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The Effect of Road Infrastructure and Electricity Infrastructure on Economic Growth

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Abstract

This study examines the effects of road and electricity infrastructure on economic growth in West Seram Regency, Indonesia. A quantitative approach was employed using a field survey supported by a literature review. Primary data were collected through structured questionnaires, while secondary data were obtained from official government publications. The data were analyzed using multiple linear regression analysis. The findings demonstrate that road and electricity infrastructure jointly exert a significant positive influence on regional economic growth. Improvements in transportation and electricity infrastructure enhance accessibility, facilitate the movement of goods and services, increase economic productivity, and strengthen regional connectivity. This study contributes to the limited empirical evidence on the complementary role of road and electricity infrastructure in promoting economic growth within island regions. The findings also provide practical insights for regional governments in designing integrated infrastructure investment policies to support sustainable economic growth and reduce regional development disparities.

Keywords ; Road Infrastructure, Electricity Infrastructure, Economic Growth

Introduction

Indonesia has made substantial progress in infrastructure development over the past few decades. The government's strong commitment to expanding infrastructure has played a crucial role in promoting sustainable economic growth. Large-scale infrastructure investment has generated positive economic impacts while improving social welfare through the provision of schools, hospitals, and other public facilities. Beyond physical development, infrastructure represents a long-term commitment to strengthening economic, social, and institutional capacity in order to improve people's quality of life. According to Todaro and Smith (2006), the development process pursues three fundamental objectives: increasing the availability and equitable distribution of basic needs, improving living standards, and expanding economic and social opportunities for individuals and society.

A growing body of empirical evidence demonstrates that infrastructure is a fundamental determinant of long-run economic growth. By improving transportation, power supply, and communication networks, infrastructure enhances productivity, reduces transaction costs, facilitates market integration, and strengthens economic efficiency. Cross-country evidence further indicates that infrastructure capital exerts a significant and positive long-run effect on economic output, regardless of differences in countries' levels of development (Calderón et al., 2015; Calderón & Servén, 2004).

Road infrastructure, particularly road quality and condition, plays a strategic role in promoting economic growth through both direct and indirect channels. Well-developed road networks facilitate the movement of people, goods, and services while strengthening regional connectivity and expanding market access. Efficient transportation infrastructure also supports production activities, reduces logistics costs, encourages private investment, and improves regional competitiveness. Previous empirical studies have consistently shown that transport infrastructure contributes significantly to long-term economic growth because it lowers transportation costs and improves the allocation of productive resources across regions (Canning & Pedroni, 2008; Calderón et al., 2015).

Transportation infrastructure is therefore regarded as one of the most important components of regional development. Better transportation facilities improve accessibility, enabling governments to deliver public services more efficiently while reducing spatial disparities through stronger interregional connectivity. Consequently, investment in road

infrastructure has become a fundamental strategy for promoting balanced regional development and sustaining long-term economic growth.

The availability of adequate road infrastructure is particularly important for accelerating economic development in geographically dispersed regions such as West Seram Regency. High-quality roads improve the efficiency of production and distribution systems by reducing travel time, lowering transportation costs, facilitating access to markets, and encouraging investment. In addition, infrastructure contributes not only to economic expansion but also to improving regional productivity and reducing development disparities (Calderón & Servén, 2004).

West Seram Regency has experienced fluctuating economic growth in recent years. The Gross Regional Domestic Product (GRDP) growth rate at constant 2010 prices increased from 3.40% in 2022 to 5.63% in 2023, indicating continued economic recovery following the COVID-19 pandemic. Prior to the pandemic, the regional economy maintained relatively stable growth before contracting in 2020 as economic activities were severely disrupted. The subsequent recovery was driven not only by the revival of production and consumption but also by improvements in basic infrastructure, particularly road infrastructure, which enhanced accessibility, facilitated the movement of goods and services, reduced distribution costs, and strengthened interregional connectivity. These developments suggest that infrastructure has become an essential prerequisite for strengthening regional economic performance and supporting sustainable development.

Road transportation also plays a strategic role in reducing geographical isolation and improving accessibility. Efficient road networks facilitate the movement of agricultural products, raw materials, and other commodities, thereby supporting production activities and expanding market opportunities. In 2023, the total road length in West Seram Regency reached 768.59 km, comprising 37.26% national roads, 2.86% provincial roads, and 59.87% district roads. Despite this relatively extensive road network, a considerable proportion of roads remain unpaved or consist of gravel and dirt surfaces, indicating that road infrastructure quality continues to pose a major challenge to regional development. The distribution of road length by surface type and road condition is presented in Table 1.

Road Infrastructure Conditions in West Seram Regency (km) 2021-2023

Description	Year		
	2021	2022	2023
Surface Type			
Asphalt	484,07	490,07	105,18
Gravel	244,95	233,56	165,99
Soil	43,85	42,25	39,05
Other	140,53	147,03	149,97
Total	**912,90**	**912,90**	**460,19**
Road Condition			
Good	588,13	603,12	195,44
Moderate	155,99	154,79	71,70
Damaged	166,28	152,49	108,33
Severely Damaged	2,50	2,50	84,72
Total	**912,90**	**912,90**	**460,19**

Source; SBB Regency in Figures, (2024)

Road conditions in several areas of West Seram Regency remain inadequate and continue to constrain regional development. In some locations, road infrastructure has shown little improvement for nearly two decades despite its strategic importance for regional connectivity. One notable example is Ariate Village, where a road section extending more than 200 meters remains unpaved and frequently becomes muddy during the rainy season. These conditions often cause cars and motorcycles to become stranded, forcing motorists to travel with extreme caution. Consequently, the transportation of agricultural products and other commodities to the regency capital is frequently disrupted, limiting local economic activities and reducing market accessibility. As this road serves as the primary transportation corridor connecting the villages of Iha, Luhu, and Lokki with the capital of West Seram Regency, its poor condition represents a significant obstacle to regional economic development. This local phenomenon illustrates how inadequate transportation infrastructure can reduce market efficiency, increase logistics costs, and ultimately weaken regional economic performance, particularly in geographically fragmented regions.

In addition to road infrastructure, electricity infrastructure constitutes another essential component of regional development. A reliable electricity supply supports industrial production, commercial activities, public services, and household welfare while encouraging investment and technological adoption. Adequate electricity infrastructure also improves business productivity, promotes value-added economic activities, and enhances regional

competitiveness. Conversely, unreliable electricity supply may constrain business expansion, increase production costs, and limit economic opportunities. The literature consistently recognizes access to electricity as a prerequisite for productive economic activities, especially in developing and rural regions where infrastructure availability remains uneven (Cook, 2011). Therefore, road and electricity infrastructure should be viewed as complementary forms of public capital that jointly support sustainable regional economic growth rather than as independent development components.

The relationship between infrastructure and economic growth has been widely examined in previous studies. Cross-country evidence indicates that infrastructure investment contributes positively to long-run economic growth by increasing productivity and improving resource allocation (Calderón et al., 2015; Canning & Pedroni, 2008). Likewise, studies on electricity infrastructure emphasize that expanding access to reliable electricity stimulates productive activities, supports enterprise development, and contributes to poverty reduction, particularly in developing countries (Cook, 2011). Nevertheless, much of the existing literature relies on national or cross-country datasets using aggregate infrastructure indicators, thereby providing limited evidence on infrastructure performance at the district level.

Furthermore, previous studies have generally examined transportation infrastructure and electricity infrastructure separately, resulting in limited understanding of their complementary contributions to regional economic growth. Empirical evidence from island regions characterized by geographical fragmentation, limited accessibility, and unequal infrastructure provision also remains relatively scarce. These limitations are particularly relevant to West Seram Regency, where infrastructure development continues to face significant geographical and logistical challenges. Consequently, the extent to which improvements in road and electricity infrastructure jointly influence regional economic growth remains insufficiently understood.

Addressing these gaps, this study examines the influence of road infrastructure and electricity infrastructure on economic growth in West Seram Regency. Unlike previous studies, which predominantly focus on national or provincial analyses, this research provides district-level empirical evidence from an island region with distinctive geographical characteristics. By simultaneously examining transportation and electricity infrastructure

within a single analytical framework, this study offers a more comprehensive understanding of how complementary infrastructure investment contributes to regional economic performance. The findings are expected to enrich the literature on infrastructure-led regional development while providing evidence-based policy recommendations for local governments in designing integrated infrastructure investment strategies aimed at promoting sustainable economic growth and reducing regional development disparities.

Theoretical Framework

Economic Growth Theory

Economic growth refers to the sustained increase in the production of goods and services over time, reflecting improvements in a region's productive capacity and overall economic performance. At the regional level, economic growth is commonly measured by the growth of Gross Regional Domestic Product (GRDP), while at the national level it is assessed using Gross Domestic Product (GDP) or Gross National Product (GNP). Economic growth is generally measured by comparing real GDP, GRDP, or GNP in a given period with that of the previous period (Todaro & Smith, 2015).

Economic growth is influenced by several interrelated factors, including human capital, capital accumulation, technological progress, institutional quality, and production capacity. These factors enhance productivity, stimulate investment, and increase economic output. Population growth may also contribute to economic expansion, provided that sufficient employment opportunities exist and human resources are utilized efficiently (Todaro & Smith, 2015).

According to Kuznets, economic growth is defined as a country's long-term capacity to provide an increasing supply of goods and services to its population. This capacity is supported by technological advancement, institutional development, capital formation, and favorable social and political conditions (Jhingan, 2012). Therefore, sustainable economic growth depends not only on physical capital accumulation but also on improvements in productivity, institutional performance, and technological innovation.

In the context of this study, economic growth is viewed as an outcome of regional development that is influenced by the availability and quality of basic infrastructure. Well-developed road and electricity infrastructure improve production efficiency, facilitate the

movement of goods and services, strengthen regional connectivity, and ultimately support sustainable regional economic growth.

Road Infrastructure

Road infrastructure is a fundamental component of the transportation system that facilitates the movement of people, goods, and services while supporting regional economic and social development. In Indonesia, roads are legally defined as land transportation infrastructure, including supporting structures and facilities intended for traffic, as stipulated in Law No. 38 of 2004 on Roads. From an economic perspective, road infrastructure functions as public capital that enhances accessibility, strengthens regional connectivity, reduces transportation costs, and improves economic efficiency, thereby contributing to regional development (Crescenzi et al., 2016).

Road infrastructure can be classified according to surface type, function, administrative status, network hierarchy, and physical condition. This study focuses on road surface type and road condition because these indicators directly reflect infrastructure quality and serviceability. Road surface types generally include asphalt, gravel, and earth roads, while road conditions are classified as good, moderate, damaged, and severely damaged (Kamaludin & Qibthiyyah, 2022).

High-quality road infrastructure promotes economic growth by improving connectivity, facilitating the movement of goods and services, reducing logistics costs, and expanding market access. Conversely, poor road conditions hinder mobility, increase transportation costs, and constrain regional economic activities. Therefore, road surface type and road condition are used in this study as key indicators for evaluating the contribution of road infrastructure to economic growth in West Seram Regency (Sawitri, 2023).

Electricity Infrastructure

Electricity infrastructure is a fundamental component of regional development because it provides the energy required to support households, public services, and productive sectors such as industry, commerce, and agriculture. A reliable electricity supply enhances production efficiency, reduces operating costs, improves service delivery, and creates a favorable environment for investment and economic activities. Conversely,

inadequate electricity infrastructure or frequent power disruptions may reduce productivity, discourage investment, and constrain regional economic development (Cook, 2011).

The contribution of electricity infrastructure to economic growth has been widely documented in the literature. Reliable access to electricity improves business performance, supports technological adoption, and increases the productivity of firms and households, thereby fostering long-term economic growth. Recent empirical studies also indicate that electricity infrastructure contributes significantly to regional development by improving production efficiency and strengthening economic competitiveness (Acheampong, 2018; Shahbaz et al., 2021).

In this study, electricity infrastructure is considered an important determinant of regional economic growth. The availability of a reliable electricity supply is expected to support productive economic activities, strengthen regional competitiveness, and promote sustainable economic development in West Seram Regency.

Method

This study employed a quantitative research design to examine the influence of road infrastructure and electricity infrastructure on regional economic growth in West Seram Regency. Primary data were collected through structured questionnaires administered to road users, including motorcycle and car users. Secondary data were obtained from the Central Statistics Agency (BPS) of West Seram Regency, including Gross Regional Domestic Product, population statistics, and road infrastructure data published in *West Seram Regency in Figures*.

Prior to analysis, the collected data were subjected to editing, coding, and tabulation to ensure completeness and consistency. Multiple linear regression analysis was subsequently employed to examine the influence of road infrastructure and electricity infrastructure on regional economic growth (Hair et al., 2019).

Before estimating the regression model, classical assumption tests were conducted to ensure that the regression model satisfied the required statistical assumptions. These included normality, multicollinearity, and heteroscedasticity tests. Normality was assessed using the Normal Probability Plot, multicollinearity was evaluated using the Variance Inflation Factor (VIF), where VIF values below 10 indicate the absence of multicollinearity, and

heteroscedasticity was examined using a scatterplot (Field, 2018; Hair et al., 2019). The regression model employed in this study is expressed as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \varepsilon$$

where Y represents regional economic growth; X_1 denotes road infrastructure; X_2 denotes electricity infrastructure; a is the intercept; β_1 and β_2 are the regression coefficients; and ε is the error term (Montgomery et al., 2021).

Discussion

Classical Assumption Test

Normality Test

The Kolmogorov–Smirnov test results indicate that the road infrastructure, electricity infrastructure, and economic growth variables have significance values greater than 0.05. Therefore, the assumption of normality is satisfied, indicating that the data are normally distributed and suitable for subsequent multiple linear regression analysis.

Test Of Normality

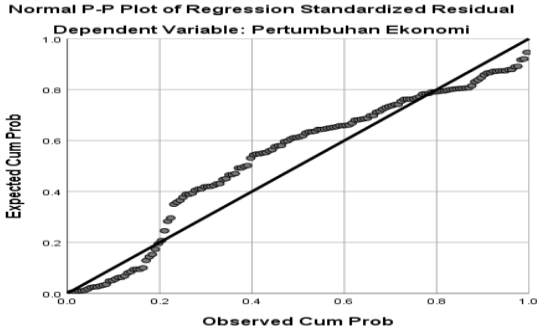
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Economic Growth	.158	150	.000	.874	150	.000
Road Surfaces	.175	150	.000	.869	150	.000
Road Conditions	.188	150	.000	.868	150	.000
Electricity Infrastructure	.172	150	.000	.763	150	.000

a. Lilliefors Significance Correction

Source; Data processed, (2024)

Normal P-P Plot of Standardized Residual Regression



Source; Primary data processed, (2024)

The Normal P–P Plot shows that the residuals are closely aligned with the diagonal line, indicating that the regression model satisfies the normality assumption. This graphical evidence is consistent with the Kolmogorov–Smirnov test results, confirming that the data are normally distributed and suitable for multiple linear regression analysis.

Multicollinearity Test

The multicollinearity test results indicate that all independent variables have Variance Inflation Factor (VIF) values below the acceptable threshold, indicating the absence of multicollinearity. Therefore, the independent variables are not highly correlated, and the regression model satisfies the multicollinearity assumption.

Multicollinearity Test Results

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	22.982	6.468		3.553	.001		
	Road Surface	.108	.103	.087	1.050	.295	**.964**	**1.037**
	Road Conditions	.207	.093	.185	2.218	.028	**.946**	**1.057**
	Electricity Infrastructure	-.087	.130	-.055	-.669	.505	**.980**	**1.020**

a. Dependent Variable: Pertumbuhan Ekonomi

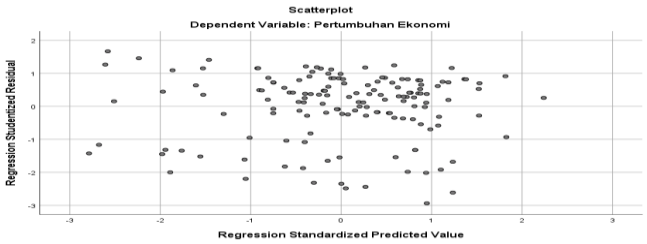
Source; Processed primary data, (2024)

The multicollinearity test results show that all independent variables have Variance Inflation Factor (VIF) values below the acceptable threshold and tolerance values above the recommended level, indicating the absence of multicollinearity. Therefore, the independent variables are not highly correlated, and the regression model satisfies the multicollinearity assumption, making it appropriate for subsequent analysis.

Heteroscedasticity Test

The heteroscedasticity test was performed using a scatterplot to examine whether the regression model satisfies the assumption of homoscedasticity. The scatterplot of the regression model is presented below.

Heteroscedasticity Test



Source; Primary data processed, (2024)

The scatterplot shows that the residuals are randomly distributed above and below the zero line without forming a clear pattern, indicating the absence of heteroscedasticity. Therefore, the regression model satisfies the homoscedasticity assumption and is appropriate for subsequent analysis.

To confirm the graphical assessment, the Glejser test was performed by regressing the absolute residual values on the independent variables. The test results provide additional statistical evidence regarding the presence or absence of heteroscedasticity.

Results of the Heteroscedasticity Test Using the Glejser Test

Correlations								
			Economic Growth	Road Surface	Road Conditions	Electricity Infrastructure	Unstandardized Residual	AbsRes
Spearman's rho	Economic Growth	Correlation Coefficient	1.000	.004	.172*	.012	.965**	-.039
		Sig. (2-tailed)	.	.962	.035	.882	.000	.636
		N	150	150	150	150	150	150
	Road Surface	Correlation Coefficient	.004	1.000	-.135	.289**	-.048	.021
		Sig. (2-tailed)	.962	.	.098	.000	.558	.800
		N	150	150	150	150	150	150
	Road Conditions	Correlation Coefficient	.172*	-.135	1.000	-.094	-.015	-.078
		Sig. (2-tailed)	.035	.098	.	.252	.851	.345
		N	150	150	150	150	150	150
	Electricity Infrastructure	Correlation Coefficient	.012	.289**	-.094	1.000	.082	-.009
		Sig. (2-tailed)	.882	.000	.252	.	.320	.908
		N	150	150	150	150	150	150
	Unstandardized Residual	Correlation Coefficient	.965**	-.048	-.015	.082	1.000	-.005
		Sig. (2-tailed)	.000	.558	.851	.320	.	.947
		N	150	150	150	150	150	150
	AbsRes	Correlation Coefficient	-.039	.021	-.078	-.009	-.005	1.000
		Sig. (2-tailed)	.636	.800	.345	.908	.947	.
		N	150	150	150	150	150	150
*. Correlation is significant at the 0.05 level (2-tailed).								
**. Correlation is significant at the 0.01 level (2-tailed).								

Source; Processed primary data, (2024)

Regression Coefficients on Economic Growth

Multiple linear regression analysis was performed to examine the influence of road surface, road condition, and electricity infrastructure on regional economic growth. Standardized beta coefficients were used to assess the relative contribution of each independent variable to the regression model.

Multiple Linear Regression Test Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.368	3.898		1.377	.171
	Road Surface	.044	.063	.042	.705	.482
	Road Conditions	.759	.063	.713	12.097	.000
	Electricity Infrastructure	.104	.068	.089	1.520	.131

a. Dependent Variable: Pertumbuhan Ekonomi

Source; Processed primary data, (2024)

The multiple linear regression analysis indicates that all independent variables have positive regression coefficients, suggesting that improvements in road surface, road condition, and electricity infrastructure are associated with higher economic growth. Among the three variables, road condition has the largest regression coefficient (β = 0.759), indicating that it provides the strongest contribution to economic growth. In comparison, electricity infrastructure (β = 0.104) and road surface (β = 0.044) also exhibit positive relationships with economic growth, although their estimated effects are relatively smaller.

Hypothesis Testing

Coefficient of Determination Analysis (R^2 Test)

The coefficient of determination (R^2) was used to evaluate the explanatory power of the regression model. The results indicate the proportion of variation in economic growth that can be explained by the independent variables included in the model.

Coeffient of Determination Test Results

Model Summary[b]				
Model	R	RSquare	Adjusted R Square	Std. Error of the Estimate
	.715[a]	.511	.501	5.127

a. Predictors: (Constant), Electrical Infrastructure, Road Surface, Road Condition

b. Dependent Variable: Economic Growth

Source: Processed primary data, (2024)

The coefficient of determination analysis shows an Adjusted R^2 value of 0.511, indicating that 51.1% of the variation in economic growth is explained by road surface, road condition, and electricity infrastructure. The remaining 48.9% is attributable to other factors outside the scope of this study.

Determination Analysis (R^2)

The Model Summary presents the multiple correlation coefficient (R) and the coefficient of determination (Adjusted R^2), which describe the overall relationship between the independent variables and economic growth as well as the explanatory power of the regression model. The model summary is presented as follows:

Model Summary R-square (R^2) Test

Model Summary[b]				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.715[a]	.511	.501	5.127
a. Predictors: (Constant), Electrical Infrastructure, Road Surface, Road Condition				
b. Dependent Variable: Economic Growth				

Source: Processed primary data, (2024)

The regression model produced a coefficient of determination (R^2) of 0.511, indicating that 51.1% of the variation in regional economic growth is explained by road surface, road condition, and electricity infrastructure. The remaining 48.9% is attributable to factors outside the scope of this study that were not included in the regression model.

The Adjusted R^2 value of 0.501 indicates that the model retains satisfactory explanatory power after adjusting for the number of independent variables. Overall, these results suggest that the regression model provides a reasonable explanation of regional economic growth in West Seram Regency.

Partial Effect Significance Test (t-Statistic Test)

The t-test was conducted to examine the individual effect of each independent variable on regional economic growth. Statistical significance was evaluated at the 5% significance level ($\alpha = 0.05$).

Results of the t-Test of Multiple Regression Analysis

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.368	3.898		1.377	.171
	Road Surface	.044	.063	.042	.705	.482
	Road Conditions	.759	.063	.713	12.097	.000
	Electricity Infrastructure	.104	.068	.089	1.520	.131

a. Dependent Variable: Economic Growth

Source: Processed primary data, (2024)

The t-test results indicate that road surface has a positive regression coefficient; however, its effect on regional economic growth is not statistically significant ($p > 0.05$). Therefore, the proposed hypothesis regarding the influence of road surface on economic growth is not supported. Road condition exhibits a positive and statistically significant effect on regional economic growth ($p < 0.05$), indicating that improvements in road condition contribute significantly to economic growth. Accordingly, the proposed hypothesis regarding the effect of road condition is supported. Similarly, electricity infrastructure shows a positive regression coefficient but does not have a statistically significant effect on regional economic growth ($p > 0.05$). Thus, the proposed hypothesis concerning the influence of electricity infrastructure is not supported.

Discussions

Effect of Road Surface on Economic Growth

The results indicate that road surface has a positive but statistically insignificant effect on regional economic growth in West Seram Regency. Although improvements in road surface quality are expected to facilitate transportation and improve economic activities, the findings suggest that upgrading pavement alone has not been sufficient to generate measurable economic growth.

From a theoretical perspective, road infrastructure is regarded as public capital that improves accessibility, reduces transportation costs, and enhances regional productivity (Todaro & Smith, 2015; Crescenzi et al., 2016). Previous studies also demonstrate that transportation infrastructure contributes to long-term economic growth by strengthening

connectivity and market integration (Canning & Pedroni, 2008; Calderón et al., 2015). However, these benefits depend not only on the availability of paved roads but also on the overall quality, continuity, and functionality of the transportation network. Consequently, improvements in road surface alone may not produce significant economic impacts when road accessibility remains constrained.

This finding reflects the geographical characteristics of West Seram Regency, where dispersed settlements and uneven infrastructure limit regional connectivity. As highlighted in the Introduction, several strategic road sections, including those in Ariate Village, remain difficult to access during the rainy season, disrupting the transportation of agricultural products and other economic activities. Therefore, improving road surface quality should be accompanied by better road conditions, network connectivity, and regular maintenance to maximize the contribution of transportation infrastructure to regional economic growth.

Effect of Road Condition on Economic Growth

The results demonstrate that road condition has a positive and statistically significant effect on regional economic growth in West Seram Regency. This finding indicates that improvements in road conditions contribute more substantially to economic growth than road surface type alone. Well-maintained roads facilitate the movement of people and goods, reduce travel time and transportation costs, and improve access to markets, thereby stimulating regional economic activities.

This finding is consistent with economic growth theory, which emphasizes that infrastructure enhances productivity and supports economic expansion by improving production efficiency and market accessibility (Todaro & Smith, 2015). It also supports the road infrastructure framework adopted in this study, which considers road condition a key indicator of infrastructure serviceability (Crescenzi et al., 2016; Sawitri, 2023). Furthermore, the result is in line with previous studies showing that high-quality transportation infrastructure promotes regional economic growth by strengthening connectivity, improving logistics efficiency, and facilitating the movement of productive resources (Canning & Pedroni, 2008; Calderón et al., 2015).

The significant influence of road condition reflects the realities of West Seram Regency, where economic activities rely heavily on road accessibility. As illustrated in the Introduction, damaged roads in several areas, including Ariate Village, frequently disrupt

the transportation of agricultural products and limit market access, particularly during the rainy season. These findings suggest that maintaining road functionality and improving road conditions should become a priority in regional infrastructure policy, as they provide more immediate economic benefits than road expansion alone.

Effect of Electricity Infrastructure on Economic Growth

The results indicate that electricity infrastructure has a positive but statistically insignificant effect on regional economic growth in West Seram Regency. Although a reliable electricity supply is expected to support productive activities, improve business performance, and encourage investment, the findings suggest that the existing electricity infrastructure has not yet generated a measurable contribution to regional economic growth.

From a theoretical perspective, electricity infrastructure is considered an important form of public capital that enhances production efficiency, supports technological adoption, and promotes long-term economic development (Cook, 2011). Recent empirical studies have also reported that improved electricity infrastructure contributes positively to economic growth by increasing productivity and strengthening regional competitiveness (Acheampong, 2018; Shahbaz et al., 2021). However, these benefits depend not only on the availability of electricity but also on the reliability, continuity, and productive utilization of electricity across economic sectors.

The insignificant effect observed in this study may reflect the development characteristics of West Seram Regency, where economic activities remain largely concentrated in agriculture, fisheries, and small-scale enterprises with relatively low electricity intensity. Consequently, improvements in electricity infrastructure alone may not immediately stimulate economic growth unless accompanied by industrial development, business expansion, and greater adoption of productive technologies. These findings suggest that electricity infrastructure should be integrated with broader regional economic development policies to maximize its contribution to sustainable economic growth.

Effect of of Road and Electricity Infrastructure to Economic Growth

The findings demonstrate that road and electricity infrastructure collectively contribute to regional economic growth in West Seram Regency, although their individual effects differ. While road condition has a significant positive effect on economic growth,

road surface and electricity infrastructure do not show statistically significant individual effects. These results suggest that regional economic growth is influenced not merely by the availability of infrastructure but by the quality, functionality, and integration of infrastructure systems.

This finding is consistent with economic growth theory, which emphasizes that public infrastructure promotes economic development by improving productivity, reducing transaction costs, and enhancing the efficiency of resource allocation (Todaro & Smith, 2015). It also supports previous studies arguing that infrastructure investment generates greater economic benefits when different types of infrastructure complement one another in facilitating production, distribution, and market accessibility (Calderón & Servén, 2004; Calderón et al., 2015). Therefore, infrastructure should be viewed as an integrated system rather than as separate development components.

An important contribution of this study is the evidence that, in island regions such as West Seram Regency, infrastructure quality appears to be more important than infrastructure availability in supporting regional economic growth. The significant effect of road condition, compared with the insignificant effects of road surface and electricity infrastructure, indicates that maintaining functional and accessible infrastructure provides greater economic benefits than merely expanding physical infrastructure. These findings highlight the importance of prioritizing infrastructure quality, regular maintenance, and integrated infrastructure planning to strengthen regional connectivity, improve productivity, and promote sustainable economic growth.

Conclusion

This study examined the effects of road infrastructure and electricity infrastructure on regional economic growth in West Seram Regency. The findings reveal that road condition has a positive and statistically significant effect on economic growth, whereas road surface and electricity infrastructure have positive but statistically insignificant effects. Nevertheless, the three infrastructure variables collectively contribute significantly to regional economic growth, indicating that infrastructure development remains an important driver of regional economic performance.

The findings suggest that infrastructure quality is more important than infrastructure availability in promoting economic growth in geographically fragmented regions. In particular, maintaining functional and accessible road networks provides greater economic benefits than merely expanding paved road coverage. This study also demonstrates that transportation and electricity infrastructure should be viewed as complementary components of regional development, requiring integrated planning to strengthen productivity, accessibility, and regional competitiveness.

By providing district-level evidence from an island region, this study contributes to the growing literature on infrastructure-led regional development. The findings enrich existing empirical evidence by highlighting the importance of infrastructure quality and functionality in supporting sustainable economic growth in regions with geographical constraints.

Recommendation

The findings provide several practical implications for regional infrastructure planning. First, local governments should prioritize improving road conditions through regular maintenance and rehabilitation rather than focusing solely on expanding paved road networks. Maintaining road functionality is essential to ensure year-round accessibility and support the efficient movement of people, goods, and services.

Second, infrastructure development should adopt an integrated approach by coordinating investments in transportation and electricity infrastructure. Although electricity infrastructure did not exhibit a significant individual effect, reliable electricity remains an important supporting factor for productive economic activities, business development, and long-term regional competitiveness. Therefore, infrastructure investment policies should emphasize the quality, functionality, and integration of infrastructure systems to maximize their contribution to sustainable regional economic growth.

Limitation & Future Research

This study has several limitations. First, it focuses on a single district, which may limit the generalizability of the findings to other regions with different socioeconomic and geographical characteristics. Second, the analysis includes only road infrastructure and electricity infrastructure, while other important determinants of regional economic growth,

such as telecommunications infrastructure, human capital, institutional quality, investment, and government expenditure, were not incorporated into the research model. Third, the study employs a cross-sectional design based primarily on perception data, which may not fully capture the long-term dynamic relationship between infrastructure development and economic growth.

Future studies are encouraged to expand the geographical coverage by comparing multiple districts or provinces, particularly other island and remote regions in Indonesia. Further research may also incorporate additional infrastructure indicators and socioeconomic variables, apply longitudinal or panel data approaches, and utilize spatial econometric techniques to better capture regional spillover effects and provide a more comprehensive understanding of infrastructure-led economic growth.

References

Calderón, C., & Servén, L. (2004). *The Effects of Infrastructure Development on Growth and Income Distribution* (Policy Research Working Paper No. 3400). World Bank. https://doi.org/10.1596/1813-9450-3400

Calderón, C., Moral-Benito, E., & Servén, L. (2015). Is Infrastructure Capital Productive? A Dynamic Heterogeneous Approach. *Journal of Applied Econometrics, 30*(2), 177–198. https://doi.org/10.1002/jae.2373

Canning, D., & Pedroni, P. (2008). Infrastructure, Long-Run Economic Growth and Causality Tests for Cointegrated Panels. *The Manchester School, 76*(5), 504–527. https://doi.org/10.1111/j.1467-9957.2008.01073.x

Cook, P. (2011). Infrastructure, Rural Electrification and Development. *Energy for Sustainable Development, 15*(3), 304–313. https://doi.org/10.1016/j.esd.2011.07.008

Todaro, M. P., & *Smith*, S. C. (2006). *Economic Development* (9th ed.). Pearson Addison Wesley.

Todaro, M. P., & Smith, S. C. (2015). *Economic Development* (12th ed.). Pearson.

Crescenzi, R., Di Cataldo, M., & Rodríguez-Pose, A. (2016). Government Quality and the Economic Returns of Transport Infrastructure Investment in European Regions. *Journal of Regional Science, 56*(4), 555–582. https://doi.org/10.1111/jors.12264

Kamaludin, A. S., & Qibthiyyah, R. M. (2022). *Village Road Quality and Accessibility on Transforming Rural Development*. *Agraris, 8*(2), i60-180, https://doi.org/10.18196/agraris.v8i2.13618

Sawitri, D. (2023). The Contribution of Road Construction on Regional Economic Development in Indonesia. *Jurnal Perencanaan Pembangunan: The Indonesian Journal of Development Planning, 7*(3). https://doi.org/10.36574/jpp.v7i3.409

Acheampong, A. O. (2018). Electricity Consumption, CO_2 Emissions and Economic Growth: The Case of Sub-Saharan Africa. *Energy Economics, 76*, 15–31. https://doi.org/10.1016/j.eneco.2018.09.008

Cook, P. (2011). Infrastructure, rural electrification and development. *Energy for Sustainable Development, 15*(3), 304–313. https://doi.org/10.1016/j.esd.2011.07.008

Shahbaz, M., Raghutla, C., Song, M., Zameer, H., & Jiao, Z. (2021). Public Private Partnership Investment in Energy as a New Determinant of Economic Growth. *Energy Policy, 154*, 112295. https://doi.org/10.1016/j.enpol.2021.112295

Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5th ed.). Sage Publications.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate Data Analysis* (8th ed.). Cengage Learning.

Montgomery, D. C., Peck, E. A., & Vining, G. G. (2021). *Introduction to Linear Regression Analysis* (6th ed.). John Wiley & Sons.