

Research Article

Infrastructure Development and Regional Disparities

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ORCIDMairizal S. Siatan: <https://orcid.org/0000-0003-2298-2917>**Abstract.**

This paper delves into the intricate relationship between infrastructure development and regional disparities. Recognizing the pivotal role of infrastructure in catalyzing economic growth, this study investigates how uneven distribution and accessibility to infrastructure can exacerbate existing regional inequalities. Through an exploration of challenges and opportunities, the paper underscores the need for strategic planning and inclusive policies to ensure equitable infrastructure development. The research provides valuable insights for policymakers seeking to bridge the gap between urban and rural areas, fostering a more balanced and sustainable trajectory of development. As nations globally prioritize infrastructure investments, understanding and addressing regional disparities become imperative for fostering inclusive and resilient societies.

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1. Introduction

Infrastructure development is one of the vital aspects of accelerating the national development process. Infrastructure also plays a crucial role as one of the drivers of economic growth. This is considering that the pace of a country's economic growth cannot be separated from the availability of infrastructure such as transportation, telecommunications, sanitation, and energy. High economic growth can have noticeable impacts on development, particularly in the real economic sector. It will also affect the increase in consumption, per capita income, and export values, both in volume and foreign exchange, thereby driving an improvement in the economic structure. This is marked by the growth of the industrial sector and a decrease in the role of the agricultural sector. However, the development orientation that prioritizes high economic growth acceleration can influence disparities in development among regions [1]. The development approach tends to overlook the occurrence of disparities or developmental gaps among regions because it heavily emphasizes macroeconomic growth. As a

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result, investments and resources are absorbed and concentrated in urban areas and growth centers [2]. Regional disparities eventually give rise to issues on a macro scale that significantly hinder the development process intended for a country. The poor distribution and allocation of resource utilization, creating inefficiencies and suboptimal economic systems, on one side, are caused by the imbalance in development among regions.

2. Literature Review

Regional inequality was introduced by Douglas C. North in his analysis of the Neo-Classical Growth Theory. In this theory, a prediction regarding the relationship between the level of national economic development of a country and the disparities in regional development is presented. This hypothesis is later known as the Neo-Classical Hypothesis [3]. According to the Neo-Classical Hypothesis, in the early stages of a country's development, regional disparities tend to increase. This process continues until the disparities reach their peak. Subsequently, if the development process persists, the regional development disparities gradually decrease. Based on this hypothesis, regional development disparities are generally higher in developing countries and conversely lower in developed countries. In other words, the curve of regional development disparities takes the shape of an inverted U. The truth of this Neo-Classical Hypothesis was tested by Williamson (1966) through a study on the development disparities between regions in developed and developing countries using time series and cross-sectional data. The results indicate that the Neo-Classical Hypothesis is empirically proven true. This means that the development process of a country does not directly reduce the level of regional development disparities; on the contrary, the opposite occurs at the initial stage.

Myrdal (1957) also explains the occurrence of disparities between regions. Myrdal develops a theory of backwardness and economic development centered around the idea of regional disparities at both the national and international levels. To elucidate this, he employs the concepts of the spread effect and backwash effect as influences spreading from the growth center to the surrounding regions. The spread effect, interpreted as a favorable impact, involves the flow of investment activities from the growth center to the surrounding areas. On the other hand, the backwash effect, seen as an unfavorable impact, includes the movement of people from the surrounding or peripheral areas, including the flow of capital to the core region, resulting in a reduction of development capital for the peripheral regions, which is necessary to balance the development of the core region [4].

According to Solow in neoclassical economic growth theory, economic growth is caused by three factors: first, an increase in the quantity and quality of labor; second, an increase in capital or investment (through savings and investment); and third, an improvement in technology. Each increase in the quantity of labor, capital, and technology will affect changes in the resulting output level. The capital referred to by Solow includes, among other things, infrastructure or physical investment. The presence of infrastructure promotes increased productivity for production factors, and conversely, neglecting it will decrease productivity. Infrastructure is considered the driving force of economic growth. Insufficient infrastructure is one of the key obstacles to faster economic growth[5].

Infrastructure plays a crucial role in development. In growth theories, infrastructure is specifically categorized as public capital and often referred to as an uncompensated factor of production that directly stimulates increased output. On the other hand, infrastructure is also frequently seen as an augmenting factor that fosters productivity growth. Infrastructure serves as a catalyst contributing to the improvement of individual well-being[6]. The World Bank has released the World Development Report 1994: Infrastructure for Development, which examines innovative approaches to developing infrastructure to meet public needs more efficiently, responsively to user demand, environmentally friendly, and involving both public and private sectors. In support of these proposals, two main conclusions are presented: (1) Due to the unmet development impact of past infrastructure investments, it is crucial to enhance the effectiveness of investments and the efficiency of service provision; and (2) Innovations in delivering infrastructure services, coupled with new technologies, offer solutions to enhance performance.

Infrastructure is directly linked to a country's economic development. The presence of telecommunications, power, well-maintained roads, and access to clean water significantly influences a nation's Gross Domestic Product. Moreover, economic growth affects the demand for infrastructure-provided services. Successful infrastructure investment depends not only on quantity but also on the quality and reliability of services. Furthermore, services must be delivered efficiently to meet the nation's demand effectively [7].

Infrastructure development under the right conditions can have positive impacts on the income and well-being of the poor, improving their average income. Infrastructure helps individuals in poverty and lagging regions access economic activities, providing them with opportunities to increase their productivity. The development of infrastructure in disadvantaged areas can also reduce production and transaction costs, and enhance access to health and education services. In line with this, it can improve the quality of

human capital, opening up more job opportunities and prospects for increased income. Ultimately, the increase in income will reduce disparities [8].

3. Methods

This research employs an explanatory approach with a quantitative method. According to Sugiyono, explanatory research is a study that explains the causal relationship between variables influencing a hypothesis. In this study, several variables are interconnected and serve to explain, predict, and control a phenomenon[9].

The research aims to elucidate the interactive or reciprocal relationship between the variables under investigation and the extent to which they mutually influence each other. The choice of explanatory research is made to test the proposed hypothesis, allowing for an explanation of the influence of independent variables (economic infrastructure, social infrastructure, workforce, and per capita income) on dependent variables (per capita income and the Gini index), both partially and simultaneously, as stated in the hypothesis.

To analyze the collected data, econometric models will be employed. The analytical methods used encompass qualitative and quantitative descriptive analyses. Qualitative descriptive analysis is a straightforward analysis aimed at describing and facilitating interpretation. This is achieved by presenting information in the form of tables, graphs, and diagrams. Quantitative descriptive analysis is used to analyze quantitative information (measurable, testable data that can be transformed into equations, tables, etc.)[10].

The quantitative analysis stage consists of estimating a regression model with panel data. Panel data is a combination of cross-sectional and time-series data. Based on the assumption of the presence or absence of correlation between error components and independent variables, three model approaches are applied in panel data regression: fixed-effect model (FEM), and random-effect model (REM) [11].

4. Results and Discussion

4.1. The Impact Of Infrastructure Development On Economic Growth

Using the assistance of the Eviews 13 computer program, in the first stage regression, an R2 value of 0.99 indicates a strong influence between the independent variables and the dependent variable, namely Economic Growth. The remaining 0.10 percent is explained by other factors not included in the model.

Through an overall test (F-test), which is useful for examining the influence of all independent variables on the dependent variable, a calculated F value of 1.634 is obtained, exceeding the tabled F value of 2.45. This indicates that the Total Road Length, Installed Electricity Capacity, Number of Schools, Number of Hospitals, Workforce, and Investment Amount collectively have a significant impact on the Economic Growth rate in the provinces within the Sumatra region. The determination coefficient of 0.99 and the calculated F value of 1.634 suggest that the use of the independent variables to explain the dependent variable in this study is considered representative and acceptable.

Infrastructure development has significant potential to significantly reduce poverty rates in a given region. Adequate infrastructure, such as well-constructed roads, connected bridges, efficient transportation systems, reliable electricity supply, and sufficient clean water, can provide communities with better access to various economic opportunities, adequate healthcare services, and improved education. These factors are crucial in addressing unequal access and poverty, particularly in previously marginalized areas.

With improved infrastructure, rural communities can not only access markets more efficiently, reduce logistical costs, and increase income through the sale of agricultural products or local goods, but also experience enhanced access to healthcare and education facilities. This improvement, in turn, can positively contribute to increased well-being and the reduction of health risks and educational limitations in the community.

Furthermore, infrastructure development not only directly impacts the local economy but can also create both direct and indirect job opportunities. This provides employment prospects for those who were previously unemployed or engaged in low-paying jobs. Thus, quality infrastructure not only enhances the overall quality of life for the community but also plays a crucial role in reducing poverty levels in a given region. This statement is supported by research conducted by Andy et al. [12], which emphasizes that infrastructure development plays a strategic role in enhancing economic growth through the creation of new jobs, the reduction of poverty rates, and the increase in per capita income.

4.2. The Impact Of Economic Growth On Regional Disparities

In the second stage of regression, an R² value of 0.71 is obtained, indicating a sufficiently strong influence between economic growth and the dependent variable, which is inequality, accounting for 71 percent. The remaining 29 percent is explained by other factors not included in the model.

Through an overall test (F-test), which is useful for examining the influence of all independent variables on the dependent variable, a calculated F value of 9.62 is obtained, exceeding the tabled F value of 4.08. This indicates that the independent variables collectively have a significant impact on the dependent variable in the provinces within the Sumatra region. The determination coefficient of 0.71 and the calculated F value of 9.62 suggest that the use of independent variables to explain the dependent variable in this study is considered representative and acceptable.

Meanwhile, the t-test at a 90 percent confidence level ($\alpha = 0.1$) with degrees of freedom = 43, indicates that economic growth (Y_{fitted}) has a statistically significant and negative impact on the level of inequality. This is evidenced by the t value = $-2.171 > t_{table} = 1.301$.

Economic growth, as a dynamic and multifaceted phenomenon, not only creates broad and complex effects on regional disparities but is also highly influenced by several critical variables, including implemented government policies, the distribution of existing resources, and the layout of the economic structure that prevails in a specific geographical context or country.

Uneven economic growth can lead to a significant increase in income inequality between regions experiencing rapid growth and those growing more slowly. Regions or cities receiving larger investments and having rapidly developing economic sectors may undergo substantial income growth, while conversely, other regions may face sustained economic lag. This disparity encompasses not only income aspects but also can involve access to job opportunities, infrastructure, and public services, creating complex dynamics in the economic development of a region.

One of the main challenges facing Indonesia in its current development journey is tackling widespread inequality, involving not only individual or household dimensions but also extending into regional aspects. Despite data from the Central Statistics Agency (BPS) showing that Indonesia has achieved a relatively high economic growth rate for more than three decades, paradoxically, the level of income inequality remains high.

While there have been many positive changes in the economic realm, poverty continues to haunt the nation. Poverty data from 1970 to 2017 paints a concerning picture, especially when comparing urban and rural areas. In urban areas, the poverty rate reaches 13.9 percent, which, despite showing a decline over time, remains an issue that needs to be addressed. On the other hand, rural areas experience a higher poverty rate, reaching 19.0 percent.

Therefore, pursuing inclusive and equitable economic growth becomes a necessity for Indonesia. Concrete steps to address income inequality need to be taken, with a focus not only on individual aspects but also on equalizing development among regions.

Only through a holistic approach and sustainable policies can Indonesia establish a strong, fair, and sustainable foundation for the development of all its citizens.

5. Conclusion

Infrastructure development and regional disparities in Indonesia underscores the multifaceted challenges and opportunities facing the nation. While strides have been made in enhancing connectivity and fostering economic growth, it is imperative to address the persistent gaps that exist between urban and rural areas. The disparities highlighted in this article, whether in terms of access to infrastructure or the economic benefits derived, emphasize the need for a comprehensive and inclusive approach to development. To bridge these regional divides, concerted efforts must be made to ensure that infrastructure development is not only extensive but also equitable. Strategic investments in rural areas, coupled with targeted policies that promote inclusive growth, will play a pivotal role in narrowing the gap and fostering a more balanced and sustainable development landscape. Moreover, collaboration between government entities, private sectors, and local communities is essential to harness the full potential of infrastructure projects and uplift regions that have been historically marginalized.

As Indonesia charts its course towards a more developed and unified nation, the synergy between infrastructure development and addressing regional disparities should remain at the forefront of policymaking. By fostering an environment where the benefits of progress are shared by all, Indonesia can pave the way for a more resilient, harmonious, and prosperous future for every corner of the archipelago.

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