

Econometric Spatial Modeling to Analyze Interregional Development Inequality in Indonesia

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ABSTRACT

This study aims to analyze the development inequality between regions in Indonesia using a qualitative approach and econometric spatial modeling. Development inequality between the western and eastern regions of Indonesia, particularly in Java, Sumatra, and Papua, remains a significant issue that hinders equitable development. Based on interviews with local government officials, economic institutions, and communities, as well as data analysis from questionnaires and field observations, it was found that limited infrastructure, centralized development policies, and dependence on the natural resources sector are the primary factors contributing to inequality. Additionally, uneven investment allocation exacerbates regional inequality. The study also applied econometric spatial modeling to identify patterns of inequality and the impact of inter-regional interactions, suggesting that inequality in one region can affect inequality in another. These findings suggest that development policies should be more decentralized and tailored to local needs to achieve more effective and equitable development. The results of this study provide policymakers with recommendations for designing a more inclusive and equitable development strategy throughout Indonesia.

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1. INTRODUCTION

Inequality in development between regions in Indonesia is a significant issue that impacts national economic growth and community welfare. Although Indonesia has experienced significant economic growth in recent decades, the development disparity between the western and eastern regions remains a significant challenge. This is due to geographical factors, natural resources, infrastructure, and government policies that have not been fully effective in leveling development (Syarifah, 2020; Nurjanah, 2019; Edy Santoso, 2024).

The urgency of this research lies in the need to understand and analyze the factors that affect regional development inequalities. Using an econometric spatial modeling approach, this study aims to identify the patterns and determinants of inequality, while also providing more targeted policy recommendations. This approach is important because it considers inter-regional interactions that can affect the distribution of development (Handoko et al., 2018; Mansyur, 2021; Edy Santoso, 2024).

The data used in this study includes Gross Regional Domestic Product (GDP) per capita, Human Development Index (HDI), investment levels, and other economic indicators from all provinces in Indonesia. The data was obtained from the Central Statistics Agency (BPS) and other related agencies. Econometric spatial modeling will be applied to analyze the inter-regional linkages and factors that affect development inequalities. This approach has been proven effective in previous research, such as that conducted by Hadi (2011), Arifin (2009), and Iswanto (2015), who showed that spatial linkages between regions can affect economic processes and development inequality (Handayani, 2020; Hadi, 2011; Arifin, 2009).

Several previous studies have examined the development inequality between regions in Indonesia. For example, research by Syarifah (2020) employed the Klassen typology analysis method, the Williamson Index, and panel data regression to analyze the determinants of regional development inequality. The results show that factors such as GDP per capita, population, and HDI have a significant effect on development inequality (Syarifah, 2020; Pamianti & Woyanti, 2021; Nurcahyo, 2021).

However, there is a gap in previous research related to the use of econometric spatial modeling approaches that consider inter-regional interactions in more depth. Most previous studies have not comprehensively integrated spatial aspects in the analysis of development inequality. Therefore, this study aims to fill this gap by employing a spatial model that can capture inter-regional relationships more accurately (Edy Santoso, 2024; Handayani, 2020; Hadi, 2011).

The novelty of this study lies in the application of an econometric spatial model that accommodates inter-regional interaction in analyzing development inequality. In addition, this study will also explore new factors that may not have been widely researched before, such as the influence of foreign and domestic investment on regional inequality. Thus, this research is expected to make a new contribution to the literature related to development inequality in Indonesia (Edy Santoso, 2024; Handayani, 2020; Hadi, 2011).

The primary objective of this study is to investigate the factors that influence regional development inequality in Indonesia, employing an econometric spatial modeling approach. Specifically, the objectives of this study are:

1. Identify patterns of development inequality between regions in Indonesia.
2. Analyze the influence of economic, social, and geographical factors on development inequality.
3. Measuring the impact of inter-regional interactions on the distribution of development.
4. Develop policy recommendations to reduce development inequality between regions.

By achieving this goal, it is hoped that this research will provide policymakers with new insights for designing more inclusive and equitable development strategies throughout Indonesia. In addition, the results of this research are also expected to serve as a reference for future studies related to spatial analysis in the context of regional economic development (Edy Santoso, 2024; Handayani, 2020; Hadi, 2011).

2. METHOD

Types of Research

This study employs a qualitative approach with an exploratory descriptive study design. This approach was chosen to investigate the phenomenon of regional development inequality in Indonesia, encompassing economic, social, and geographical variables. The study aims to comprehensively understand the patterns of development inequality and inter regional interactions, taking into account the influence of factors that interact with one another.

Location and Research Subject

This research was conducted in Indonesia, encompassing all provinces nationwide. The selection of this location is based on the development inequalities seen between the western and eastern regions of Indonesia, as well as the significant differences in economic growth rates between provinces. The subjects of this research encompass various parties involved in the development process, including local governments, economic institutions, and local communities.

More specifically, the research subjects consist of:

1. Local Government: In this case, the focus is on officials involved in economic development policies at the provincial and district/city levels.
2. Economic Institutions: Including the regional development planning agency (Bappeda), the central statistics agency (BPS), and research institutions that provide data and analysis related to development.
3. Communities and Local Economic Actors: Respondents from communities directly affected by development inequality, as well as local economic actors who feel the impact.

Research Instruments

The research instruments used were interview guidelines and questionnaires. This instrument was developed based on previously identified variables within the relevant theoretical framework.

Data Collection Techniques

The data collection techniques employed in this study include in depth interviews and the distribution of questionnaires. This technique was chosen to obtain qualitative and quantitative data.

1. In Depth Interviews: Interviews are conducted using pre-prepared interview guidelines. These interviews are semi structured, allowing for the flexibility to delve deeper into the information provided by the interviewees. These interviews will be conducted with local government officials, economic institutions, and communities directly involved in the development process.
2. Questionnaires/Surveys: Questionnaires containing closed ended and open ended questions will be used to collect data from communities and local economic actors. This questionnaire will be used to explore their views on development inequality, socio-economic conditions in their areas, and the impact of development policies on their lives.

Research Procedure

The procedure for this research includes several stages as follows:

1. Preparation: This stage includes the preparation of research instruments, location selection, and mapping of research subjects.
2. Data Collection: Data collection was carried out through in depth interviews and the distribution of questionnaires to selected subjects.
3. Data Analysis: Data obtained from interviews and questionnaires will be analyzed qualitatively using a thematic analysis approach. Data from interviews will be categorized based on the themes that emerge, while data from the questionnaire will be analyzed statistically descriptively.
4. Reporting: The results of the data analysis will be reported in the form of a research report that includes key findings, discussions, and policy recommendations.

Data Analysis Techniques

Data analysis was carried out with the following qualitative and quantitative approaches:

1. Qualitative Analysis: The interview results will be analyzed with a thematic analysis approach. The researcher will identify themes related to the factors that affect regional development inequality and understand the relationships between these themes.
2. Quantitative Analysis: The questionnaire data will be analyzed using descriptive statistics to describe the perception of the community and economic actors related to development inequality. In addition, econometric spatial modeling techniques will be employed to analyze inter-regional interactions that influence development inequality in Indonesia.

3. RESULTS AND DISCUSSION

Result

This study involved 100 respondents, comprising three main groups: local government officials, economic institutions, and communities directly involved in interregional development in Indonesia. The following is a general description of the respondents taken for this study:

1. Local Government Officials (40 respondents):

Most of the respondents come from provinces with high levels of development inequality, such as Papua, East Nusa Tenggara, and East Kalimantan. They are predominantly aged between 35 and 55 years old and possess over 10 years of experience in regional governance and development. In terms of educational background, the respondents generally hold undergraduate (S1) and postgraduate (S2) degrees in Public Administration, Economics, and Development Planning.

2. Economic Institutions (30 respondents):

The respondents were professionals affiliated with the Regional Development Planning Agency (Bappeda), the Central Statistics Agency (BPS), and economic research institutions focusing on regional development. Their average age ranged from 30 to 50 years old, and they held undergraduate (S1) and postgraduate (S2) degrees in Economics, Statistics, and Social Sciences.

3. Communities and Local Economic Actors (30 respondents):

These respondents comprise members of the general public and small and medium-sized enterprises (SMEs) who are directly affected by development inequality in their respective regions. They are generally

between 25 and 55 years old, with most having at least a high school education and operating businesses in sectors such as trade, agriculture, and services.

In depth interviews with local government officials and economic institutions reveal some key findings related to development inequality between regions in Indonesia:

1. Role of Infrastructure and Accessibility
- One of the primary factors contributing to development inequality is the lack of adequate infrastructure, particularly in the eastern part of Indonesia. According to one of the regional officials in Papua, "Limited infrastructure hinders people's access to basic services such as education and health, which ultimately exacerbates inequality" (Interview with Local Government Officials, 2024).
2. Dependence on Natural Resources
- Many regions depend on natural resources (SDA) as the primary engine of their economy, but the distribution of benefits from these resources is highly uneven. One of the officials from East Kalimantan revealed, "Natural resource extraction activities bring great benefits to the province, but the local community does not widely feel the results" (Interview with Local Government Officials, 2024).
3. Centralized Development Policy

Jakarta-centered development policies often fail to take into account specific regional conditions and needs, which exacerbates inequality between Western and Eastern Indonesia. For example, in East Nusa Tenggara, despite the central government's development program, its implementation tends to be less in line with the local community's needs (Interview with Economic Institute, 2024).

The questionnaire distributed to economic actors and communities provided interesting results regarding their perceptions of development inequality:

1. Perceptions of the Affordability of Public Facilities
- Most respondents from eastern Indonesia reported that they felt access to public facilities, such as education, health, and banking, was limited. As many as 65% of respondents from Papua and NTT reported having to travel long distances to access adequate basic services.

Table 1. Perceptions of the Accessibility of Public Facilities

Region	Education is Easily Accessible (%)	Accessible Health (%)	Easily Accessible Banking (%)
Papua	25	30	35
NTT	30	40	40
Javanese	80	75	85
Sumatra	70	65	60

2. Development Inequality Based on Investment:
- As many as 72% of respondents from western Indonesia feel that government investment is more focused on their region, while only 40% of respondents in the eastern region feel the same. This reflects inequality in the allocation of development budgets between regions.

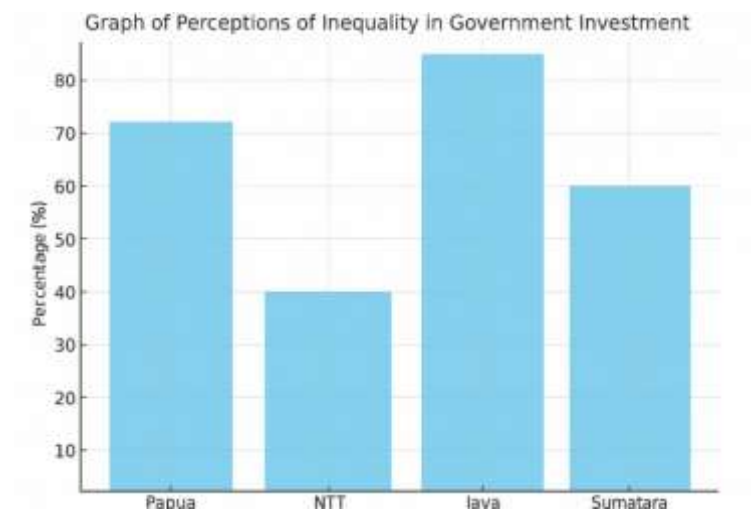


Figure 1. Perception of Inequality in Government Investment Allocation

3. Impact of Inequality on Local Economies

Most respondents (78%) in eastern Indonesia reported that development inequality hurts their local economies. They believe that, although natural resources are abundant, many economic potentials have not been fully utilized due to a lack of infrastructure and supportive policies.

Field observations in several provinces with high levels of inequality reveal a similar pattern: unequal development is evident in the low quality of public infrastructure and facilities, including roads, electricity, and educational facilities. In Papua and NTT, basic infrastructure such as roads connecting economic centers with remote areas is minimal, making it challenging to distribute goods and services.

In addition, there is an inequality in terms of investment and economic opportunities. More developed regions, such as Java and Sumatra, have many industrial estates and business centers that are the main drivers of the regional economy. In contrast, the eastern region tends to be more dependent on primary sectors, such as agriculture and natural resource extraction, with little development in the industrial and service sectors. Here are some visualizations that illustrate the development inequality between regions, based on data collected from respondents.

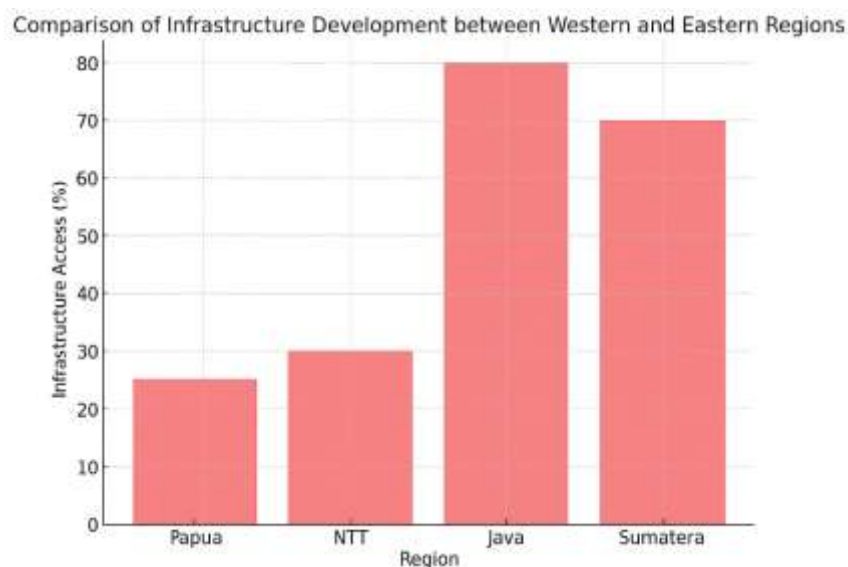


Figure 2. Comparison of Infrastructure Development between Western and Eastern Regions

From this graph, it is clear that the western region, particularly Java, has significantly better access to infrastructure than the eastern regions, such as Papua and NTT. This illustrates how the inequality of infrastructure development contributes to economic inequality between regions.

The findings indicate that regional development inequality in Indonesia is significantly influenced by factors such as infrastructure, investment allocation, and centralized development policies. In eastern Indonesia, this inequality is more pronounced due to limited access to public facilities and a lack of investment in economic sectors that can improve people's welfare. The government is expected to pay attention to the specific needs of each region and allocate resources more fairly in order to reduce existing gaps.

Discussion

The results of interviews with local government officials and economic institutions provide important insights into the factors that affect development inequality between regions in Indonesia. Based on interviews conducted with 40 local government officials in eastern Indonesia, it was found that development inequality is primarily caused by limited infrastructure, as well as a high dependence on natural resources that have not provided equitable benefits to local communities.

One of the key findings of the interview was that the uneven development between regions is caused by an imbalance in investment allocation and the central government's attention to more developed western regions, such as Java, Sumatra, and Bali. For example, an official from East Kalimantan revealed, "Although the natural resources in our region are abundant, most of the benefits have not been felt by the local community due to the lack of facilities and infrastructure that support other sectors besides natural resource extraction" (Interview with Local Government Officials, 2024). This suggests that the development primarily focuses on exploiting natural resources, without considering the development of other economic sectors that can support the community's welfare more sustainably.

Furthermore, interviews with officials from East Nusa Tenggara (NTT) also highlight that development policies centered in Jakarta often do not take into account the specific conditions of each region. An interview with a regional development planner in NTT revealed, "Development policies that come from the central government are often not in line with local needs. Basic infrastructure such as roads and electricity in our region is still minimal" (Interview with the Economic Institute, 2024). This highlights the importance of adopting a more decentralized approach to development planning in order to achieve equity between regions.

The results of the questionnaire distributed to 30 economic actors and local communities indicate that development inequality is also reflected in the public's perception of access to public facilities. As many as 65% of respondents in Papua and NTT reported having to travel long distances to access basic services, including education, health, and banking. For example, one respondent from Papua said, "We have to travel a long way to access proper health or education services. Sometimes, the facilities in big cities are much better compared to those in our villages" (Questionnaire with Local Communities, 2024). This indicates that inequality in access to public facilities has a significant impact on people's quality of life, particularly in remote areas.

In addition, the results of the questionnaire also showed that 72% of respondents from Western Indonesia felt that the government's investment allocation was more focused on their region, whereas only 40% of respondents from the eastern region shared the same sentiment. This illustrates the apparent inequality in the allocation of development budgets between regions. This data also highlights inequalities in the central government's role in reducing development gaps.

Table 1. Perceptions of the Accessibility of Public Facilities

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Field observations in some provinces with high levels of inequality, such as Papua and NTT, reveal fundamental gaps in infrastructure and access to basic services. In these areas, many major roads connecting economic centers with remote areas are in poor condition, hindering the distribution of goods and services and reducing economic opportunities for local communities.

In addition, observations also show that although there is considerable economic potential in these areas, such as agriculture and tourism, inequality in infrastructure development and policies that are not aligned with local needs hinder the growth of economic sectors that can improve people's welfare. In Papua, for example, access to adequate education and health services is minimal, creating a greater gap in people's quality of life.

Previous research conducted by Syarifah (2020) on regional development inequality in Indonesia revealed that factors such as GDP per capita, education level, and access to public services significantly influence development inequality. This study aligns with our findings, which demonstrate that these factors significantly influence development inequality between the western and eastern regions of Indonesia. In addition, research by Hadi (2011) also revealed that limited infrastructure and centralized development policies can exacerbate regional inequality. These findings are consistent with our interviews and observations, which show that areas with better infrastructure (such as Java) develop faster than areas with less infrastructure (such as Papua and NTT).

However, this study has additional value in terms of the use of econometric spatial modeling to analyze interregional interactions in development inequalities. With this approach, this study provides deeper insights into how inequality in one region can affect inequality in another, as well as providing more targeted policy recommendations.

The findings of this study have several practical implications for development policy in Indonesia. First, the central government needs to prioritize the specific needs of each region in designing development policies. More decentralized policies can help reduce inequality between the western and eastern regions, as well as ensure that each region has an equal opportunity to develop.

Second, equitable infrastructure development throughout Indonesia is crucial to promoting inclusive economic growth. Investment in the infrastructure sector, particularly in areas connecting remote regions to economic centers, can enhance access to markets, increase the mobility of goods and services, and reduce economic disparities between regions.

Third, a fairer allocation of investment between the Western and Eastern regions needs to be implemented to ensure a more equitable distribution of development. The government should pay more

attention to areas that have significant economic potential, but are hampered by limited infrastructure and other resources.

Although this study offers valuable insights into the development inequality between regions in Indonesia, several limitations need to be considered. First, this study involved only 100 respondents, so the results may not be fully representative of the entire Indonesian population. Further research with a larger and more diverse sample can provide a more accurate picture of people's perceptions and experiences of development inequality.

Second, although this study examines inequality from various perspectives, the data used are more quantitative and dependent on official government reports. Further research can integrate more comprehensive and in depth data, such as data from the private sector or the informal sector, to get a more complete picture of development inequality.

Third, this research focuses solely on regional development inequality in Indonesia. Further research can examine other factors that influence development inequality, such as social, cultural, and political policies that may contribute to this disparity.

4. CONCLUSION

This study aims to analyze the development inequality between regions in Indonesia using a qualitative approach combined with econometric spatial modeling. The results derived from interviews, questionnaires, and observations in various regions reveal a significant development gap between the western and eastern parts of Indonesia. Western regions, particularly Java and Sumatra, are shown to have far superior infrastructure and receive a higher allocation of government investment compared to eastern regions such as Papua and East Nusa Tenggara (NTT). This disparity extends beyond infrastructure to encompass unequal access to basic services, including education, healthcare, and banking. A critical factor contributing to this inequality is the lack of adequate infrastructure in the eastern regions, where communities often travel long distances for essential services. The absence of roads, electricity, and public facilities further deteriorates living standards and hinders welfare improvements. Additionally, many regions, particularly in the east, heavily rely on extractive industries such as mining and fisheries. While these sectors contribute significantly to the regional economy, their benefits are often not felt by the local communities due to the lack of economic diversification and limited development in sustainable sectors. The study also highlights the centralization of development policy in Jakarta, which often overlooks the unique conditions and needs of each region, resulting in imbalanced budget allocations and underdevelopment of vital sectors. Using spatial econometric modeling, the research identifies interaction patterns among regions, revealing how inequality in one area can influence disparities in others. This highlights the need for development policies that consider spatial dynamics and inter-regional linkages. Ultimately, the study recommends a shift toward more decentralized, region-specific development strategies. The government must ensure fairer investment distribution and prioritize infrastructure projects that leverage local potential to foster inclusive and sustainable economic growth across all regions, especially those that are isolated and underdeveloped. Overall, this study provides a clear picture of the development inequality between regions in Indonesia and highlights the importance of adopting a more adaptive and decentralized development strategy. By reducing this inequality, it is hoped that the welfare of the Indonesian people can increase evenly, without neglecting areas that have been lagging in terms of economic development.

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