International Journal of Economic, Finance and Business Statistics (IJEFBS)
Vol. 4, No. 4, 2026: 423-440

The Effect of Road Infrastructure, Electricity Infrastructure, and Clean Water Infrastructure on Economic Growth in Blora Regency

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A R T I C L E I N F O

Keywords: Economic Growth, Road Infrastructure, Electricity Infrastructure, Clean Water Infrastructure, Blora Regency.

Received : 20, June
Revised : 22, July
Accepted: 29, August

A B S T R A C T

This study examines the effects of road, electricity, and clean water infrastructure on economic growth in Blora Regency during 2011–2025. Using a quantitative approach, secondary time-series data were collected from Statistics Indonesia (BPS) of Blora Regency and related institutions and analyzed through multiple linear regression using IBM SPSS Statistics 22 after classical assumption testing. The findings reveal that road and clean water infrastructure positively and significantly influence economic growth, while electricity infrastructure has a significant negative effect. Clean water infrastructure is the most influential variable. Collectively, all infrastructure variables significantly affect regional economic growth, highlighting the importance of improving infrastructure quality, equitable distribution, and electricity utilization to support sustainable economic development.

DOI: https://doi.org/10.59890/ijefbs.v4i4.20
ISSSN-E: 3025-9959
http://journalijefbs.my.id/index.php/ijefbs

INTRODUCTION

Because it shows the economy's capacity to generate products and services sustainably, economic growth is a crucial metric for evaluating the success of a region's development (Fahrudin, 2024). The provision of essential infrastructure, such as roads, power, and clean water, which facilitate efficient production, distribution, and investment activities, is one of the key elements that propels economic growth (World Bank, 2023). The government also positions economic infrastructure as one of the pillars of inclusive development because it can increase regional competitiveness and community welfare (Ernawati et al., 2021). Adequate infrastructure will increase the efficiency of economic activities while expanding public access to various productive activities (Kamilla & Hutajulu, 2020). Therefore, infrastructure development is a crucial factor in driving sustainable regional economic growth.

Blora Regency is one of the regions in Central Java Province whose economic structure is dominated by the agriculture, forestry, and mining sectors, making it highly dependent on the availability of basic infrastructure (Nasikhah & Susilowati, 2024). GRDP per capita at constant prices rose steadily from IDR 17.50 million in 2020 to IDR 20.83 million in 2025, according to statistics from the Central Statistics Agency of Blora Regency. Although showing a positive growth trend, this increase does not fully reflect the optimal fundamental factors that support regional economic growth (Todaro & Smith, 2020). Furthermore, infrastructure development still shows various dynamics, such as the length of roads changing from 1,210.84 km to 916.10 km due to changes in administrative status, while installed electricity capacity and clean water distribution continue to increase until 2025 (BPS Blora Regency, 2026). These conditions indicate that the effectiveness of basic infrastructure on the economic growth of Blora Regency still requires further study.

Infrastructure related to roads, electricity, and clean water is crucial for boosting output, making it easier to distribute goods and services, and promoting local economic activity. (Hutauruk, 2021). However, Blora Regency still faces various challenges, such as changes in road classification, unstable electricity supply, and suboptimal distribution of clean water (Ministry of Energy and Mineral Resources, 2023). These conditions have the potential to hamper economic activity, especially since most regional economic activity relies on the primary sector, which requires adequate basic infrastructure support. If infrastructure quality and equity are not continuously improved, the potential for regional economic growth is feared to be hampered (Todaro & Smith, 2023). Therefore, an empirical study is needed to determine the contribution of each infrastructure to the economic growth of Blora Regency.

Various previous studies have shown that infrastructure is related to economic growth, although the results are not consistent across regions. Road and energy infrastructure have been shown to positively impact economic growth by improving connectivity and production efficiency (Jaćimović et al., 2025). Other studies have also found that investment in transportation infrastructure can boost long-term economic growth, while low-quality electricity infrastructure actually hinders economic activity (Liu et al., 2023).

Conversely, Syahputra et al. (2021) found that only clean water infrastructure significantly impacts economic growth, while road and electricity infrastructure have no partial effect. These differences in results indicate that the influence of infrastructure is strongly influenced by regional characteristics and the economic structure of each region.

The majority of prior research has focused on the correlation between infrastructure and economic growth at a national, provincial, or even municipal level; However, there is a dearth of data from districts whose economies are heavily dependent on agricultural and mining. Using time series data from 2011 to 2025, this study aims to narrow that gap by examining the influence of roads, power, and clean water infrastructure on Blora Regency's economic growth simultaneously. The Gross Regional Domestic Product (GRDP) is a measure of economic growth; infrastructure includes things like road length, installed electrical capacity, and clean water delivery. In addition to looking at how these infrastructure variables affect economic growth, both separately and all at once, this study hopes to contribute to what is already known about economic growth at the district level by providing evidence that can back up better regional policies for building infrastructure.

LITERATURE REVIEW

Economic Growth Theory

According to economic growth theory, the accumulation of capital, labor, and technical advancement all have an impact on a region's ability to produce more. Infrastructure is seen as a component of public capital that may increase productivity, lower production costs, and speed up the distribution of commodities and services under Solow's neoclassical growth theory. Economic efficiency brought forth by adequate infrastructure would boost the Gross Regional Domestic Product (GRDP) and promote sustained regional economic growth (Todaro & Smith, 2020). As a result, infrastructure development is essential to promoting economic growth in an area.

The Impact of Road Infrastructure on Economic Growth

Road infrastructure is a mode of transport that contributes to enhancing interregional connectivity, promoting public mobility, and lowering the cost of goods and service delivery. Aschauer's Public Capital theory states that investments in road infrastructure will boost economic sector productivity by improving market access and transportation efficiency. According to study by Jaćimović et al. (2025), The development of road infrastructure has a substantial and beneficial effect on the expansion of economies in the Western Balkans. Investments in transportation infrastructure contribute to long-term economic growth by increasing economic activity and connectivity, as demonstrated by a study by Liu et al. (2023). This theory has its foundations in the theoretical framework as well as in previous studies.

H1: Road infrastructure has a positive and significant effect on economic growth in Blora Regency.

The Impact of Electricity Infrastructure on Economic Growth

A fundamental infrastructure that supplies energy for domestic consumption, commerce, industry, and the service sector is electricity infrastructure. Reliable energy supply will boost regional economic competitiveness, promote investment, and improve industrial efficiency. Fedajev et al. (2023) discovered that while inadequate power distribution quality actually impedes economic productivity, the quality of electrical infrastructure has a substantial impact on economic growth. Additionally, Jaćimović et al. (2025) showed that energy infrastructure contributes favorably to regional economic expansion. The following hypothesis is put out in light of the theory and findings of earlier studies.

H2: Electricity infrastructure has a significant impact on economic growth in Blora Regency.

The Impact of Clean Water Infrastructure on Economic Growth

Clean water infrastructure is a fundamental infrastructure that supports industrial, domestic, and agricultural operations while also enhancing public health. A sufficient supply of clean water may boost worker productivity and promote the long-term viability of business ventures. Access to clean water services is a crucial element of sustainable economic development, according to the World Bank (2023), and research by Syahputra et al. (2021) demonstrates that clean water infrastructure significantly and favorably affects economic growth. The following hypothesis is developed in light of these theories and the findings of earlier studies.

H3: Clean water infrastructure has a positive and significant impact on economic growth in Blora Regency.

The Impact of Road, Electricity, and Clean Water Infrastructure on Economic Growth

The synergy of several complementary basic infrastructures rather than a single form of infrastructure is what drives regional economic growth. Clean water boosts local productivity and economic activity, energy helps industrial processes, and road infrastructure facilitates transportation and distribution. According to research by Sajjad and Dar (2025), enhanced regional economic growth is a result of the concurrent development of several kinds of economic infrastructure. Syahputra et al. (2021), who claimed that infrastructure related to roads, power, and clean water all significantly affects economic growth, corroborate this conclusion. The following is the study hypothesis based on this description.

H4: Road, electricity and clean water infrastructure simultaneously have a significant effect on the economic growth of Blora Regency.

METHODOLOGY

Research Approach and Type

This study uses an associative causal research design and a quantitative methodology. Because it depends on numerical data analyzed using statistical techniques to evaluate preconceived assumptions, a quantitative approach is employed (Sekaran & Bougie, 2017; Sugiyono, 2022). Investigating the causal relationship between independent and dependent variables is the goal of the associative causal design. Roads, power, and clean water infrastructure are the independent factors in this study, whereas Blora Regency's economic growth is the dependent variable. Multiple linear regression is used to analyze the relationship between multiple variables, yielding objective, quantifiable, and scientifically supported results.

Research Location and Object

1. Location: The research was conducted in Blora Regency, Central Java, Indonesia.
2. Time: This study uses time series data covering the period 2011–2025. The data were obtained from the Central Statistics Agency (BPS) of Blora Regency, the Central Statistics Agency (BPS) of Central Java Province, and other relevant official sources. The fifteen-year period was selected based on methodological considerations regarding the adequacy of observations for quantitative analysis, as recommended by Hair et al. (2021).

Data Sources (Informants)

1. The population consists of all annual secondary data on Gross Regional Domestic Product (GRDP), road infrastructure, electricity infrastructure, and clean water infrastructure in Blora Regency during the period 2011–2025.
2. The sample was selected using a purposive sampling technique based on the availability and completeness of the data. The sample includes annual time series data on GRDP, road infrastructure, electricity infrastructure, and clean water infrastructure obtained from the Central Statistics Agency (BPS) of Blora Regency and other related institutions during the period 2011–2025.

Data Collection Techniques

The study uses secondary data collected through the documentation method. The data were obtained from official publications issued by the Central Statistics Agency (BPS) of Blora Regency, the Central Statistics Agency (BPS) of Central Java Province, and other relevant literature and government publications. The data collected include:

1. Economic Growth: Gross Regional Domestic Product (GRDP) at Constant Prices (ADHK).
2. Road Infrastructure: Total road length in Blora Regency, measured in kilometers (km).
3. Electricity Infrastructure: Total installed electricity capacity provided by the State Electricity Company (PLN), measured in kilovolt-amperes (KVA).
4. Clean Water Infrastructure: Total clean water production by source, measured in cubic meters (m^3). g.

Data Analysis Techniques

Data were analyzed using multiple linear regression analysis with the assistance of IBM SPSS Statistics Version 26. Before hypothesis testing, the regression model was tested using classical assumption tests. The analysis consisted of the following stages:

1. Normality Test: To determine whether the regression residuals are normally distributed.
2. Multicollinearity Test: To examine whether there is a high correlation among the independent variables using the Tolerance and Variance Inflation Factor (VIF) values.

3. Heteroscedasticity Test: To determine whether the residuals have constant variance using the Glejser test.
4. Autocorrelation Test: To identify the presence of autocorrelation in the time series data using the Durbin-Watson test.
5. Coefficient of Determination (R^2): To measure the proportion of variation in economic growth explained by the independent variables.
6. F-Test: To examine the simultaneous effect of road infrastructure, electricity infrastructure, and clean water infrastructure on economic growth.
7. t-Test: To examine the partial effect of each independent variable on economic growth.

Data Validity (Triangulation)

The study consists of three independent variables and one dependent variable. The variables are measured as follows:

1. Road Infrastructure (X_1): Measured by the total road length in Blora Regency, expressed in kilometers (km).
2. Electricity Infrastructure (X_2): Measured by the total installed electricity capacity provided by PLN, expressed in kilovolt-amperes (KVA).
3. Clean Water Infrastructure (X_3): Measured by the total clean water production by source, expressed in cubic meters (m^3).
4. Economic Growth (Y): Measured using Gross Regional Domestic Product (GRDP) at Constant Prices (ADHK) as an indicator of the real economic growth of Blora Regency.

RESEARCH RESULT

Description of Research Results

Using time series data from 2015 to 2025 from the Central Statistics Agency (BPS) and the Public Works, Housing, and Energy and Mineral Resources Department of Blora Regency, this study investigates the effects of road, energy, and clean water infrastructure on economic growth. In the multiple linear regression analysis, the dependent variable was economic development, while the independent variables were clean water, power, and road infrastructure. Prior to testing the hypothesis, each research variable's evolution is explained. Road infrastructure has a critical role in boosting mobility, facilitating the efficient distribution of products and services, and promoting regional economic growth.

Table 1. Road Infrastructure in Blora Regency 2011-2025

Year	Road Length (Km)	Development (%)
2011	797.69	-
2012	797.69	0.00%
2013	797.69	0.00%
2014	794.69	-0.004%
2015	794.69	0.00%
2016	1,222.84	0.54%

2017	1,210.84	-0.01%
2018	1,210.84	0.00%
2019	1,210.84	0.00%
2020	1,210.84	0.00%
2021	1,210.84	0.00%
2022	1,210.84	0.00%
2023	916.10	-0.24%
2024	916.10	0.00%
2025	916.10	0.00%

Source: Blora Regency Statistics Office

Based on Table 1, the development of road infrastructure in Blora Regency during the 2011–2025 period shows a fluctuating pattern. Road length was relatively stable in the 2011–2015 period, increased significantly in 2016 to 1,222.84 km, then stabilized again until 2022 before decreasing to 916.10 km in 2023 and remaining at that level until 2025. This decline was not caused by a reduction in the physical road network, but rather by revisions to road section status, updates to administrative data, and adjustments to authority classifications based on audit results and local government validation. Nevertheless, the government continues to carry out road construction, rehabilitation, and maintenance through various strategic programs to improve regional connectivity and support the economic growth of Blora Regency.

Electricity infrastructure is a crucial component supporting various community and economic activities. Adequate electricity availability plays a role in supporting industrial and trade activities, as well as the production and distribution of goods and services, thereby increasing productivity and driving economic growth.

Table 2. Electricity Infrastructure in Blora Regency 2011-2025

Year	**Installed Electrical Power (KVA)**	**Growth (%)**
2011	119,986,750	-
2012	136,225,860	0.14%
2013	150,623,700	0.11%
2014	151,528,000	0.01%
2015	177.873.300	0,17%
2016	182.086.950	0,02%
2017	156.343.050	-0,14%
2018	110.375.400	-0,29%

2019	177.805.800	0,61%
2020	238.038.050	0,34%
2021	238.038.050	0,00%
2022	266.282.350	0,12%
2023	229.348.152	-0,14%
2024	297.363.671	0,30%
2025	297,363,671	0.00%

Source: Blora Regency Statistics Office

Based on Table 2, the development of electricity infrastructure in Blora Regency during the period 2011–2025 shows a fluctuating pattern. Installed electricity capacity increased from 119,986,750 KVA in 2011 to 182,086,950 KVA in 2016, then decreased in 2017–2018 before increasing again since 2019. In the period 2020–2022, electricity capacity continued to increase to reach 266,282,350 KVA, which reflects an increase in the provision of electricity infrastructure to support community needs and economic activities in Blora Regency.

Water is a basic human need that is inseparable from daily activities, from consumption and sanitation to other household needs. Rapid population growth puts significant pressure on natural resources, including the increasing need for clean water, creating an imbalance between natural resource availability and human needs. This situation is exacerbated by human behavior that lacks environmental sustainability, with water pollution further degrading water quality and quantity, rendering it unsuitable for daily life.

Table 3. Clean Water Infrastructure in Blora Regency 2011-2025

Year	**Water Distributed (m³)**	**Development (%)**
2011	1,959,657	-
2012	1,966,495	0,35%
2013	2.184.040	11,06%
2014	2.446.307	12,01%
2015	2.487.105	1,67%
2016	2.588.804	4,09%
2017	2.588.804	0,00%
2018	2.719.119	5,03%
2019	2.984.200	9,75%
2020	3.167.598	6,15%
2021	3.415.852	7,84%

2022	3.404.030	-0,35%
2023	3,995,474	17.37%
2024	4,279,551	7.11%
2025	4,298,261	0.44%

Source: Blora Regency Statistics Office

Based on Table 3, the volume of clean water distributed in Blora Regency during the 2011-2025 period shows an increasing trend. In 2011, the amount of water distributed was 1,959,657 m^3 and continues to increase to reach 4,298,261 m^3 in 2025. The highest increase occurred in 2023 with growth of approximately 17% compared to the previous year, namely from 3,404,030 m^3 to 3,995,474 m^3. Conversely, growth has not changed or amounted to 0.00%. Recent years show that the volume of water distributed has remained relatively stable. Although the annual growth rate fluctuates, the overall increase in the volume of clean water distribution reflects the increasing development of clean water supply services in Blora Regency. This condition indicates an increase in service capacity to meet the community's clean water needs which continue to grow in line with population growth, regional development, and increasing socio-economic activities.

One of the key metrics for evaluating how well an area is doing is economic growth. Gross Regional Domestic Product (GRDP) at Constant Prices (ADHK) is used in this study to assess economic growth since it may characterize increases in the added value of goods and services generated by an area without being impacted by price fluctuations (inflation). In order to more precisely describe the evolution of economic activity over time, GRDP ADHK is frequently employed to quantify real economic growth. The region's capacity to produce economic production increases with the GRDP ADHK value. Data about GRDP ADHK Blora Regency's growth from 2011 to 2025 is shown below.

Table 4. GRDP per Capita at Constant Prices in Blora Regency 2011-2025

Year	**ADHK GRDP (Billion Rp)**	**Growth (%)**
2011	10.597,23	-
2012	11.116,86	4,90%
2013	11.712,50	5,36%
2014	12.227,20	4,39%
2015	12.882,59	5,36%
2016	15.914,66	23,54%
2017	16.886,64	6,11%
2018	17.609,72	4,28%

2019	18.318,42	4,02%
2020	17.483,89	-4,56%
2021	18,126.45	3.68%
2022	18,609.49	2.66%
2023	19,188.67	3.11%
2024	19,778.45	3.07%
2025	20,834.42	5.34%

Source: Blora Regency Statistics Office

Table 4 illustrates an increasing trend in Blora Regency's GRDP per capita at constant prices from 2011 to 2025, with a fall in 2020 as a result of the COVID-19 pandemic. The leading industries in the area agriculture, forestry, fisheries, and mining and quarrying contributed to the largest growth in 2017, which was 23.54%. After the pandemic, Blora's economy gradually recovered, with the mining, agriculture, and trade sectors remaining the main contributors to economic growth. By 2025, GRDP per capita reached Rp20,834.42 with a growth of 5.34%, reflecting the recovery and continuous improvement of the region's economic performance.

Classical Assumption Test

normality test used a one-sample Solgomorov-Smirnov test. The following are the results of the normality test:

Table 5. One -Sample Kolmogorov-Smirnov Test Results Table

One-Sample Kolmogorov-Smirnov Test	
	Unstandardized Residual
Asymp. Sig. (2-tailed)	0.200

Source: SPSS processed

The Kolmogorov-Smirnov technique was employed in this study's normalcy test Based on the test results in Table 4.5, the Asymp. Sig. (2-tailed) value was 0.200, which is greater than the significance level of 0.05 (0.200 > 0.05). The study's residual data is therefore considered to be regularly distributed, meeting the normalcy assumption and qualifying the regression model for additional hypothesis testing.

Multicollinearity occurs when all or almost all of the independent variables in a regression model have a linear connection with one another, as shown by the exceptionally high correlation coefficient value.

Table 6. Multicollinearity Test Results Table

Variables	Tolerance	Provision	VIF	Provision	Information
Road Infrastructure	0.945	>0.1	1,058	<10	No Multicollinearity Occurs
Electricity Infrastructure	0.187	>0.1	5,358	<10	No Multicollinearity Occurs
Clean Water Infrastructure	0.183	>0.1	5,475	<10	No Multicollinearity Occurs

Source: SPSS processed

Based on the results of the multicollinearity test in Table 6, the tolerance values of the Road Infrastructure, Electricity Infrastructure, and Clean Water Infrastructure variables are 0.945, 0.187, and 0.183, respectively, all of which are above 0.1. Meanwhile, the VIF values of the three variables are 1.058, 5.358, and 5.475, respectively, all of which are below 10. Referring to the rules put forward by Puspitasari (2022), Due to the absence of multicollinearity shown by a tolerance value > 0.1 and VIF < 10, it can be concluded that none of the three independent variables in this research display any evidence of multicollinearity. Hence, further testing of the regression model is warranted.

In order to examine heteroscedasticity, this study utilized the Glejser test. Heteroscedasticity is not present in the data if the significance value of the independent variable is greater than 0.05. When the p-value is less than 0.05, heteroscedasticity becomes apparent in the data (Puspitasari, 2022). A table displaying the outcomes of the test for heteroscedasticity is provided below:

Table 7. Table of Heteroscedasticity Test Results

Variables	Provision	Results (sig)	Information
Road Infrastructure	> 0.05	0.818	There is no heteroscedasticity symptom.
Electricity Infrastructure		0.987	
Clean Water Infrastructure		0.699	

Source: SPSS processed

The Road Infrastructure, Electricity Infrastructure, and Clean Water Infrastructure variables have significant values of 0.818, 0.987, and 0.699, respectively, which are all above 0.05, based on the results of the Glejser test for heteroscedasticity in Table 7. The regression model is appropriate for additional testing because the three independent variables in this study do not exhibit heteroscedasticity symptoms, in accordance with Puspitasari's (2022) decision-making criteria, which state that a significant value > 0.05 indicates the data is free from heteroscedasticity.

To determine if residuals at various time periods are correlated or not, especially with time series data, an autocorrelation test is used. Model estimation may not work well when autocorrelation is present. according to Table 7's Glejser test results for heteroscedasticity. The following table displays the findings of the autocorrelation test that was employed in this investigation:

Table 8. Autocorrelation Test Results Table

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate	Durbin-Watson
1	0.991	0.983	0.978	511.54499	2,039

Source: SPSS processed

The Durbin-Watson (DW) value of 2.039 was determined using the autocorrelation test findings in Table 8. The value of 4-dU is 2.250 when the number of observations (n) is 15, the number of independent variables (k) is 3, and the significance level is 5%. The highest limit value (dU) is 1,750. If the regression model satisfies the requirements dU < DW < 4 − dU, it does not exhibit autocorrelation according to the decision-making criterion. The test results show that the DW value is between dU and 4 − dU, with 1.750 < 2.039 < 2.250. As a result, it may be said that the regression model has no autocorrelation, which suggests that there is no relationship between the residuals over various time periods. This demonstrates that since the conventional assumption of autocorrelation has been met, the regression model is suitable for use in multiple linear regression analysis and hypothesis testing.

Hypothesis Analysis and Testing

To determine the magnitude of the influence of road length infrastructure (I *J*), electricity infrastructure (*IL*), and water infrastructure (*IA*) on economic growth in Blora Regency, a multiple linear regression analysis was conducted. The test results are presented in the following table.

Table 9. Multiple Linear Regression Results

Blora Regency						
	Model	Unstandardized Coefficients	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-1983,881	809,969		-2,449	0.032
	Road Infrastructure	7,178	0.715	0.411	10,037	0.000
	Electricity Infrastructure	-0.014	0.005	-0.250	-2,715	0.020
	Clean Water Infrastructure	0.455	0.041	1,030	11,070	0.000

Source: SPSS processed

Economic Growth = -1983.881 + 7.178 IJ − 0.014 IL + 0.455 IAB + e is the equation derived from multiple linear regression analysis. These findings show that while electricity infrastructure has a negative impact on economic growth, roads and clean water infrastructure have a positive impact. When all other things are equal, road lengthening contributes more to Blora Regency's economic growth. The reason for this is that road infrastructure has the highest coefficient.

The R2 value indicates the extent to which an independent variable explains the variation in the dependent variable in a regression model. The proportion of the independent variable's contribution to the dependent variable is shown in this figure; the remaining amount is affected by elements that were not included in the study model. Here are the findings from the study's test for coefficient of determination:

Table 10. Determination Test

Model	R	R Square	Adjusted R Square
1	0.991 [a]	0.983	0.978

Source: Data processed with SPSS

A combined Adjusted R Squared value of 0.978 from the determination coefficient test indicates that the three infrastructure variables roads, power, and clean water are able to account for 97.8% of the variance in economic growth in Blora Regency. Variation attributable to sources other than the study model accounts for the remaining 2.2%. The accuracy with which the regression model describes the connection between infrastructure components and GDP growth is seen here.

The simultaneous impact of the independent variables (X1, X2, and X3) on the dependent variable (Y) is demonstrated by the following results of the F Test (Simultaneous Test):

Table 11. Results of simultaneous hypothesis testing (Anova)

Model	Sum of Squares	df	Mean Square	F Count	Sig.
Regression	162489740.743	3	54163246.914	206,984	0.000

Source: SPSS processed

Road infrastructure, power infrastructure, and clean water infrastructure all concurrently have a major impact on Blora Regency's economic growth, according to the F-test findings, which yielded an F-value of 206.984 with a significance value of 0.000. These findings suggest that integrated infrastructure development is important for boosting regional economic growth, enabling economic activity, and raising productivity.

The partial impact of water infrastructure (X3), power infrastructure (X2), and road length infrastructure (X1) on economic growth (Y) is examined using the t-test (Partial Test). The following are the t-test results:

Table 12. Simultaneous Test Results (t-Test)

Variables	t count	t table	Significance
Road Infrastructure	10,037		0.000
Electricity Infrastructure	-2,715	2,201	0.020
Clean Water Infrastructure	11,070		0.000

Source: SPSS processed

To prove whether or not there is an influence between the three variables, it is necessary to perform calculations and compare the calculated t with the t table. The t table is obtained from the following formula:

T table = α/2; n – k – 1
= 0.05/2; 15 – 3 – 1
= 0.025; 11
T table = 2.201

1) Partial Influence of Road Infrastructure (X1) on Economic Growth (Y)

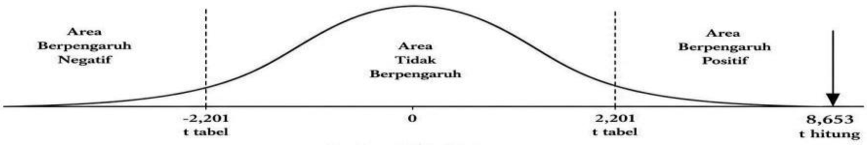

Figure 2. Road Infrastructure t-Test Curve
Source: SPSS processed

The Road Infrastructure variable's calculated t value is 8.653, which is higher than the t table value of 2.201 (8.653 > 2.201), according to the t distribution curve. Furthermore, the Road Infrastructure variable has a significant value of 0.000 according to the t test findings, which is less than the designated significance threshold of 0.05 (0.000 < 0.05). The Road Infrastructure variable has a somewhat positive and significant impact on the Economic Growth variable (Y) if the calculated t value > t table and the significance value < 0.05, according to the defined grounds for decision making.

2) Partial Effect of Electricity Infrastructure (X2) on Economic Growth (Y)

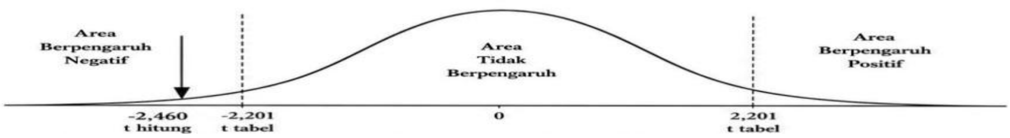

Figure 3. t-Test Curve of Electricity Infrastructure
Source: SPSS processed

Compared to the absolute t table value of 2.201, the calculated t value of the Electricity Infrastructure variable is -2.460, as shown by the t distribution curve. The t test findings also reveal that the Electricity Infrastructure variable is statistically significant with a value of 0.032, which is less than the predetermined significance threshold of 0.05 (0.032 < 0.05). The developed decision-making basis states that the Electricity Infrastructure variable has a slightly negative and considerable influence on the Economic Growth variable (Y) if the predicted t value is more than the t table value and the significance value is less than 0.05. The negative direction of this variable indicates that advances in power infrastructure did not directly drive economic development over the study's observation period.

3) Partial Effect of Water Infrastructure (X3) on Economic Growth (Y)

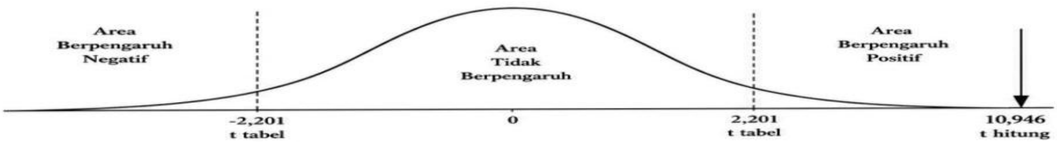

Figure 4. Clean Water Infrastructure t-Test Curve
Source: SPSS processed

The t distribution curve clearly shows that the estimated t value of 10.946 for the Water Infrastructure variable is greater than the t table value of 2.201 (10.946 > 2.201). Apart from that, the Water Infrastructure variable's t-test result indicates a significance level of 0.000, which is less than the specified 0.05 (0.000 < 0.05). The Water Infrastructure variable has a somewhat positive and substantial effect on the Economic Growth variable (Y) if, according to the given foundation for decision making, the estimated t>t table and the significance value <0.05. Water infrastructure has the largest partial influence on economic growth, according to the biggest calculated t value among the three variables in this study.

DISCUSSION

The Influence of Road Infrastructure on Economic Growth in Blora Regency

The partial test results show that road infrastructure has a positive and significant influence on Blora Regency's economic growth (t = 10.037; p = 0.000). This study indicates that improving road connectivity and quality can facilitate the distribution of agricultural, mining, forestry, and commercial items, increasing regional economic activity and productivity. The results of this study are in line with the Endogenous Growth Theory and Neoclassical Economic Growth Theory, which emphasize the importance of infrastructure investment in increasing production capacity. Furthermore, studies by Liu et al. (2023) and Jaćimović et al. (2025) discovered that road infrastructure boosts economic growth.

The Impact of Electricity Infrastructure on Economic Growth in Blora Regency

The partial test results show that electricity infrastructure has a negative and significant effect on the economic growth of Blora Regency (t = -2.715; p = 0.020). This finding indicates that the increase in electricity capacity has not been followed by optimal utilization in productive sectors, so the economic benefits have not been maximally felt. This condition is in accordance with the characteristics of Blora Regency, which is still dominated by the primary sector, so electricity investment requires time to have an impact on economic growth. These results are in line with Neoclassical Growth Theory, Endogenous Growth Theory, and research by Fedajev et al. (2023) which emphasizes that the quality and efficiency of electricity infrastructure utilization are more decisive for economic growth than increasing capacity alone.

The Impact of Clean Water Infrastructure on Economic Growth in Blora Regency

According to the partial test results, Blora Regency's economic growth is positively and significantly impacted by clean water infrastructure ($t = 11.070$; $p = 0.000$). According to this research, expanding the availability and distribution of clean water may boost commerce, agriculture, industry, and microbusiness operations, boosting productivity and promoting economic expansion. The Neoclassical Economic Growth Theory and Endogenous Growth Theory, which contend that basic infrastructure boosts productivity and economic capacity, are consistent with these findings. This result is also in line with studies by Liu et al. (2023) and Jaćimović et al. (2025), which found that public infrastructure improvement contributes to economic growth by boosting productivity and efficiency.

CONCLUSIONS AND RECOMMENDATIONS

According to the study's findings, Blora Regency's economic growth is positively and significantly impacted by road and clean water infrastructure, but it is negatively and significantly impacted by electricity infrastructure due to its subpar use in the productive sector. The factor that most significantly affects regional economic growth is clean water infrastructure. In order to promote sustainable economic growth, it is recommended that the Blora Regency Government prioritize the construction of clean water services, optimize the use of energy infrastructure for the productive sector, and enhance the quality and equity of road infrastructure. The community is also required to contribute to the upkeep of the current infrastructure, and more study is advised to include additional variables and employ a wider range of time periods and analysis techniques in order to produce more thorough results.

ADVANCED RESEARCH

This study has limitations because it only uses time series data from Blora Regency for the period 2011–2025, with road infrastructure, electricity, and clean water as the variables influencing economic growth. Future research is recommended to use a longer observation period, add other variables such as investment, education, health, and telecommunications infrastructure, and apply more comprehensive analytical methods to provide a more in-depth picture of the determinants of regional economic growth

ACKNOWLEDGMENT

The authors would like to thank all parties who provided support, assistance, and input throughout this research process. Appreciation is also extended to the Blora Regency Central Statistics Agency and related agencies for providing data that enabled the research to be carried out successfully. Hopefully, the results of this study will benefit the development of science and serve as a reference in formulating regional development policies.

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