

## ANALYSIS OF THE INFLUENCE OF SOCIAL AND ECONOMIC INFRASTRUCTURE ON THE DYNAMICS OF ECONOMIC GROWTH IN WEST JAVA PROVINCE FOR THE PERIOD 2020 – 2024

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Received: 31-05- 2025

Revised: 08-06-2025

Approved: 20-06-2025

### ABSTRACT

*This study aims to analyze the influence of social and economic infrastructure on economic growth dynamics in West Java Province from 2020 to 2024. The research employs a panel data regression method using the Fixed Effect Model (FEM), based on secondary data from the Central Bureau of Statistics. The independent variables examined include road length, the percentage of households with access to clean water, the number of healthcare workers, and literacy rates, with Gross Regional Domestic Product (GRDP) per capita as the dependent variable. The results indicate that access to clean water and the number of healthcare workers have a positive and significant impact on regional economic growth, with coefficients of 0.007 (p-value 0.002) and 0.060 (p-value 0.000), respectively. In contrast, road length and literacy rates do not show a statistically significant effect, with p-values of 0.181 and 0.176. The simultaneous F-test yields an F-statistic of 139.53 (p-value 0.000), indicating that all independent variables together significantly affect the dependent variable. The R-squared value of 0.997 demonstrates that the regression model explains 99.7% of the variation in GDP per capita during the study period.*

**Keywords:** growth, infrastructure, health, clean water, west Java

### INTRODUCTION

One way to measure the extent to which a country's economic development is successful is through economic growth. A country can be considered successful in economic development if there is an increase in its economic growth. (Sukirno, 2016) explains that economic development is an effort to increase per capita income by transforming economic potential into real economic activity. This is done through various steps such as investment, skills improvement, knowledge development, technology adoption, improvement of organizational capabilities, and improvement of management standards.

The economic growth of a region is not only reflected in the amount of production and consumption activities, but also in how much the economic benefits are felt by the community. One indicator that is often used to measure the level of population welfare is gross domestic regional product. During the period 2020 to 2024, the gross regional domestic product in West Java showed a positive trend. The data recorded shows an increase from year to year, which indicates an improvement in the regional economy.

**Table 1. Development of GRDP of West Java Province (2020-2024)**

Years	Gross Regional Domestic Product
2020	43.236,51
2021	45.234,18
2022	49.136,90
2023	52.651,59
2024	56.079,61

Source: BPS (2025)

In 2020, West Java's gross domestic regional product stood at IDR 43,236.51 thousand. This value continued to increase in the following years, reaching Rp45,234.18 thousand in 2021, Rp49,136.90 thousand in 2022, Rp52,651.59 thousand in 2023, and is estimated to reach Rp56,079.61 thousand in 2024. This increase shows that the various development efforts undertaken by the local government have had a significant impact on community welfare. However, behind the growth of these figures, challenges in equalizing development results and improving the quality of life in all regions of West Java are still an important agenda that needs attention. Challenges in equalizing development outcomes and improving the quality of life throughout West Java, although data shows positive economic growth from year to year. In addition, it was also stated that the quality and equity of infrastructure are still major challenges, as well as gaps in previous analyses that tend to view infrastructure in aggregate without distinguishing the contribution of social and economic infrastructure specifically. This problem is explicitly stated as the reason for the importance of research to analyze the influence of social and economic infrastructure on the dynamics of economic growth in West Java for the period 2020–2024

Recent research by (Khurriah & Istifadah, 2019) This study looks at how public capital particularly infrastructure relates to Indonesia's economic expansion. In this work, public infrastructure capital is estimated as the growth model's explanatory power using a growth model developed from aggregate production functions and the generalized method of moment (GMM) estimation approaches. Another study by (Prabowo et al., 2021) also highlighted that the development of clean water infrastructure has a positive effect on economic growth in Aceh Province. The availability of reliable clean water not only increases community productivity but also attracts investment and creates new jobs, thereby strengthening the regional economy. This study is in line with previous findings that basic infrastructure such as clean water plays an important role in improving the quality of life and economic productivity. In addition, research by (Shrestha et al., 2022) emphasized that access to transportation infrastructure contributes to economic growth by increasing connectivity and efficiency of distribution of goods and services. However, the impact of infrastructure is greatly influenced by local characteristics and the level of community participation in project planning and implementation.

Infrastructure development is a fundamental pillar in promoting regional economic growth (Mustafa, 2017). The availability of adequate infrastructure such as highways, public transportation systems, energy supply, clean water, and telecommunications enhances the efficiency of production and the distribution of goods and services. Furthermore, it strengthens connectivity between regions, thereby facilitating the movement of people and goods (Awainah et al., 2024). Reliable infrastructure contributes to reducing logistics costs, expanding market access, and increasing the competitiveness of local products in both domestic and international markets. In addition to its economic advantages, infrastructure development plays a crucial role in improving the quality of life for communities. Access to essential public services such as education, healthcare, and clean water is highly dependent on the presence of quality infrastructure (Fakhrur et al., 2023). For example, the construction and operation of schools and healthcare facilities in remote areas become more feasible with proper roads and adequate transportation. Moreover, infrastructure development

supports equitable regional development and the fair distribution of welfare. It serves as a strategic instrument for reducing the development gap between urban and rural areas (Nasikhah & Susilowati, 2024).

Infrastructure, both economic and social, constitutes a critical component of public capital that supports national development. Economic infrastructure such as roads, electricity, and access to clean water, along with social infrastructure such as education and healthcare, plays a central role in enhancing productivity, improving the efficiency of the distribution of goods and services, and elevating the overall quality of life (World Bank, 2021) According to the Solow Swan neoclassical model of economic growth, increases in economic output are primarily driven by the accumulation of physical capital and the development of human capital. Within this theoretical framework, infrastructure is regarded as a key element of public capital that significantly contributes to the improvement of total factor productivity (Mankiw & Sungkono, 2018). The availability of adequate infrastructure helps to reduce transaction costs, improve regional connectivity, and facilitate the smooth flow of goods, services, and information. These outcomes are essential for broadening market access, fostering inclusive economic development, and supporting long term sustainable growth (Arwenyo et al., 2022)

A growing body of empirical research demonstrates that the simultaneous development of economic and social infrastructure has a positive impact on economic growth in Indonesia. (Syahputra et al., 2021) found that infrastructure related to roads, electricity, clean water, healthcare, and information and communication technology significantly contributed to national economic growth during the period 2015 to 2019. At the provincial level, (Syahputri, 2013) showed that road infrastructure, electricity, and clean water had a positive effect on economic growth in West Java, with electricity infrastructure identified as the most influential factor. Similarly, a study by (Isfatkhurohmah, 2024) using panel data from 34 provinces in Indonesia over the 2015 to 2023 period, confirmed that road infrastructure, foreign direct investment, and domestic investment positively affect economic growth. However, the study also noted that the effects of healthcare and telecommunications infrastructure were not consistently positive when analyzed individually. In addition to economic infrastructure, several studies have emphasized the critical role of social infrastructure in supporting long term economic development. For example, (Sari, 2021) affirmed that improvements in the quality of education and healthcare facilities can enhance human capital, which in turn contributes to regional economic growth.

Despite various development efforts, the issues of infrastructure quality and equity remain significant challenges in West Java, particularly in relation to its development trajectory and regional economic growth dynamics. Most existing studies have tended to examine the aggregate effects of infrastructure without differentiating between the specific contributions of social and economic infrastructure. In response to this gap, the present study seeks to provide a comprehensive analysis of the impact of both social and economic infrastructure on the dynamics of economic growth in West Java Province during the period 2020 to 2024. The findings of this research are expected to offer valuable insights and contribute to the formulation of infrastructure development policies that are more effective, inclusive, and responsive to the unique challenges of regional development.

## RESEARCH METHODS

The research method used in this study is a quantitative approach with a panel data regression method, which aims to analyze the influence of social and economic infrastructure on economic growth in West Java Province during the 2020–2024 period. The data used are secondary data obtained from official publications of the Central Statistics Agency (BPS), including indicators of road length, percentage of households with access to clean water, number of health workers, and literacy rate as independent variables, and Gross Regional Domestic Product (GRDP) per capita as the dependent variable. The analysis begins with the collection of panel data that combines the dimensions of time (year) and region (district/city), followed by descriptive statistical analysis to describe the characteristics of the data for each variable. Furthermore, an estimation of the panel data regression model is carried out using three approaches, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The selection of the best model is carried out through the Chow test to compare CEM and FEM, and the Hausman test to determine the best model between FEM and REM. Based on the results of these tests, the Fixed Effect Model (FEM) was chosen as the most appropriate model because it is able to accommodate differences in characteristics between regions and time better. After the best model is obtained, a significance test is carried out simultaneously (F-test) and partially (t-test) to determine the effect of each independent variable on the dependent variable. Thus, this research method systematically combines panel data collection techniques, selection of the right regression model, and comprehensive statistical testing to produce valid and relevant findings in the context of the influence of infrastructure on economic growth in West Java.

For the purposes of this study, infrastructure is classified into two main categories. Economic infrastructure consists of indicators such as road length and the percentage of households with access to clean water. Social infrastructure, on the other hand, is represented by indicators related to health and education. The analytical model developed in this study is structured as follows:

$$GRDP_{it} = \alpha + \beta_1 RL_{it} + \beta_2 PWA_{it} + \beta_3 HW_{it} + \beta_4 PLR_{it} + it \dots \dots \dots (1)$$

The function of equation 1 was transformed into a regression equation, resulting in the following model:

$$\log GRDP_{it} = \alpha + \beta_1 \log RL_{it} + \beta_2 \log PWA_{it} + \beta_3 \log HW_{it} + \beta_4 \log PLR_{it} + U_{it} \dots \dots \dots (2)$$

Description :

GRDP = Gross Regional Domestic Product

RL = Road Length

PWA = Percentage of Water Access

HW = Health Workers

PLR = Percentage of Literacy Rate

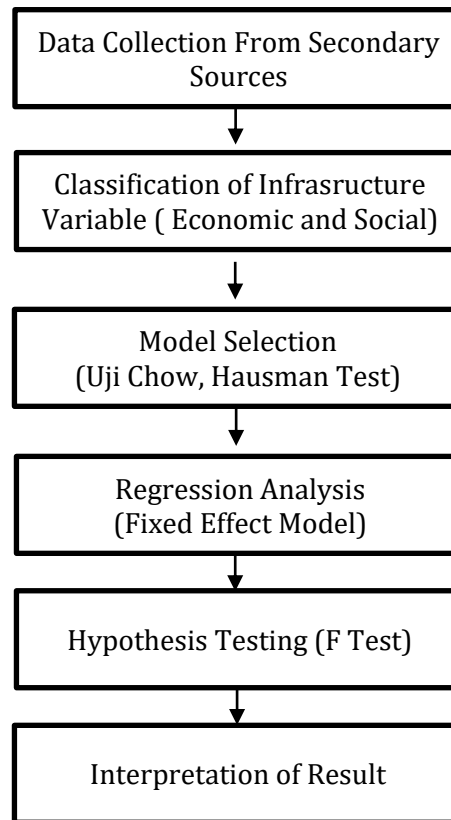
$\alpha$  = Constant

$\beta_1$ - $\beta_3$  = Regression Coefficient

$\epsilon_{it}$  = Error

$i$  = Number of Cross Sections

$t$  = Period



**Figure 1. Reserch Process For Analyzing Influence of Social Economic**

**RESULTS AND DISCUSSION**

By interpreting the outcomes of these tests, researchers can select the most suitable model to explain the relationships among variables in panel data. This careful selection is crucial to ensure the accuracy and reliability of the analysis, as choosing an inappropriate model may lead to biased estimates. The process and criteria for model selection are typically summarized in a table to guide researchers through the comparison of test results.

**Selection of the Best Panel Data Regression Model**

**Table 2. Results of Panel Data Regression Determination**

<b>1. Chow Test</b>	<b>2. Hausman Test</b>	<b>3. LM Test</b>
H0 : CEM	H0 : REM	H0 : CEM
H1 : FEM	H1 : FEM	H1 : REM
<b>Results Test</b>		
<b>Chow Test</b>	<b>Hausman Test</b>	<b>LM Test</b>
Prob < $\alpha$ (0.05) = 0.000	Prob < $\alpha$ (0.05) = 0.000	NO NEED TO DO
Decision Making:		
Reject H0, if Prob < $\alpha$ (0.05) or at 5%		

Source: Data Processed (2025)

Based on the results presented in Table 2, the panel data regression model selection process begins with the Chow test. The Chow test yields a p-value of 0.000,

indicating that the Fixed Effect Model (FEM) is more appropriate than the Pooled Ordinary Least Squares (OLS) model. To further determine the most suitable model between the Fixed Effect Model (FEM) and the Random Effect Model (REM), the Hausman test is conducted. The test produces a p-value of 0.000, leading to the conclusion that the Fixed Effect Model (FEM) is the preferred model for this analysis.

### Panel Data Regression with Fixed Effect Model (FEM)

**Table 3.** Fixed Effect Model (FEM) Results

	<b>Coefficient</b>	<b>Std.Error</b>	<b>t-statistic</b>	<b>Prob</b>
Road Length	0.011	0.008	1.346	0.181
Percentage of Water Access	0.007	0.002	3.147	0.002
Health Workers	0.060	0.007	8.506	0.000
Percentage of Literacy Rate	-0.017	0.013	-1.360	0.176

Source: Data Processed (2025)

Based on the Fixed Effect Model (FEM) results summarized in Table 3, the variable representing road length exhibits a positive but statistically insignificant relationship with economic growth, as indicated by a coefficient of 0.011 and a p-value of 0.181. This implies that although an increase in road length is associated with higher economic output, the effect is not strong enough to be deemed statistically significant within this model. Similarly, the proportion of the population with access to clean water shows a positive impact on economic growth, with a coefficient of 0.007; however, this effect is also statistically insignificant given a p-value of 0.002. This suggests that while improved access to clean water may contribute to economic progress, the strength of this relationship is limited in the current context. In contrast, the number of health workers has a significant and positive effect on economic growth, as demonstrated by a coefficient of 0.060 and a highly significant p-value of 0.000. This finding indicates a strong linkage between increases in health workforce availability and economic advancement. Conversely, the literacy rate variable yields a negative coefficient of -0.017 with a p-value of 0.176, indicating no statistically significant effect on economic growth at the 5 percent significance level. Overall, these results highlight that, within this model, only the variables representing health workers demonstrate a robust and statistically significant positive influence on economic growth. In contrast, road length, access to clean water, and literacy rate do not show meaningful or significant effects.

### Hypothesis Testing

#### Simultaneous Significance Test (F Test)

**Table 4. Simultaneous Significance Test (F Test)**

F-statistic	139,53
Prob (F-statistic)	0,000

Source: Data Processed (2025)

Referring to the results of the Simultaneous Significance Test (F-test) presented in the table, the F-statistic is 139.53 with a p-value of 0.000. This extremely small p-value indicates that, when considered together, all independent variables in the

regression model have a significant impact on the dependent variable. Therefore, it can be inferred that the regression model as a whole is statistically valid and effective in accounting for variations in the dependent variable.

### **Coefficient of Determination (R Square Test)**

**Table 5. R Square Test**

R-squared	0,997
Adjusted R-squared	0,996

Source: Data Processed (2025)

Referring to Table 5, which presents the Coefficient of Determination (R-squared), the analysis shows that the R-squared value reaches 0.997. This indicates that approximately 99.7% of the changes in the dependent variable can be accounted for by the independent variables included in the regression model. The Adjusted R-squared value, which is slightly lower at 0.996, takes into consideration the number of predictors used in the model. Although this adjusted value is marginally less than the original R-squared, it remains very high, suggesting that the model is highly effective at capturing the variation in the dependent variable while minimizing the risk of overfitting. These results collectively demonstrate that the regression model applied has a very strong ability to explain the data being analyzed.

## **DISCUSSION**

The results of research conducted in West Java province using the variables of Road Length, Percentage of Water Access, Labor and Percentage of Literacy Rate show that Variable X1 or Road Length has an insignificant positive effect on the dependent variable with a coefficient of 0.011 and a p-value of 0.181, every 1% increase in roads will increase economic growth by 0.011%, meaning that any increase in road length tends to be associated with an increase in the value of the dependent variable. However, the effect is not statistically significant, as the p-value obtained is 0.181, which is greater than the general significance threshold of 0.05. This indicates that although there is a positive relationship between road length and the dependent variable, the relationship is not strong or consistent enough to be considered significant. The effect of road length on the dependent variable is not large enough to produce a clear effect, perhaps because other factors are more dominant in influencing the dependent variable, or because the road construction studied has not been significant enough in supporting economic growth. This study is consistent with (Fernald, 1999) in research explaining that public infrastructure such as roads has a positive impact on productivity and economic growth. However, the effect can be insignificant or limited if it is not supported by other factors such as good management and efficient use. In addition, (Iriyena et al., 2019) the variable of government spending in the field of road infrastructure does not have a significant effect on the Economic Growth of Kaimana Regency, the results of the study show that government spending on road infrastructure is still low and its allocation has not been particularly effective, causing slowness in increasing economic growth.

Furthermore, research by (Suswita et al., 2020) states that Road Length has a positive and insignificant effect on economic growth in Simalungun Regency. The results of this study are in line with the theory which states that roads have two main roles. Roads function as drivers of economic growth by facilitating the distribution of goods and services between production centers and marketing areas, and vice versa. In addition, roads also play a role in reducing development imbalances between regions. Road development, therefore, becomes an important foundation for the development of a region (Syafrizal, 2012)

The percentage of access to clean water or variable X2 has a positive and significant effect on economic growth with a coefficient of 0.007 and a p-value of 0.002, which means that this coefficient indicates that every 1% increase in community access to clean water will lead to an increase of 0.007% in economic growth. This effect is statistically significant, as the p-value is smaller than 0.05 (i.e., 0.002), which means that the relationship between access to clean water and economic growth is not a coincidence, but a real relationship. Improved access to clean water can make a positive contribution to the economy, demonstrating the importance of providing clean water facilities to support community welfare and sustainable economic growth. Research by (Warsilan & Noor, 2015) proves that clean water infrastructure has a positive effect on economic growth in Samarinda city, confirming that the higher the value of the clean water variable, the higher the level of economic growth. Furthermore, research (Zein et al., 2024) the results of the analysis shows that clean water distribution affects economic growth in Aceh Province because it plays a role in providing a safe and reliable clean water supply. Clean water distribution that meets technical standards and economic efficiency has been proven to be able to encourage regional economic growth, thus supporting a positive and significant relationship between clean water access and economic growth (Brilyawan & Santosa, 2021). The study (Damania et al., 2019) in the report *Quality Unknown: The Invisible Water Crisis* reveals that water pollution has a significant economic impact. The downstream areas of highly polluted rivers experienced a decrease in GDP of 0.82 basis points compared to the average normal growth. Middle-income countries face the risk of losing almost 50% of their economic growth, while high-income countries experience a potential decline of 0.32 basis points. Several previous studies, such as those conducted by (Wahyuni, 2009), (Musouwir, 2006), (Pamungkas, 2009) show that water availability contributes positively to economic growth. These studies confirm that water infrastructure as a public facility can increase labor productivity, which is an important factor in the production process and ultimately drives economic growth.

Health workers or X3 have a positive and significant effect on economic growth with a coefficient of 0.060 and a p-value of 0.000, meaning that health workers (variable X3) show a significant positive effect on economic growth, with a coefficient of 0.060 and a p-value of 0.000. This coefficient indicates that each one-unit increase in the number or quality of health workers will lead to an increase of 0.060 units in economic

growth. This positive relationship indicates that the more health workers available or the higher quality of health workers available, the more it will contribute to an increase in economic growth. The very small p-value (0.000) indicates that the effect of health workers on economic growth is highly statistically significant, which means that this relationship is reliable and does not occur by chance. This confirms the importance of the health sector in supporting sustainable economic development, as an adequate health workforce can improve people's quality of life, extend life expectancy, and create a more productive workforce. The results of the study are in line with research (Bloom et al., 2003) found that investment in health workers plays a major role in promoting economic growth in developing countries. Better access to qualified health workers increases life expectancy, labor productivity, and ultimately promotes faster economic growth. In (de Almeida & de Mendonça, 2019) it was found that investment in the health workforce plays a major role in driving economic growth in developing countries. Better access to qualified health workers increases life expectancy, labor productivity, and ultimately leads to faster economic growth. An empirical study on health expenditure and economic welfare in Indonesia by (Prasetyo et al., 2024) confirmed that human resource health is one of the important factors in economic growth and development. This study proves that health expenditure, life expectancy, labor force, and household consumption have a significant positive relationship with GDP per capita. The 2021 Indonesian health economy study noted that the health sector recorded the highest growth rate of 10.46%, contributing significantly to the national economic recovery (Purwanti, 2022). Health workers have a positive effect on economic growth because good health increases labor productivity and reduces absenteeism, so that working time becomes more optimal. A healthy society can work more efficiently and produce higher output, which then drives overall economic growth. Longer life expectancy also allows labor's contribution to the economy to last longer, while lowering the burden of health costs as the need for medical care decreases. Increasing the number and quality of health workers improves access to and quality of health services, which in turn improves the quality of human resources and boosts the competitiveness of the national economy. Secured health also creates a virtuous cycle: healthy people are more likely to invest in education and innovation, making economic growth more sustainable.

The percentage of literacy rate or X4 has a negative and insignificant effect on economic growth with a coefficient of -0.017 and a p-value of 0.176, meaning that the percentage of literacy rate (variable X4) shows a negative effect on economic growth, with a coefficient of -0.017 and a p-value of 0.176. A p-value greater than 0.05 indicates that this effect is not statistically significant. A high literacy rate only reflects basic education, which is not enough to drive economic growth, especially if the quality of further education and skills is inadequate. In addition, unequal access to quality education also limits its positive impact. Other factors such as economic policy, infrastructure and technology are more dominant in influencing economic growth. Research in the regencies/cities of Bali Province shows that literacy rates have a

negative and insignificant effect on economic growth. Researchers assess that literacy rates do not have a direct effect on economic growth, but are more related to increasing public education (Putri et al., 2022). Research (Faturrohmin et al., 2011) found that literacy has a negative but insignificant effect on poverty reduction, because increasing literacy does not necessarily increase people's economic productivity. The study (Pratiwi et al., 2025) shows a low and insignificant correlation between literacy rate and GRDP per capita, so literacy rate is not the main factor in increasing economic growth. Literacy rates have a negative and insignificant effect on economic growth because the ability to read and write is not enough to directly boost economic productivity. Many individuals are literate, but these skills have not been channeled to produce innovation or increase added value in the economy. In addition, the mismatch between the skills possessed by the community and the needs of the world of work means that a high literacy rate is not automatically followed by an increase in economic growth. This condition can also occur when the labor market is unable to absorb educated workers optimally, so that the potential of literate human resources is not fully utilized. As a result, an increase in the literacy rate does not have a significant impact on economic growth, as reflected by a p-value greater than 0.05.

## CONCLUSION

Based on the research objectives, it can be concluded that social and economic infrastructure have varying impacts on economic growth in West Java Province during the 2020–2024 period. Water access and the number of health workers show a significant and positive effect on economic growth, indicating that improvements in these sectors can directly enhance productivity and community welfare. Meanwhile, road length and literacy rate do not have a statistically significant impact on economic growth, although road infrastructure remains important for supporting regional connectivity. Overall, all independent variables together significantly influence economic growth, with the model explaining almost all the variation in GRDP per capita in West Java. These findings emphasize the importance of prioritizing development in the health and water access sectors to promote more inclusive and sustainable economic growth in the province.

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