create a more resilient, inclusive, and sustainable pattern of economic growth in Gorontalo Province.

CONCLUSION

This study examined the effect of human capital investment, represented by education expenditure, health expenditure, and labor productivity, on regional economic growth in Gorontalo Province during the 2014-2025 observation period. The empirical findings demonstrate that all three variables have positive and statistically significant effects on regional economic growth. Among them, labor productivity exhibits the strongest influence, followed by education expenditure and health expenditure. These results indicate that strengthening human capital remains an essential strategy for promoting sustainable regional economic development.

The findings support the propositions of Human Capital Theory and Endogenous Growth Theory, suggesting that investment in education and health improves the quality of human resources, which is ultimately reflected in higher labor productivity and stronger regional economic performance. In the context of Gorontalo Province, policies that enhance the effectiveness of education and health spending, while simultaneously improving workforce productivity, are expected to contribute to more inclusive and sustainable economic growth.

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This study is subject to several limitations. The analysis focuses only on three dimensions of human capital investment and uses secondary time-series data from Gorontalo Province. Consequently, other factors that may influence regional economic growth, such as infrastructure development, technological innovation, institutional quality, investment, and demographic dynamics, were not included in the regression model. Future research is encouraged to incorporate additional explanatory variables, employ broader datasets such as panel or comparative regional data, and utilize more advanced econometric approaches to provide a more comprehensive understanding of the relationship between human capital investment and regional economic growth. Such efforts are expected to strengthen the empirical evidence supporting regional development policies in Indonesia.

Recommendations

Based on the findings of this study, the Government of Gorontalo Province should continue strengthening human capital investment as a strategic instrument for promoting sustainable regional economic growth. Since labor productivity was found to have the strongest influence on economic growth, policies should prioritize programs that improve workforce skills through vocational education, technical training, professional certification, and entrepreneurship development. These initiatives should be aligned with the needs of the regional labor market to ensure that improvements in human capital translate into higher productivity and economic competitiveness.

Furthermore, regional authorities should enhance the effectiveness of education and health expenditures by emphasizing not only budget allocation but also service quality, accessibility, and program outcomes. Improving educational attainment and expanding access to quality healthcare are expected to strengthen the quality of human resources and support long-term economic development. In addition, greater collaboration among government agencies, educational institutions, healthcare providers, and the private sector is recommended to maximize the impact of human capital investment on regional economic performance.

Limitations and suggestions for further study

This study has several limitations that should be considered when interpreting the findings. First, the analysis focuses exclusively on Gorontalo Province, limiting the generalizability of the results to other regions with different economic structures and development characteristics. Second, the study examines only three dimensions of human capital investment, namely education expenditure, health expenditure, and labor productivity, while other factors that may influence regional economic growth were beyond

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the scope of the research. Third, the analysis relies on secondary time-series data, which are constrained by the availability and consistency of official statistical records.

Future research is encouraged to extend the analytical framework by incorporating additional determinants of regional economic growth, such as infrastructure development, technological innovation, institutional quality, investment, demographic characteristics, and digital transformation. Comparative studies across provinces or the use of panel data may provide broader empirical evidence regarding the relationship between human capital investment and economic growth. In addition, future studies may employ more advanced econometric techniques to capture dynamic relationships and improve the robustness of empirical findings, thereby contributing to more comprehensive evidence for regional development policy formulation.

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