International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

The Effect Of Infrastructure And Economic Growth On Income Inequality In Regency/City Areas In East Java

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Abstract.

Income inequality is one of the major issues in economic development, reflecting the unequal distribution of development outcomes across regions. This study aims to analyze the effect of road infrastructure, health infrastructure, education infrastructure, and economic growth on income inequality in East Java Province. This study employs a quantitative approach using panel data consisting of 38 regencies/cities in East Java Province during the period of 2015–2024. The analytical method used is panel data regression with the Fixed Effect Model (FEM) approach. The results indicate that road infrastructure, health infrastructure, and economic growth have a negative and significant effect on income inequality. Meanwhile, education infrastructure has a negative but insignificant effect on income inequality. These findings suggest that infrastructure development should be directed toward improving equal access and the quality of public services so that development benefits can be distributed more broadly among communities. This study provides implications for local governments in formulating development policies that support economic equality across regions.

Keywords: Infrastructure, Income Inequality, Gini Ratio, Panel Data, East Java.

INTRODUCTION

Economic development is a multidimensional process that is not only characterized by an increase in per capita income but also involves changes in economic structure, improvements in quality of life, and equitable distribution of income. These efforts are directed toward improving community welfare through sustainable economic

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growth, structural transformation, and equitable distribution of development outcomes (Todaro & Smith, 2020). The success of economic development is therefore not solely reflected in high economic growth but also in the ability of a country to reduce income inequality. Sustainable economic growth needs to be accompanied by an equitable distribution of development outcomes so that the benefits of development can be experienced by communities across regions (Irmawanti & Mohd, 2026). Thus, income inequality remains an important indicator in evaluating the success of economic development.

Economic growth does not always result in an equitable distribution of development outcomes. When the benefits of development are concentrated in certain groups or regions, income inequality may emerge. Income inequality refers to differences in income distribution among groups within society, resulting in some groups receiving relatively high incomes while others receive relatively low incomes (Fathoni, 2023). Such differences in income distribution represent a challenge to economic development because they indicate that the benefits of development have not been distributed evenly across society (Refiana & Keumala, 2023). As the gap in income distribution becomes larger, the level of income inequality experienced by a region also increases.

As an archipelagic country consisting of thousands of islands with diverse geographical conditions, resource potential, and levels of development, Indonesia faces significant differences in economic capacity across regions (Sugiastuti & Pratama, 2022). Although Indonesia has maintained relatively stable economic growth in recent years, the benefits of development have not been fully distributed across all levels of society. This condition is reflected in persistent income inequality. According to World Bank data through the Poverty and Inequality Platform, the richest 10 percent of the population still controls approximately 28.8 percent of total national income. This condition indicates that income distribution in Indonesia remains concentrated among high-income groups, making equitable development an important challenge in achieving inclusive welfare (Fathoni, 2023).

Income inequality can be measured using the *Gini Ratio*, which ranges from 0 to 1. A value approaching 0 indicates a more equal distribution of income, while a value approaching 1 indicates higher inequality (Wahyuni S., 2022). Data published by the Badan Pusat Statistik (BPS) show that Indonesia's *Gini Ratio* fluctuated during the period from March 2015 to September 2024. Although it declined in several periods, the combined *Gini Ratio* for urban and rural areas generally remained within the moderate

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inequality range, at approximately 0.38–0.39. In addition, the *Gini Ratio* in urban areas was consistently higher than in rural areas, indicating that income inequality remains more prominent in urban regions. This condition suggests that equitable distribution of development outcomes remains a challenge for Indonesia.

One province with a significant contribution to the national economy is East Java. As a province with a large population and high economic activity, East Java has diverse development characteristics across its regencies and cities. Based on BPS data, income inequality in East Java fluctuated during the observation period. The combined *Gini Ratio* for urban and rural areas was 0.442 in March 2015 and declined to 0.373 in September 2020, indicating an improvement in income distribution during this period. However, based on regional classification, the *Gini Ratio* in urban areas remained consistently higher than in rural areas throughout 2015–2024. This indicates that income distribution in East Java has not been fully equal and that development policies promoting equitable welfare across regions are still needed. East Java consists of 29 regencies and 9 cities with diverse characteristics in infrastructure development, human resource quality, and economic activity. These differences are expected to influence income distribution across regions. In line with this condition, the RPJPD of East Java Province for 2025–2045 identifies the reduction of interregional disparities and equitable development as strategic regional development issues.

Infrastructure is an important factor in promoting economic development and equitable welfare (Nurdina, 2021). Road infrastructure, in particular, plays a strategic role because it connects regions and expands community access to economic centers, education, healthcare, and public services (Hadi et al., 2021). The development of road infrastructure is expected to improve regional connectivity, facilitate population mobility, and stimulate economic activity, thereby potentially supporting more equitable income distribution. In addition to road infrastructure, health infrastructure also contributes to economic development and community welfare. In this study, health infrastructure is represented by the number of community health centers (*puskesmas*). The availability of adequate health facilities is expected to improve public health, labor productivity, and welfare, thereby potentially reducing income inequality across regions (Nurdina, 2021).

Education infrastructure is another important factor in supporting economic development and income distribution. In this study, education infrastructure is represented by the number of educational institutions, including kindergartens, elementary schools, junior high schools, and senior high schools. Adequate educational facilities can expand access to education, improve the quality of human resources, and

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increase labor productivity and income (Nurdina, 2021). In addition to infrastructure, economic growth is also considered a factor influencing income inequality. Economic growth reflects increased economic activity within a region, as indicated by changes in Gross Regional Domestic Product (GRDP) over time. However, the relationship between economic growth and income inequality remains debated because increased economic activity does not necessarily result in equitable income distribution. Kessy & Romadhoni (2021) found that the relationship between economic growth and income inequality differs across regions, with economic growth in some regional groups being associated with increased income inequality.

Previous empirical studies have also produced diverse findings regarding the relationship between infrastructure development and income inequality. Sukwika (2018) found a positive relationship between infrastructure development and interregional economic inequality in Indonesia, indicating that disparities in infrastructure development remain an important factor affecting regional economic gaps. In contrast, Abdur-Rabb et al. (2024) found that road infrastructure significantly reduced income inequality in Indonesia, while economic growth had no significant effect. Siswantoro (2024) also found that road infrastructure, education, health, and per capita GRDP affected income inequality in West Java, with road infrastructure being the most dominant factor in reducing inequality. These findings indicate that basic infrastructure can play an important role in expanding access to economic activities and public services.

Other studies have reported different results. Arnedia & Deky (2025) found that road infrastructure affected per capita GRDP, while water infrastructure and information technology did not. Road infrastructure and per capita GRDP were also found to affect income inequality in Java. These differences indicate that the effects of infrastructure may vary depending on regional characteristics and the distribution of infrastructure development.

Based on previous studies, inconsistencies remain regarding the effect of infrastructure development on income inequality. Some studies indicate that road infrastructure can reduce income inequality through improved regional connectivity and economic activity, while others suggest that infrastructure development may be positively associated with inequality when its provision is uneven across regions. Furthermore, studies specifically examining the relationship between road, health, and education infrastructure and income inequality in East Java remain limited. Therefore, this study aims to analyze the effect of infrastructure development on income inequality

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in East Java Province. The study is expected to provide empirical evidence regarding the role of infrastructure development in supporting more equitable income distribution and to contribute to the formulation of regional development policies aimed at reducing interregional disparities.

Method

This study employed a quantitative descriptive approach to analyze the effect of infrastructure development on income inequality based on numerical data processed using statistical methods. Quantitative research is based on the positivist philosophy and is used to examine specific populations or samples through statistical analysis to test predetermined hypotheses (Sugiyono, 2017). The descriptive approach was used to describe the development of infrastructure, economic growth, and income inequality in the research area. The study was conducted in East Java Province, covering 38 regencies/cities, consisting of 29 regencies and 9 cities, with an observation period from 2015 to 2024. Secondary data were obtained from publications of the Badan Pusat Statistik (BPS), both BPS East Java Province and BPS regencies/cities.

The population consisted of all 38 regencies/cities in East Java Province. Sampling was conducted using saturated sampling (census), in which all members of the population were included as research samples (Sugiyono, 2023). Thus, the study used 380 observations, consisting of 38 regencies/cities observed over 10 years. The dependent variable was income inequality, proxied by the *Gini Ratio*, measured on an index scale ranging from 0 to 1. The independent variables consisted of road infrastructure, health infrastructure, education infrastructure, and economic growth. Road infrastructure (X1) was measured by the length of roads in each regency/city in kilometers. Health infrastructure (X2) was measured by the number of *puskesmas* and auxiliary *puskesmas* in units. Education infrastructure (X3) was measured by the number of educational institutions, including kindergartens, elementary schools, junior high schools, and senior high schools/vocational schools, in units. Economic growth (X4) was measured by the growth rate of Gross Regional Domestic Product (GRDP) at constant prices in percentage terms.

The data were analyzed using panel data regression with EViews 12. Panel data combine time-series observations from 2015–2024 with cross-sectional observations from 38 regencies/cities in East Java Province. The use of panel data provides more observations and information by incorporating variations across regions and over time, resulting in more efficient estimation than using time-series or cross-sectional data

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separately (Widarjono, 2018; Gujarati & Porter, 2009). The regression model examined the effect of road infrastructure, health infrastructure, education infrastructure, and economic growth on income inequality.

Three panel data estimation approaches were considered, namely the *Common Effect Model* (CEM), *Fixed Effect Model* (FEM), and *Random Effect Model* (REM). CEM assumes that all cross-sectional units have the same characteristics and therefore does not account for individual differences. FEM accommodates differences among research units through individual-specific intercepts and is appropriate when individual characteristics may be correlated with the independent variables. REM treats individual differences as random components of the error term and is appropriate when individual effects are not correlated with the independent variables (Gujarati & Porter, 2009; Widarjono, 2018). The selection of the most appropriate model was determined through the Chow test, Hausman test, and Lagrange Multiplier (LM) test. The Chow test was used to determine the choice between CEM and FEM, the Hausman test to determine the choice between FEM and REM, and the LM test to determine the choice between CEM and REM.

Classical assumption tests were conducted to assess the suitability of the regression model. The tests included the Jarque-Bera normality test, multicollinearity test using the correlation matrix, and Breusch-Pagan-Godfrey heteroscedasticity test. The normality test was used to examine whether the regression residuals were normally distributed, with a probability value greater than 0.05 indicating normally distributed residuals (Ghozali, 2021). Multicollinearity was assessed based on the correlation between independent variables, where a correlation coefficient below 0.80 indicated no indication of multicollinearity (Gujarati & Porter, 2009). The Breusch-Pagan-Godfrey test was used to identify heteroscedasticity, with a probability value greater than 0.05 indicating that the model did not experience heteroscedasticity (Ghozali, 2021).

Hypothesis testing was conducted after the best panel regression model had been selected. The partial effect of each independent variable on income inequality was examined using the t-test, while the simultaneous effect of all independent variables was examined using the F-test. Both tests used a significance level of 5% ($\alpha = 0.05$) (Gujarati & Porter, 2009). In addition, the coefficient of determination (R^2) was used to assess the extent to which road infrastructure, health infrastructure, education infrastructure, and economic growth explained variations in income inequality. A higher R^2 indicates a greater ability of the independent variables to explain variations in the dependent variable.

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RESULTS AND DISCUSSION

This section presents the results of the analysis examining the effects of road infrastructure, health infrastructure, education infrastructure, and economic growth on income inequality, measured by the Gini Ratio, across regencies and cities in East Java Province during 2015–2024. The data were analyzed using panel data regression with EViews 12. The results include data description, estimation of the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), model selection, diagnostic testing, and hypothesis testing.

Data Description

The study employed balanced panel data consisting of 38 regencies/cities in East Java Province observed over a ten-year period from 2015 to 2024, resulting in 380 observations. The dependent variable was the Gini Ratio, while the independent variables consisted of road infrastructure, health infrastructure, education infrastructure, and economic growth. The data were obtained from the Central Statistics Agency (BPS) and processed using panel data regression.

Panel Data Regression Estimation

Panel data regression was estimated using three approaches: the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM).

Table 1. Results of CEM, FEM, and REM Estimation

	Common Effect Model		*Fixed Effect Model*		*Random Effect Model*	
Variabel	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
C	0.464119	0.0000	0.870120	0.0000	0.469618	0.0000
JLN	-0.0000302	0.0000	-0.000191	0.0000	-0.0000321	0.0000
KES	-0.001086	0.0000	-0.004675	0.0000	-0.001161	0.0000
PEND	-0.00000457	0.0318	-0.0000277	0.3805	-0.0000444	0.0895
PE	-0.010944	0.0000	-0.011011	0.0000	-0.010980	0.0000
R-squared	0.581039		0.725657		0.48997	
Adjusted R-squared	0.576570		0.692379		0.484530	
F-statistics	130.0177		21.80575		90.06288	

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Prob (F-statistics)	0.000000	0.000000	0.000000

As presented in Table 1, all three models produced negative coefficients for road infrastructure, health infrastructure, education infrastructure, and economic growth. In the CEM, the coefficients for road, health, education, and economic growth were −0.0000302, −0.001086, −0.00000457, and −0.010944, respectively. The CEM produced an R-squared of 0.581039 and an Adjusted R-squared of 0.576570, with an F-statistic of 130.0177 (p = 0.0000).

The FEM produced coefficients of −0.000191 for road infrastructure, −0.004675 for health infrastructure, −0.0000277 for education infrastructure, and −0.011011 for economic growth. The model had an R-squared of 0.725657 and an Adjusted R-squared of 0.692379, with an F-statistic of 21.80575 (p = 0.0000). Meanwhile, the REM produced coefficients of −0.0000321, −0.001161, −0.0000444, and −0.010980 for road, health, education, and economic growth, respectively, with an R-squared of 0.489970 and an Adjusted R-squared of 0.484530.

These estimates indicate that the three approaches generally produced consistent negative coefficient directions, although differences were observed in coefficient magnitudes and significance levels, particularly for education infrastructure. Therefore, model selection tests were conducted to determine the most appropriate panel regression model.

Panel Regression Model Selection

The appropriate panel regression model was determined using the Chow and Hausman tests.

Chow Test

The Chow test was used to determine whether the CEM or FEM was more appropriate. The test indicated a Cross-section F statistic of 4.815549 with a probability value of 0.0000.

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Table 2. Chow Test Results

Redundant *Fixed Effects* Tests			
Equation: FEM			
Test cross-section *Fixed Effects*			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.815549	(37,338)	0.0000
Cross-section Chi-square	160.892223	37	0.0000

Because the probability value was lower than the 5% significance level (0.0000 < 0.05), the null hypothesis was rejected. Thus, the FEM was preferred to the CEM. The F-statistic of 4.8155 was also greater than the F-table value of 1.4463, supporting the selection of the FEM.

$$F_{\text{hitung}} = \frac{\frac{RSS_{\text{CEM}} - RSS_{\text{FEM}}}{N-1}}{\frac{RSS_{\text{FEM}}}{NT-N-K}}$$

$$F_{\text{hitung}} = \frac{\frac{0.324851 - 0.212718}{38-1}}{\frac{0.212718}{380-38-4}}$$

$$F_{\text{hitung}} = \frac{\frac{0.112133}{37}}{\frac{0.212718}{338}}$$

$$F_{\text{hitung}} = \frac{0.00303062}{0.00062934}$$

$$F_{\text{hitung}} = 4.8155$$

$$F_{\text{tabel}} = F_{(0.05;37;338)} \approx 1.4463$$

$$F_{\text{hitung}} > F_{\text{tabel}}$$

$$4.8155 > 1.4463$$

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Hausman Test

The Hausman test was conducted to determine whether the FEM or REM was more appropriate. The test produced a Chi-square statistic of 107.576520 with a probability value of 0.0000.

Table 3. Hausman Test Results

Correlated Random Effects - Hausman Test			
Equation: REM			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	107.576520	4	0.0000

The probability value was lower than 0.05, indicating that the null hypothesis was rejected. Therefore, the FEM was selected as the more appropriate model compared with the REM. Based on both the Chow and Hausman tests, the FEM was established as the final model for hypothesis testing.

Selected Model: Fixed Effect Model

The FEM was selected as the final panel regression model. The estimation results are presented in Table 4.

Table 4. Fixed Effect Model Estimation Results

Variabel	Coefficient	Std. Error	t-Statistic	Prob.
C	0.870120	0.060182	14.45802	0.0000
Road	-0.000191	0.0000174	-11.00523	0.0000
Health	-0.004675	0.00065	-7.193635	0.0000
Education	-0.0000277	0.0000316	-0.878127	0.3805
Economic Growth	-0.011011	0.000855	-12.88112	0.0000
R-squared	0.725657			
Adjusted R-squared	0.692379			
F-statistics	21.80575			
Prob (F-statistics)	0.000000			

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The FEM estimation produced a coefficient of −0.000191 for road infrastructure, −0.004675 for health infrastructure, −0.0000277 for education infrastructure, and −0.011011 for economic growth. Road infrastructure, health infrastructure, and economic growth were statistically significant at the 5% level, whereas education infrastructure was not statistically significant.

The FEM generated an R-squared of 0.725657 and an Adjusted R-squared of 0.692379, with an F-statistic of 21.80575 and a probability value of 0.000000.

$$GINI_{it} = \beta_0 + \beta_1 JLN_{it} + \beta_2 KES_{it} + \beta_3 PEND_{it} + \beta_4 EKONOMI_{it} + \alpha_i + \varepsilon_{it}$$

$$GINI_{it} = 0{,}870120 - 0{,}000191 JLN_{it} - 0{,}004675 KES_{it} - 0{,}000277 PEND_{it} - 0{,}011011 EKONOMI_{it} + \alpha_i + \varepsilon_{it}$$

Diagnostic Tests

Diagnostic testing was conducted to assess potential problems in the selected regression model, particularly multicollinearity and heteroscedasticity.

Multicollinearity Test

Multicollinearity was assessed using the Variance Inflation Factor (VIF). A VIF value below 10 indicates that the model does not have a multicollinearity problem.

Table 5. Multicollinearity Test Results

Variable	R-squared	Score VIF	Description
Road	0.021886	1.022376	There is no multicollinearity
Health	0.015949	1.016207	There is no multicollinearity
Education	0.233970	1.023958	There is no multicollinearity
Economic Growth	0.028097	1.028909	There is no multicollinearity

As shown in Table 5, all independent variables had VIF values below 10. The VIF values were 1.022376 for road infrastructure, 1.016207 for health infrastructure, 1.023958 for education infrastructure, and 1.028909 for economic growth. Therefore, the regression model did not exhibit multicollinearity. The VIF formula can be omitted because the table and interpretation are sufficient for the journal.

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Heteroscedasticity Test

Heteroscedasticity was examined using the Panel Cross-section Heteroskedasticity LR Test. The test produced a Likelihood Ratio value of 41.70250 with a probability value of 0.3129.

Table 6. Heteroscedasticity Test Results

Panel Cross-section Heteroskedasticity LR Test				
Equation: CEM				
Specification: GINI_RATIO C ROAD HEALTH EDUCATION GRDP				
Null hypothesis: Residuals are homoskedastic				
	Value	df	Probability	
Likelihood ratio	41.70250	38	0.3129	

Because the probability value was greater than 0.05, the null hypothesis of homoskedastic residuals was not rejected. Thus, the model did not exhibit a heteroscedasticity problem.

Hypothesis Testing

Hypothesis testing was conducted using the selected FEM to examine the simultaneous and partial effects of road infrastructure, health infrastructure, education infrastructure, and economic growth on the Gini Ratio.

Simultaneous Test (F-Test)

The F-test was used to determine whether all independent variables jointly affected the Gini Ratio. The FEM produced an F-statistic of 21.80575 with a probability value of 0.000000.

Because the probability value was below 0.05, the null hypothesis was rejected. Therefore, road infrastructure, health infrastructure, education infrastructure, and economic growth simultaneously had a significant effect on income inequality in the regencies/cities of East Java Province during 2015–2024.

Partial Test (t-Test)

The t-test was used to examine the individual effect of each independent variable on the Gini Ratio.

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Table 7. Partial Test (t-Test) Results

Variable	t-Statistic	Prob.
Road	-11.00523	0.0000
Health	-7.193635	0.0000
Education	-0.878127	0.3805
Economic Growth	-12.88112	0.0000

As shown in Table 7, road infrastructure had a t-statistic of −11.00523 with a probability value of 0.0000, indicating a significant negative effect on the Gini Ratio. Health infrastructure also had a significant negative effect, with a t-statistic of −7.193635 and a probability value of 0.0000.

Education infrastructure had a t-statistic of −0.878127 and a probability value of 0.3805. Since the probability value exceeded 0.05, education infrastructure did not have a statistically significant effect on the Gini Ratio. Meanwhile, economic growth had a t-statistic of −12.88112 and a probability value of 0.0000, indicating a significant negative effect on the Gini Ratio.

Effect of Road Infrastructure

Road infrastructure had a probability value of 0.0000, which was below 0.05, indicating a statistically significant effect on the Gini Ratio. The negative coefficient (−0.000191) indicates that an increase in road infrastructure was associated with a decrease in income inequality.

Effect of Health Infrastructure

Health infrastructure had a probability value of 0.0000, indicating a statistically significant effect on the Gini Ratio. Its negative coefficient (−0.004675) indicates that greater health infrastructure was associated with lower income inequality.

Effect of Education Infrastructure

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Education infrastructure had a probability value of 0.3805, which exceeded 0.05. Therefore, education infrastructure did not have a statistically significant effect on the Gini Ratio during the observation period.

Effect of Economic Growth

Economic growth had a probability value of 0.0000, indicating a statistically significant effect on the Gini Ratio. The negative coefficient (−0.011011) indicates that higher economic growth was associated with lower income inequality.

Coefficient of Determination

The coefficient of determination was assessed using the Adjusted R-squared from the selected FEM. The model produced an Adjusted R-squared of 0.692379, indicating that 69.24% of the variation in the Gini Ratio could be explained by road infrastructure, health infrastructure, education infrastructure, economic growth, and the individual fixed effects of the regencies/cities. The remaining 30.76% was explained by other factors outside the model.

DISCUSSION

Effect of Road Infrastructure on the Gini Ratio

The Fixed Effect Model (FEM) results show that road infrastructure has a significant negative effect on the Gini Ratio, with a coefficient of −0.000191 and a probability value of 0.0000 < 0.05. This finding indicates that improvements in road infrastructure are associated with lower income inequality across regencies/cities in East Java Province. Better road connectivity can expand access to economic centers, public services, labor markets, and markets for goods and services while reducing transportation and distribution costs. These conditions provide broader opportunities for communities to participate in economic activities and allow the benefits of development to be distributed more widely.

This finding is consistent with the role of infrastructure as physical capital in supporting productivity and regional economic activity. In the Solow growth theory, capital accumulation contributes to productive capacity and economic growth (Solow, 1956). The result also supports the research of Abdur-Rabb et al. (2024), which found that road infrastructure significantly reduces income inequality in Indonesia, as well as Siswantoro (2024), which identified road infrastructure as an important factor in reducing

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regional income inequality. Thus, the hypothesis that road infrastructure has a negative and significant effect on income inequality is supported.

Effect of Health Infrastructure on the Gini Ratio

Health infrastructure has a significant negative effect on the Gini Ratio, with a coefficient of −0.004675 and a probability value of 0.0000 < 0.05. This result indicates that greater availability of health facilities is associated with lower income inequality. Improved access to health services can enhance quality of life and labor productivity, enabling people to participate more effectively in economic activities. Therefore, health infrastructure contributes not only to social welfare but also to more equitable economic opportunities through improvements in human capital.

This finding is consistent with the perspective of economic development, which emphasizes improvements in human quality and well-being alongside income growth. Health is an important form of human capital investment because healthier individuals generally have greater capacity to participate productively in economic activities. The result supports Siswantoro (2024), which found that health infrastructure is related to income inequality, and Thye et al. (2022), which emphasized the role of human capital development in reducing income inequality. Therefore, the hypothesis that health infrastructure has a negative and significant effect on income inequality is supported.

Effect of Education Infrastructure on the Gini Ratio

Education infrastructure has a negative but statistically insignificant effect on the Gini Ratio, with a coefficient of −0.0000277 and a probability value of 0.3805 > 0.05. This indicates that the availability of educational facilities alone did not significantly affect income inequality across East Java during the study period. Although the negative coefficient suggests a tendency toward lower inequality, the effect was not statistically sufficient to confirm a significant relationship.

This finding may be explained by the fact that an increase in the number of educational facilities does not necessarily reflect improvements in educational quality or equal educational outcomes. The impact of education infrastructure also depends on teacher quality, learning quality, school participation, and the relevance of graduates' skills to labor market demands. Moreover, education as human capital investment generally requires a relatively long period before its effects on productivity and income become apparent. This result is consistent with Thye et al. (2022), which highlighted the importance of human capital quality in reducing income inequality, and Siswantoro

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(2024), which found a relationship between education and regional income inequality. Thus, the hypothesis that education infrastructure has a significant effect on income inequality is not supported.

Effect of Economic Growth on the Gini Ratio

Economic growth has a significant negative effect on the Gini Ratio, with a coefficient of −0.011011 and a probability value of 0.0000 < 0.05. This finding indicates that higher economic growth is associated with lower income inequality in East Java Province during 2015–2024. Economic growth can create employment and business opportunities and increase household income. When economic activity and access to economic resources expand more evenly across regions, the benefits of growth can reach broader segments of society and contribute to reducing income inequality.

The finding is consistent with Todaro and Smith (2020), who explain that economic growth can increase production capacity, income, and welfare when its benefits are broadly distributed. It is also consistent with the Kuznets *Inverted U-Hypothesis*, which suggests that inequality may decline at later stages of economic development as the benefits of growth become more widely distributed. However, the result differs from Kessy and Romadhoni (2021), which found that the relationship between economic growth and inequality varies across regions, and from Ridho and Wijayanti (2022), which found a positive effect of economic growth on income inequality in Indonesia. These differences may reflect variations in regional characteristics, observation periods, economic structures, and the capacity of regions to distribute the benefits of economic growth.

CONCLUSION

Based on the results and discussion of the effects of infrastructure development on income inequality across regencies/cities in East Java Province during 2015–2024 using panel data regression with the Fixed Effect Model (FEM), it can be concluded that road infrastructure, health infrastructure, and economic growth significantly affect income inequality and have negative relationships with the Gini Ratio. These findings indicate that improvements in road connectivity can expand access to economic activities and support income distribution, while improved health infrastructure can enhance human capital and productivity, thereby contributing to lower income inequality. In contrast, education infrastructure does not have a significant effect on income inequality, indicating that increasing the number of educational facilities alone is

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insufficient to directly reduce inequality, as its impact also depends on educational quality, equitable access, and the alignment of education with employment opportunities. Meanwhile, economic growth, measured by the growth rate of GRDP per capita, has a significant negative effect on income inequality, suggesting that increased regional economic activity during the study period was associated with a reduction in income inequality across East Java.

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