

The Influence of Government Spending, Road Infrastructure and HDI on Indonesia's Economic Growth

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Published: February , 2026

ABSTRACT

The study purpose was to analyze the influence of central government spending, road infrastructure development, and the Human Development Index (HDI) on economic growth in Indonesia over the period 1995–2024.

Materials and methods. This study employs annual secondary data sourced from the official publications of Statistics Indonesia (BPS) and the Ministry of Finance. The analytical method applied is multiple linear regression to determine the extent of the influence exerted by each independent variable on the dependent variable, namely economic growth.

Results. The study found an R-squared (R^2) of 0.988291, showing that 98.83% of GDP variation is explained by the model. The F-statistic (0.000) confirms a significant simultaneous effect. Partially, central government spending (X_1) has a highly significant positive impact ($p=0.000$), while road infrastructure (X_2) and HDI (X_3) do not show significant effects ($p > 0.05$).

Conclusions. The study concludes that central government spending is the primary driver of Indonesia's GDP, whereas road infrastructure and HDI require better optimization to yield immediate economic impacts. These findings suggest a potential "lag effect" in infrastructure and social investments. Consequently, the government should prioritize spending efficiency and the long-term quality of human capital to ensure a more balanced and sustainable contribution to national economic growth.

Keywords: Economic Growth, Government Spending, Road Infrastructure, HDI, Indonesia.

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INTRODUCTION

Economic growth is a fundamental indicator for assessing a country's development success, including Indonesia, which aspires to become one of the world's largest economies by 2045. In the long term, the stability of economic growth is significantly influenced by fiscal policy and the strengthening of supporting production factors. Central Government Spending plays a vital role through fiscal stimulus mechanisms, where well-targeted budget allocations are expected to create a multiplier effect on public economic activities. However, the effectiveness of this spending often depends on the availability of adequate physical infrastructure. Road infrastructure development is key to reducing logistics costs and smoothing the flow of goods and services between regions, which ultimately integrates the domestic market and enhances national competitiveness.

In addition to physical factors, the quality of human resources, represented by the Human Development Index (HDI), is a crucial determinant in driving inclusive economic growth. Healthy, educated individuals with a decent standard of living create a productive workforce capable of adopting technology and innovation. Although Indonesia has shown positive trends in these three variables over the past three decades (1995-2024), volatile economic dynamics caused by global and domestic crises present unique challenges in maintaining consistent growth.

Economic growth serves as a key indicator reflecting a country's ability to sustainably expand the output of goods and services. In the context of Indonesia, fiscal policy plays a strategic role in promoting sustainable economic growth, both through its short-term influence on aggregate demand and its long-term impact on aggregate supply by enhancing overall economic capacity (Darma et al., 2024).

Central government expenditure plays a crucial role in stimulating national economic activity. Alfayed et al., (2025), find that budget allocations for capital expenditure, particularly for infrastructure development such as roads, bridges, ports, and other public facilities, make a significant contribution to increasing economic activity. Similar findings are reported by Nursawitri et al., (2025), who emphasizes that government spending focused on the health, education, and strategic infrastructure sectors strengthens productive capacity and national competitiveness, as reflected in economic growth of approximately 5.03% in 2024, indicating the effectiveness of fiscal policy in driving aggregate demand.

In addition to fiscal policy, road infrastructure development makes a substantial contribution to economic connectivity and efficiency. According to Surya et al., (2025), infrastructure development policies should be directed not only toward improving efficiency and economic growth but also toward reducing regional development disparities. Meanwhile, Widyanti & Yasin, (2025), note that the availability of supporting infrastructure such as road access, logistics systems, and basic utilities outside industrial areas remains uneven, thereby constraining the expansion of business activities into other regions.

Another important factor is the Human Development Index (HDI), which reflects the quality of human resources. Utami (2020), argues that a high level of human development plays a critical role in enhancing society's capacity to utilize sources of economic growth, both through technological mastery and institutional strengthening. A similar view is expressed by Rohmah et al., (2025), who state that economic development and improvements in human resource quality are mutually reinforcing, where economic growth creates opportunities for human capital development, while high-quality human resources foster sustainable economic growth.

Table 1. Trends in Indonesia's Macroeconomic Indicators

Variable	2021	2022	2023	2024
Pertumbuhan Ekonomi (%)	3,70	5,31	5,05	5,08
Belanja Pemerintah Pusat (Triliun Rp)	2.001,1	2.274,5	2.240,6	2.410,6
Kondisi Jalan Mantap (%)*	91,27	91,00	92,10	94,00
Indeks Pembangunan Manusia (IPM)	72,29	72,91	74,39	75,02

Source: (BPS, (2025); Data Processed, 2026)

Based on the data in Table 1, Indonesia's economic dynamics have demonstrated remarkable resilience over the last five years. The national economic growth experienced a sharp contraction of -2.07% in 2020 due to the COVID-19 pandemic. However, the recovery progressed acceleratively, with the economy rebounding to 5.31% in 2022 and remaining stable at 5.08% in 2024. This recovery phenomenon is inseparable from the role of fiscal instruments through countercyclical Central Government Spending. According to the Kemenkeu RI, (2024), expansive spending reached IDR 2,410.6 trillion in 2024, a significant increase from IDR 1,833.0 trillion in 2020, aimed at stimulating productive sectors and maintaining public purchasing power.

This growth acceleration was also massively supported by strengthened physical connectivity. The Kementerian PUPR, reported that despite mobility constraints during the pandemic, the government maintained consistency in road infrastructure development, achieving a national road stability index of 94.00% by 2024. This became a key factor in logistics cost efficiency, facilitating the flow of goods and services post-pandemic.(Ramadhan, 2024).

On the other hand, the quality of human capital, represented by the Human Development Index (HDI), showed extraordinary resilience. Even as the economy contracted in 2020, the HDI remained at 71.94 and continued to grow, reaching 75.02 in 2024.(BPS, 2025). The significant increase in 2023 and 2024 was also influenced by BPS, (2025), methodological adjustment based on the Long Form SP2020, providing a more accurate reflection of living standards. The synergy between targeted government spending, reliable infrastructure, and improved human resource quality has proven to be a primary determinant in maintaining Indonesia's economic resilience against global and domestic shocks.

Research Gap and Novelty The research gap lies in the inconsistency between massive central government spending expansion and road infrastructure development relative to real economic growth acceleration, particularly during the COVID-19 shock. The novelty of this study is the use of an extensive three-decade dataset (1995–2024), covering the transition from the 1998 monetary crisis to the post-pandemic era of 2024. Furthermore, it integrates HDI data using the latest Long Form SP2020 methodology to examine the extent to which human capital quality moderates the impact of fiscal and physical policies on Indonesia's economic resilience.

Based on the background and phenomena described, this research is crucial for empirically testing how government spending, infrastructure, and human capital interact to determine the direction of national economic growth. With a thirty-year data scope, the results are expected to contribute academically to endogenous growth theory and serve as a strategic reference for policymakers in optimizing fiscal instruments and more inclusive infrastructure development in the future.

METHOD

Research Design

This study adopts a quantitative approach with an explanatory research design. According to Sugiyono, (2020), this method is used to examine specific populations or samples through statistical data analysis to test established hypotheses. Specifically, the explanatory approach is applied to explain the causal relationships between the variables identified as determinants in this study. This approach aims to statistically prove the roles of government spending, infrastructure, and HDI as determinants of Indonesia's economic growth over the last 30 years.

Population and Sample

The population in this study includes all Indonesian macroeconomic indicator data since the beginning of modern statistical recording. Given the extent of the population, sampling was conducted using a Non-Probability Sampling technique through the Purposive Sampling method. Sugiyono, (2020), defines purposive sampling as a technique for determining samples based on specific considerations or criteria.

The criteria established for this study are: 1. Annual Indonesian macroeconomic indicator data officially published by Statistics Indonesia (BPS) and the Ministry of Finance, 2. Complete data for the variables of Central Government Spending, Infrastructure (Road Stability Index), Human Development Index (HDI), and Economic Growth, 3. An observation period of 30 years, from 1995 to 2024.

Based on these criteria, a sample of 30 annual observations was obtained. This sample size is considered adequate and meets the minimum requirements for multiple linear regression analysis to obtain consistent and efficient estimates.

Data Collection Techniques

Data collection in this study utilizes documentation and literature review methods. The collected data is secondary in the form of annual time series for the 1995-2024 period. The data collection steps were as follows: 1. Secondary Data Observation: Downloading official data from the publication portals of the relevant authorities, 2. Literature Review: Examining literature, previous scientific journals, policy papers, and relevant regulations to support the validity of data interpretation.

Classical Assumption Tests

According to Ghazali, I. & Ratmono, (2020), the purpose of classical assumption testing is to ensure that the regression model is free from bias, so that the resulting parameters can reliably explain the influence of independent variables on economic growth accurately. The series of tests includes normality, multicollinearity, heteroscedasticity, and autocorrelation tests, all of which are performed to guarantee that the data satisfies the requirements for multiple linear regression analysis.

Multiple Linear Regression Analysis

Multiple linear regression analysis is used to measure the strength and direction of the relationship between the dependent and independent variables. According to Ghazali, I. & Ratmono, (2020), this analysis aims to predict the value of the dependent variable using two or more independent variables and to identify which variable contributes most significantly to changes in the dependent variable.

Hypothesis Testing

Hypothesis testing is conducted to determine the level of significance of the influence of independent variables on the dependent variable, both partially and simultaneously. According to Ghazali, I. & Ratmono, (2020), this testing is divided into two main stages: 1. t-Test (Partial Test): Used to test the significance of the influence of each independent variable (Government Spending, Infrastructure, and HDI) individually on Economic Growth. If the significance value is < 0.05 or $t_{count} > t_{table}$, the variable is declared to have a significant effect, 2. F-Test (Simultaneous Test): Used to determine whether all independent variables in the model collectively (simultaneously) affect the dependent variable. The model is considered feasible if the F-significance value is < 0.05 .

Coefficient of Determination

The coefficient of determination (R^2) measures the extent to which the variation in independent variables can explain the dependent variable in the regression model. The R^2 value ranges from 0 to 1; the closer it is to 1, the stronger the model's ability to explain the variation and vice versa. (Japina et al., 2025).

RESULTS AND DISCUSSION

Classical Assumption Test

The classical assumption test is conducted to ensure that the multiple linear regression model meets the fundamental statistical requirements to produce accurate and unbiased estimates. This series of tests aims to detect potential distribution deviations, correlations between independent variables, and inconsistency in residual variance. Fulfilling these assumptions ensures the model's feasibility in empirically testing the influence of independent variables on the dependent variable.

Normality Test

The normality test is used to assess whether the residuals are normally distributed by examining the Jarque-Bera (JB) value and its probability. This study utilizes the Jarque-Bera Test. The statistical criteria for the JB test are as follows: If the JB Probability $> \alpha$ (0.05), the residuals are normally distributed; If the JB Probability $< \alpha$ (0.05), the residuals are not normally distributed

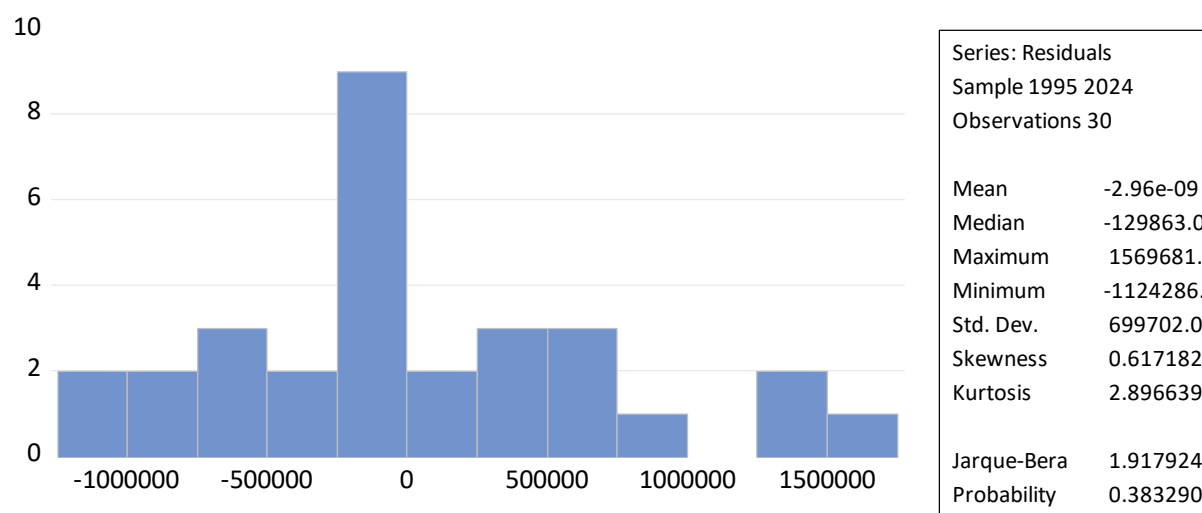


Figure 1. Histogram Graph

Based on the normality test results presented in the table above, the Jarque-Bera probability value is 0.383290, which is greater than the significance level of 0.05. This indicates that the residuals in the regression model are normally distributed. Therefore, it can be concluded that the normality assumption has been fulfilled.

Heteroscedasticity Test

This test is conducted to determine whether the regression model is free from heteroscedasticity issues. The presence or absence of heteroscedasticity can be identified by examining the Probability Chi-Square value. In this study, heteroscedasticity is assessed using both graphical analysis and the Glejser Test. The decision rule states that if the significance value (Prob. Chi-Square) is > 0.05 , the model is confirmed to be free from heteroscedasticity issues.

Table 2. Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	2.999057	Prob. F(3,26)	0.0488
Obs*R-squared	7.712485	Prob. Chi-Square(3)	0.0523
Scaled explained SS	5.493552	Prob. Chi-Square(3)	0.1390

Based on the table above, the heteroscedasticity test yielded a Probability Chi-Square value of 0.0523, which is greater than 0.05. Therefore, it can be concluded that there is no indication of heteroscedasticity in the regression model. This implies that the model meets the required assumption, ensuring the reliability of the processed data for further analysis.

Multicollinearity Test

The multicollinearity test aims to determine whether there is a perfect or definite linear relationship between some or all of the independent variables in the regression model. This is assessed using the Variance Inflation Factor (VIF). If the VIF value is greater than 10 ($VIF > 10$), it indicates the presence of multicollinearity within the regression model. Conversely, a VIF value below 10 suggests that the independent variables are not highly correlated, ensuring the stability of the regression coefficients.

Table 3. Multicollinearity Test

Variance Inflation Factors

Date: 11/10/25 Time: 09:40

Sample: 1995 2024

Included observations: 30

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	8.11E+13	4455.379	NA
X ₁	0.745282	52.63182	20.00703
X ₂	44.49612	524.1638	15.23679
X ₃	3.16E+14	7595.277	41.70626

Based on the multicollinearity test results presented in the table above, all independent variables exhibit a Centered VIF value greater than 10. Therefore, it can be concluded that multicollinearity exists within the regression model. This indicates a high degree of correlation between the independent variables, which may affect the individual significance of the regression coefficients.

Autocorrelation Test

The autocorrelation test is conducted to determine whether the regression model exhibits an autocorrelation problem or is free from such issues. In this study, the Breusch-Godfrey Serial Correlation LM Test is employed to detect the presence of autocorrelation. This method is particularly effective for identifying higher-order serial correlations in time series data.

Tabel 4. Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	2.906351	Prob. F(2,24)	0.0741
Obs*R-squared	5.849220	Prob. Chi-Square(2)	0.0537

According to the autocorrelation test results presented in the table above, the Probability Chi-Square value is 0.0537, which is greater than the significance level of **0.05**. This indicates that there is no serial autocorrelation in the regression model, confirming that the model satisfies the required assumption for time-series analysis.

Multiple Linear Regression Analysis

The multiple linear regression model in this study is formulated as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

The multiple linear regression model in this study is formulated to examine the relationship between the dependent and independent variables. In this model, the Constant (α) represents the estimated value of Economic Growth under the condition that all independent variables are assumed to be zero or held constant. The dependent variable, Economic Growth (Y), is hypothesized to be influenced by three primary determinants: Central Government Spending (X₁), Road Infrastructure (X₂), and the Human Development Index (X₃). The magnitude and direction of these influences are

captured by the regression coefficients (β), which indicate how much the economic output is expected to change in response to a one-unit change in each respective independent variable, assuming other factors remain equal.

Table 5. Multiple Linear Regression Analysis

Dependent Variable: PDB

Method: Least Squares

Date: 11/10/25 Time: 09:39

Sample: 1995 2024

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11893098	9005486.	-1.320650	0.1981
X ₁	8.397546	0.863297	9.727297	0.0000
X ₂	-2.200491	6.670541	-0.329882	0.7441
X ₃	20.281970	17787862	1.140214	0.2646
R-squared	0.989502	Mean dependent var		7968759.
Adjusted R-squared	0.988291	S.D. dependent var		6829011.
S.E. of regression	738967.7	Akaike info criterion		29.98746
Sum squared resid	1.42E+13	Schwarz criterion		30.17429
Log likelihood	-445.8119	Hannan-Quinn criter.		30.04723
F-statistic	816.8798	Durbin-Watson stat		1.121711
Prob(F-statistic)	0.000000			

$$Y = -11893097.5274 + 8.39754621466X_1 - 2.20049147586X_2 + 20281969.6354X_3$$

The regression analysis yields a Constant (α) of -11,893,098; while theoretically representing the GDP value when all independent variables are zero, in economic analysis, this negative figure is primarily interpreted as a technical intercept to position the regression line. Regarding the independent variables, Central Government Spending (X₁) shows a positive coefficient of 8.397, indicating that every one-unit increase in spending contributes to a rise of 8.397 units in GDP, assuming other variables remain constant. This underscores the effectiveness of fiscal allocations in stimulating economic output. Conversely, Road Infrastructure (X₂) presents a notable negative coefficient of -2.200, suggesting that during the observed period, additional road length is associated with a decrease of 2.200 units in GDP. This phenomenon often occurs due to a "lag time" where infrastructure benefits are not instantaneous, or when maintenance costs outweigh economic contributions in the short term. Finally, the Human Development Index (X₃) exhibits the most dominant positive coefficient at 20.281, implying that a one-unit improvement in HDI results in a substantial increase of 20.281 units in GDP. This identifies investment in human capital encompassing health, education, and living standards as the most significant determinant for enhancing Indonesia's GDP within this model.

Hypothesis Testing

t Test

Based on the t-test results presented in the table above, it can be concluded that central government expenditure has a statistically significant effect on Gross Domestic Product (GDP). This is indicated by a probability value of 0.0000, which is lower than the significance level of 0.05, leading

to the rejection of the null hypothesis. The regression coefficient of 8.397546 suggests that a one-unit increase in central government expenditure (for example, IDR 1 billion) statistically contributes to an increase in GDP of 8.397546 units, assuming other variables remain constant.

Meanwhile, the second variable shows a probability value of 0.7441, which exceeds 0.05, indicating that it does not have a statistically significant effect on GDP. Although the regression coefficient is negative (-2.200491), suggesting an inverse relationship, this result cannot be interpreted economically due to the lack of statistical significance.

Furthermore, the Human Development Index (HDI) exhibits a probability value of 0.2646, which is also greater than 0.05, indicating that it does not have a statistically significant partial effect on GDP. Although the HDI coefficient is positive at 20,281,969.64, implying a positive relationship with GDP, the statistical evidence is not sufficiently strong to confirm a partial effect of HDI on GDP within this research model.

F Test

Based on the output table above, the F-statistic is 816.8798 with a significance value of 0.000000, which is lower than 0.05. This indicates that, simultaneously, central government expenditure, road length, and the Human Development Index (HDI) have a statistically significant effect on Gross Domestic Product (GDP) in Indonesia. Therefore, the null hypothesis is rejected, and the regression model is considered appropriate for explaining variations in GDP.

Coefficient of Determination Test

The Adjusted R-squared value of 0.988291 indicates that 98.83% of the variation in Gross Domestic Product (GDP) can be jointly explained by central government expenditure, road length, and the Human Development Index (HDI) in this research model. Meanwhile, the remaining 1.17% of the variation in GDP is explained by other factors not included in the model.

Discussion

The Effect of Central Government Expenditure on GDP in Indonesia

Central government expenditure is one of the main instruments of fiscal policy that directly influences national economic growth. Based on the results of this study, the central government expenditure variable has a positive and statistically significant effect on Gross Domestic Product (GDP), with a probability value of 0.0000, which is less than 0.05. This indicates that increases in central government expenditure have made a tangible contribution to promoting Indonesia's economic growth during the period 1995–2024.

From a theoretical perspective, increases in government spending can stimulate aggregate demand through capital expenditure, subsidies, and development programs that expand national productive capacity. When the government increases spending on infrastructure, education, and health, a multiplier effect occurs, encouraging overall economic activity within society.

These findings are consistent with the study by Lubis et al., (2025), which shows that government expenditure makes an important contribution to economic growth; however, its impact is highly dependent on the effectiveness of fiscal policy and the oversight mechanisms implemented. Therefore, enhancing transparency and strengthening control functions are crucial to preventing potential state losses while promoting more equitable and sustainable development. Furthermore, Lubis E.H. et al., (2025), explain that government spending (MA_LN_APB) has a positive effect on economic growth (MA_LN_PDB). With a coefficient of 0.8873, a 1% increase in government expenditure can raise economic growth by 0.8873% at a 1% significance level. This indicates that fiscal policy plays a vital role in driving Indonesia's economic growth.

Accordingly, it can be concluded that central government expenditure plays a strategic role in boosting Indonesia's GDP. Increased allocations of productive spending, particularly for infrastructure development and human capital enhancement, have been shown to accelerate the pace of national economic growth.

The Effect of Road Infrastructure Length on GDP in Indonesia

Transportation infrastructure, particularly road length, is often regarded as an important factor supporting economic growth due to its role in improving the efficiency of goods distribution and population mobility. However, the results of this study indicate that the road length variable has a negative and statistically insignificant effect on GDP, with a probability value of 0.7441, which is greater than 0.05.

Statistically, these results suggest that changes in road length during the study period did not have a significant direct impact on economic growth. This can be explained by the fact that increases in road length do not necessarily correspond with improvements in quality or effectiveness of road utilization in economic activities. In the Indonesian context, many road infrastructure projects remain concentrated in areas with relatively low economic activity or are not accompanied by the development of surrounding productive sectors..

According to Sari et al., (2025), the research findings indicate that road infrastructure length has a negative but statistically insignificant effect on economic growth in Tulang Bawang Regency. Meanwhile, the study by Bahari et al., (2025), shows that infrastructure investment serves as a key driver of economic growth in West Nusa Tenggara (NTB), playing an important role in strengthening the tourism sector while also generating spillover effects on trade, agriculture, and micro, small, and medium enterprises (MSMEs). Therefore, future development policies should be directed toward equity, sustainability, and cross-sectoral integration to ensure that the benefits of infrastructure development are distributed more inclusively.

Accordingly, these results indicate that road length has not yet become a direct driving factor of Indonesia's GDP during the 1995–2024 period. The government needs to strengthen the integration between infrastructure development and regional economic development so that its impact on growth can be felt more evenly.

The Effect of the Human Development Index (HDI) on GDP in Indonesia

The Human Development Index (HDI) reflects the quality of human resources in terms of education, health, and purchasing power. In theory, improvements in HDI should be directly associated with higher labor productivity, which in turn drives economic growth. However, the results of this study indicate that HDI has a positive but statistically insignificant effect on GDP, with a probability value of 0.2646, which is greater than 0.05.

These findings suggest that improvements in HDI in Indonesia during the 1995–2024 period have not yet made a significant direct contribution to economic growth. Although human capital quality has improved, its impact on economic productivity requires a longer time to materialize. This condition also indicates a gap between improvements in human resource quality and the availability of productive employment opportunities.

Sobri et al., (2022), finds that the Human Development Index (HDI) has a positive and statistically significant effect on economic growth in North Sumatra. In line with this finding, Hani et al., (2025), emphasizes that investment in education and health plays an important role in promoting economic growth, as higher-quality human resources are associated with higher economic growth rates. Countries that are able to align human capital development with labor market needs tend to obtain more optimal economic benefits.

Therefore, although the direction of the relationship between HDI and GDP is positive, its effect has not yet been significant in the short term. The government needs to strengthen the linkage between improvements in human resource quality and productive sectors through job training, technological innovation, and investment in vocational education so that the outcomes of human development can more effectively support national economic growth.

CONCLUSION

Based on the empirical findings, the study concludes that central government spending remains the primary and most significant driver of Indonesia's economic output from 1995 to 2024. The high R^2 value demonstrates an exceptionally strong relationship between the chosen fiscal and social indicators and national GDP.

However, the lack of statistical significance for road infrastructure and the Human Development Index (HDI) suggests that the impact of these variables might not be immediate or direct within the observed timeframe. For road infrastructure, this could indicate a "lag effect" where the economic benefits of physical construction require a longer period to manifest in national production. Regarding HDI, the results imply that while social quality is essential, its contribution to GDP may be mediated by other structural economic factors.

Consequently, the Indonesian government is encouraged to not only maintain the volume of central spending but also to improve the efficiency of infrastructure utilization and human capital investment to ensure they translate more effectively into measurable economic growth.

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