The 2nd International Students Conference on Economics and Business Excellence (ISCEBE) 2025
e-ISSN: 3090-4811
Vol. 2 No.1/EC-ISCEBE (2025)

The Effect of Transportation Infrastructure Development on Regional Economic Growth in Banjarnegara Regency

Noveria Anggoro K[1)], Dwi Ayu Lestari[2)]

[1,2)]Development Economics Program, Faculty of Economics, Universitas Terbuka, Indonesia

Corresponding author: anggoroknoveria@gmail.com

Abstract

Transportation infrastructure constitutes a vital component that provides support for the economic and social activities of society. One of measurement the success of development in the economic sector can be seen from economic growth, which is reflected in the value of the Gross Regional Domestic Product (GRDP). The objective of this research was to ascertain the effect of transportation infrastructure development on economic growth in Banjarnegara Regency. The research method employed is a straightforward linear regression analysis. The data utilized in this study is secondary time series data concerning the GRDP and highway infrastructure improvements in Banjarnegara Regency from 2017 to 2022. The result indicated that the duration of highway repairs exhibited a positive and significant impact on GRDP in Banjarnegara Regency, signifying that enhancing the quality and quantity of road infrastructure can substantially contribute to regional economic growth.

Keywords: *transportation infrastructure, gross regional domestic product (GRDP), and simple linear regression.*

INTRODUCTION

Transportation infrastructure is the physical network encompassing highways, railways, airports, seaports, and other supporting facilities that enables the movement of people and goods from one place to another. This infrastructure plays a crucial role in enhancing inter-regional accessibility and fostering economic growth by ensuring the smooth distribution of goods and services (Fajar Fernando Ritonga & Timbul Dompak, 2023). The development of transportation infrastructure is a key factor in driving regional economic growth. This enhanced connectivity allows for a more efficient exchange of information, goods, services, and people. This not only facilitates population mobility but also accelerates the distribution of goods. Improved access to raw materials and markets enables businesses to operate more efficiently, thereby enhancing their market competitiveness.

The provision of effective transportation can facilitate increased productivity and lower production costs, thereby fostering economic expansion and growth (Gopalakrishna & Leelavathi, 2015). Transportation serves as a vital link that propels economic progress. It plays a crucial role in national development across various sectors, including the economy and archipelagic cohesion (Asari, 2024).

Transportation infrastructure plays a vital role in supporting a community's economic and social activities. In addition to contributing to economic growth, transportation and its supporting infrastructure also enhance the public's quality of life. Improved access to education, healthcare, and other public services can enhance overall community welfare. Greater public accessibility can boost productivity, thereby influencing broader economic progress (Radjawane, L., 2021).

One indicator of successful economic development is economic growth, as reflected by the value of the Gross Regional Domestic Product (GRDP), measured at both current and constant prices. The Gross Regional Domestic Product (GRDP) indicates a region's ability to generate income and serves as a benchmark for the economic performance of all economic activities within that region (Arifin, 2022).

Banjarnegara Regency is located in the western region of Central Java Province. The Banjarnegara Regency Government is committed to continuously improving the regional economy. One of the strategies employed is the development of transportation infrastructure to facilitate inter-regional connectivity. The government's initiatives to enhance public mobility and goods distribution include the expansion of the road network.

e-ISSN: 3090-4811
Vol. 2 No.1/EC-ISCEBE (2025)

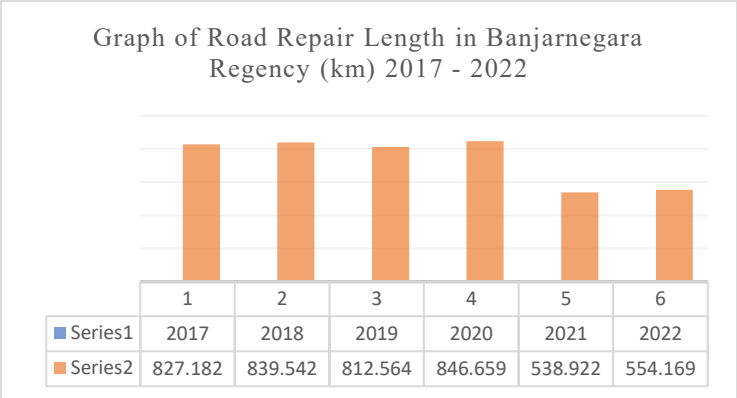

Figure 1
Length of Road Repairs in Banjarnegara Regency (km) 2017 – 2022
Source: BPS 2023 (Processed)

According to 2023 data from Statistics Indonesia - Central Java Province, asphalt road improvement projects steadily increased from 2017 to 2020. Subsequently, these activities declined in 2021 and 2022, a trend attributed to the fact that road conditions remained largely in a good and adequate state. The government's road repair efforts are considered a key initiative to ensure a smoother flow of land transportation within Banjarnegara Regency. Another major effort involves the planned construction of a type A terminal, which is aimed at improving public transportation services.

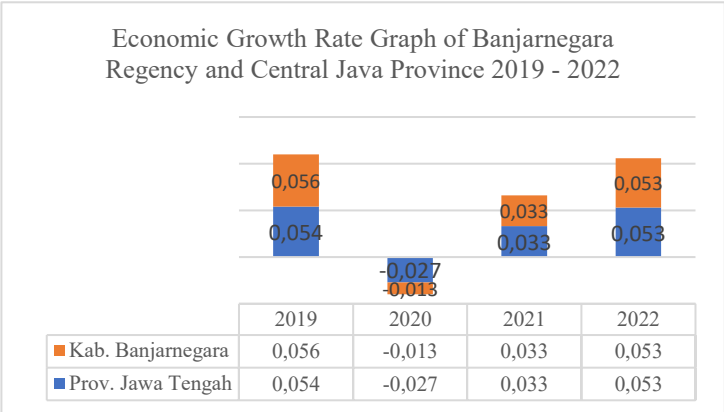

Figure 2
Economic Growth Rate of Banjarnegara Regency and Central Java Province 2019-2022
Source BPS 2023 (Processed)

As shown in Figure 2, the Gross Regional Domestic Product (GRDP) growth rate in Banjarnegara Regency and Central Java Province, based on constant prices, has fluctuated over the last four years. This was particularly evident in 2020, which marked the beginning of the COVID-19 pandemic in Indonesia. The GRDP of Banjarnegara Regency contracted by 0.013%, a decline less severe than that of Central Java Province, which fell by 0.027%. This indicates that the economic sector in Banjarnegara Regency was not as significantly impacted by the pandemic. In the following years, the GRDP of both Banjarnegara Regency and Central Java Province began to recover, showing a considerable rebound.

The development of transportation infrastructure contributes positively to regional economic growth. Previous research indicates that land and sea transportation infrastructure has a positive influence on long-term economic growth. Transportation infrastructure also generates a significant multiplier effect on the economy (Siburian, 2016). According to data from the World Bank, the elasticity of Gross Domestic Product (GDP) with respect to transportation infrastructure can yield a multiplier effect of between 7% and 44% (Palilu, 2018). This shows that every improvement in infrastructure quality can contribute to a larger increase in economic output. Hasudungan S (2007) explains that changes in the number of families, road infrastructure, and GDP per capita have a combined impact of 0.774 on changes in Land and Building Tax (PBB) revenue. Local governments must invest in infrastructure for education and training to improve the quality of human resources. This will boost PBB revenue as growth and per capita income increase simultaneously.

e-ISSN: 3090-4811
Vol. 2 No.1/EC-ISCEBE (2025)

Gross Regional Domestic Product (GRDP) is defined as the total value of goods and services produced within a region during a specific period. GRDP is an important indicator of a region's economic condition and is a component of the economic dataset that facilitates the evaluation of a region's (province or regency/city) economic development performance (Salam, 2017).

The purpose of this study is to determine the effect of transportation infrastructure development on economic growth in Banjarnegara Regency. This research is important as it aims to provide a better understanding of the influence of transportation development on economic growth in Banjarnegara Regency.

METHODS

The method employed in this study is simple linear regression, analyzed using the SPSS (Statistical Package for the Social Sciences) software. Simple linear regression is a statistical method used to test the cause-and-effect relationship between an independent variable (X) and its corresponding dependent variable. The causal factor is generally denoted as X (also called the predictor), while the outcome variable is denoted as Y (also called the response). Linear regression can be used to analyze economic growth based on the Gross Regional Domestic Product (GRDP). This method allows the researcher to predict the value of Y based on the value of X. The analysis utilizes the following formula:

$Y = a + bX + e$

Where:

Y is the dependent variable.
X is the independent variable.
a is the constant (intercept).
b is the regression coefficient (slope).
e is the error term or residual.

The steps involved in the linear regression analysis are as follows: Determining the independent variable (X) and dependent variable (Y) based on theory or previous research. Collecting data for both variables. Testing the significance of the regression model and its coefficients through normality and linearity tests. Conducting the simple linear regression analysis using the equation: $Y = a + bX$, where a is the constant and b is the regression coefficient. Interpreting the results of the simple linear regression analysis to address the research objectives. This study utilizes secondary data in the form of a time series. The data used includes Gross Regional Domestic Product (GRDP) figures and the length of highway infrastructure improvements in Banjarnegara Regency from 2017 to 2022. This data was sourced from Statistics Indonesia (BPS) of Banjarnegara Regency, BPS of Central Java, academic journals, and other websites relevant to this research. In this study, Gross Regional Domestic Product serves as the dependent variable (Y), while the length of highway infrastructure improvement is the independent variable (X).

RESULTS AND DISCUSSION

1. Normality Assumption Test

   Prior to conducting the regression analysis, a normality test of the residuals was performed using the Kolmogorov-Smirnov test. This test is essential to ensure that the data is normally distributed, a key prerequisite in linear regression. The output of the Kolmogorov-Smirnov normality test is presented in Table 1 below:

e-ISSN: 3090-4811
Vol. 2 No.1/EC-ISCEBE (2025)

Table 1 Output Results of Kolmogorov-Smirnov Normality Test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		6
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	1261821.14068447
Most Extreme Differences	Absolute	.286
	Positive	.189
	Negative	-.286
Test Statistic		.286
Asymp. Sig. (2-tailed)		.135[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Source: Output from the Kolmogorov-Smirnov normality test

Decision-making criteria:
If the significance value is > 0.05, then the residuals are normally distributed.
If the significance value is < 0.05, then the residuals are not normally distributed.

Based on the normality test analysis in Table 1, the significance value is 0.135. Therefore, it can be concluded that the residuals from the research data are normally distributed. Consequently, the research data satisfies the assumption required for a regression test.

2. Linearity Test

The purpose of the linearity test is to ensure that the relationship between the independent and dependent variables is linear, thereby validating the use of the simple linear regression model. This test is performed by examining the significance value from the linearity test results. The output of the linearity test is presented in the ANOVA table below:

Table 2 Linearity Test Output Results

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
PDRB Panjang Perbaikan Jalan Raya *	Between Groups	(Combined)	250849285571836.900	32	7839040174119.903	2.684	.109
		Linearity	25506941275208.770	1	25506941275208.770	8.734	.025
		Deviation from Linearity	225342344296628.120	31	7269107880536.392	2.489	.128
	Within Groups		17523213015944.742	6	2920535502657.457		
	Total		268372498587781.700	38			

Source: Output from the linearity test

Decision-making criteria:

Based on the Significance Value:

If the value for Sig. Deviation from Linearity is > 0.05, there is a linear relationship between the independent variable (X) and the dependent variable (Y).

If the value for Sig. Deviation from Linearity is < 0.05, there is no linear relationship between the independent variable (X) and the dependent variable (Y).

Based on the F-Value:

If the F-statistic < F-table, there is a linear relationship between the independent variable (X) and the dependent variable (Y).

If the F-statistic > F-table, there is no linear relationship between the independent variable (X) and the dependent variable (Y).

Based on the linearity test analysis in Table 2, the value for Sig. Deviation from Linearity is 0.128, which is greater than 0.05. This means it can be concluded that there is a linear relationship between the length of highway improvement and GRDP. Furthermore, the F-statistic is 2.489. When compared to the F-table value of 3.81 (for 31 and 6 degrees of freedom), the F-statistic is less than the F-table value. This also leads to the conclusion that a linear relationship exists between the length of highway improvement variable and GRDP.

Based on the results of the normality and linearity tests on the research data, a hypothesis can be formulated: there is a positive and significant influence of the length of highway improvement on the Gross Regional Domestic Product (GRDP). This implies that the greater the length of highway improvement, the higher the resulting GRDP will be.

3. Coefficient of Determination Test (R^2)

The coefficient of determination test is used to measure the proportion of the variance in the dependent variable that is predictable from the independent variable. This test also measures the goodness of fit of the regression line. The results of the coefficient of determination test are presented in Table 3 below:

Table 3: Output of the Simple Linear Regression Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15026203.755	2654027.237		5.662	.000
	Panjang Perbaikan Jalan Raya	7.173	3.639	.308	1.971	.031

a. Dependent Variable: PDRB

Source: Output from the simple linear regression test

Based on the output of the linear regression test in Table 3 above, the regression equation model can be concluded as follows:

Y = 15,026,203.755 (a) + 7.173 (X) + e

This regression equation can be interpreted as follows:

Constant (a) = 15,026,203.755: This means that if the length of highway improvement were held constant or at zero, the predicted Gross Regional Domestic Product (GRDP) would be 15,026,203.755.

Regression Coefficient (bX) = 7.173 (positive value).

A regression coefficient of 7.173 indicates that for every 1-kilometer increase in the length of highway improvement, the GRDP is predicted to increase by IDR 7,173,000 (based on the units used for the analysis). This demonstrates a tangible contribution of infrastructure to the local economy.

Table 4: Output of the Simple Linear Regression Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15026203.755	2654027.237		5.662	.000
	Panjang Perbaikan Jalan Raya	7.173	3.639	.308	1.971	.031

a. Dependent Variable: PDRB
Source: Output from the simple linear regression test

Based on the output of the linear regression test in Table 3 above, the regression equation model can be concluded as follows:
Y = 15,026,203.755 (a) + 7.173 (X) + e
This regression equation can be interpreted as follows:
Constant (a) = 15,026,203.755: This means that if the length of highway improvement were held constant or at zero, the predicted Gross Regional Domestic Product (GRDP) would be 15,026,203.755.
Regression Coefficient (bX) = 7.173 (positive value).
A regression coefficient of 7.173 indicates that for every 1-kilometer increase in the length of highway improvement, the GRDP is predicted to increase by IDR 7,173,000 (based on the units used for the analysis). This demonstrates a tangible contribution of infrastructure to the local economy.

Table 3: Output of the Simple Linear Regression Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15026203.755	2654027.237		5.662	.000
	Panjang Perbaikan Jalan Raya	7.173	3.639	.308	1.971	.031

a. Dependent Variable: PDRB

Source: Output from the simple linear regression test

The significance value is 0.031 < 0.05.
The t-statistic > t-table value (1.971 > 1.687).
Based on the two decision-making criteria above, the results show that transportation infrastructure improvement, specifically highway repairs, has a positive and significant influence on the Gross Regional Domestic Product (GRDP) in Banjarnegara Regency. This finding is consistent with research conducted by Husein and Baranyaman (2021), who also found a positive and significant correlation between the development of seaport, road, and bridge infrastructure and economic growth in North Maluku. This is also supported by the research of Hasadungan S (2007), which concluded that fluctuations in GRDP are influenced by the development of road infrastructure and the number of families.

From this study, it can be concluded that transportation infrastructure improvement, in the form of highway repairs, has a positive and significant influence on the Gross Regional Domestic Product (GRDP). A regression coefficient of 7.173 with a significance of 0.031 (< 0.05) indicates that each 1-kilometer addition of road improvement has the potential to increase GRDP by IDR 7,173,000. Good transportation infrastructure remains key to enhancing public accessibility and mobility. Equitable and sustainable infrastructure development can stimulate economic activity, facilitate the distribution of goods and services, and enhance regional

competitiveness. Therefore, transportation infrastructure development must be a priority on the regional economic development agenda.

Suggestions

1. The local government should prioritize the development of road and other transportation infrastructure, with a focus on regions that have high economic potential but low accessibility. This will help reduce inter-regional development disparities.
2. A sustainable funding strategy for infrastructure projects is required, including collaboration with the private sector and the efficient use of government funds.
3. Regular monitoring and evaluation of completed infrastructure projects should be conducted to ensure they yield a positive impact on regional economic growth.

REFERENCES

Arifin, Z. M. (2022). Understanding the Measurement of Economic Growth with GRDP Indicators. Senior Planner at the Regional Development Planning Agency (Bappeda) of Jambi Province.

Asari, A. (Ed.). (2024). Concepts of Transportation Planning. PT Mafy Media Literasi Indonesia.

Statistics Indonesia (BPS). (2022). Road Length by Regency/City and Road Surface Type in Central Java Province (km), 2020-2021. Retrieved November 28, 2024, from https://jateng.bps.go.id/id/statistics-table/2/MTAxMCMy/panjang-jalan-menurut-kabupaten-kota-dan-jenis-permukaan-jalan-di-provinsi-jawa-tengah.html

Statistics Indonesia (BPS) of Banjarnegara Regency. (2024, April 14). Gross Regional Domestic Product of Banjarnegara Regency by Business Field (Publication No. 9302021.3304). pp. 84-102.

Gopalakrishna, B. B., & Leelavathi, D. S. (2011). Infrastructure and human development in India: An Inter-state comparison. Journal of Global Economy, 7(4), 292–311. https://doi.org/10.1956/jge.v7i4.45

Hasudungan, S. (2007). The Influence of Per Capita GRDP, Road Infrastructure, and Population on Land and Building Tax Revenue in Banggai Regency. Jurnal Paradigma Multidisipliner, 2(3).

Husein, A., & Baranyaman, A. (2021). The Influence of Seaport, Road, and Bridge Infrastructure Development on the Economic Growth of North Maluku. Jurnal Poros Ekonomi, 10(1).

Banjarnegara Regency Government. (2022). Laporan Kinerja Instansi Pemerintah Tahun 2021 [Government Agency Performance Report 2021]. Retrieved from https://ppid.banjarnegarakab.go.id/wp-content/uploads/2022/08/LKJIP-Tahun-2021-Kab-Banjarnegara.pdf

Palilu, A. (2018). Analysis of the Influence of Transportation Infrastructure Development on the Gross Regional Domestic Product of Ambon City. Jurnal Buletin Studi Ekonomi, 23(2), 227-240.

Radjawane, L. (2021). The Impact of Transportation Development in Various Sectors. CV Media Sains Indonesia.

Rediansyah, Khoirudin, & Yuniarti. (2023). The Influence of Infrastructure, Water, and Electricity on the Regional Economy in Banjarnegara Regency. Journal of Environmental Economics and Sustainability, 1(2).

Ritonga, F. F., & Timbul, D. (2023). Comparative Analysis of Transportation Infrastructure in Indonesia and Japan. Batam: (Snistek Proceedings).

Salam, D. S. (2017). Indonesian Government Management. Jakarta: Djambatan.

Siburian, G., & Widodo, W. (2016). Analysis of the Influence of Land Transportation on Economic Growth in Indonesia (Doctoral dissertation, Faculty of Economics and Business).

Statistics Indonesia (BPS) of Banjarnegara Regency. (2024, April 14). Gross Regional Domestic Product of Banjarnegara Regency by Business Field. Publication No. 9302021.3304, 84-102.