

The Effect of Trans Sumatra Toll Road Infrastructure Development on Regional Development in Asahan Regency

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ABSTRACT

This study examines the impact of Trans Sumatra Toll Road (JTTS) infrastructure on regional development in Asahan Regency using a descriptive qualitative approach. The research involves data reduction, presentation, and conclusion drawing. The results show that JTTS enhances accessibility, connectivity, and local economic growth, particularly in trade, industry, and tourism sectors, while attracting investors. Despite its benefits, challenges such as environmental impacts and pollution arise. Collaboration among the government, private sector, and community is crucial to maximize the benefits of JTTS for sustainable and inclusive development in Asahan Regency.

INTRODUCTION

The development of Trans Sumatra Toll Road Infrastructure (JTTS) is one of the strategic projects that aims to improve connectivity and accessibility on the island of Sumatra. Asahan Regency, as one of the areas traversed by this toll road, has significant economic potential, especially in the agricultural and trade sectors. However, before the JTTS, transportation infrastructure in this area was still inadequate, which hindered economic growth and regional development. This condition encourages the need to pay attention to how the development of JTTS can contribute to economic and social development in Asahan Regency. With better toll roads, it is hoped that the distribution of goods and services can be more efficient, which in turn will increase the competitiveness of local products and strengthen the community's economy. The construction of toll roads is expected to accelerate the distribution of goods, improve accessibility, and stimulate investment in the surrounding areas, including in the trade, industry, and tourism sectors. However, there are also challenges that need to be faced, such as land use change, potential social conflicts, and the need for human resources and local economies to optimize the positive impact of the project.

The development of transportation infrastructure is the main factor in accelerating economic and social development in various regions. One of the strategic projects launched by the Indonesian government is the Trans Sumatra Toll Road (JTTS), which is designed to improve connectivity between regions on the island of Sumatra. The main objectives of the JTTS project are to facilitate the mobility of goods and people, reduce logistics costs, and accelerate the distribution of commodities between regions. With the availability of adequate toll road access, areas along the toll road, including Asahan Regency, are expected to experience an increase in economic activities, ease of accessibility, and increased local competitiveness. Asahan Regency passed by JTTS has significant economic potential, especially in the agriculture, plantation, and local industry sectors. However, regional development in Asahan is hampered by the limitations of adequate transportation infrastructure. The existence of JTTS is an opportunity to overcome this problem by accelerating the flow of transportation and facilitating connectivity with economic centres in North Sumatra and other regions. In addition, the existence of toll roads is expected to increase investor interest, create jobs, and strengthen the local economy.

However, the JTTS project also brings several challenges for regional development in Asahan Regency. Among them are land use changes that may have an impact on the environment and local communities, the unpreparedness of local economies to adapt to this transformation, and the risk of economic disparities between areas with toll road access and those without. In addition, there is also a great need for the development of supporting facilities around the toll road, such as rest areas, local transportation networks, and commercial and industrial areas that support the sustainability of the economic impact of this project. With various opportunities and challenges, this study aims to analyse how the development of JTTS infrastructure can contribute to regional development in Asahan Regency. This study will examine the impact of JTTS

on regional development, identify its supporting and inhibiting factors, and formulate appropriate development strategies so that the benefits of toll roads can be optimally felt by the local community and support sustainable growth in Asahan Regency.

Toll road infrastructure is an important part of efforts to improve connectivity between regions and accelerate economic development, especially in areas that have great potential but are not optimal in terms of accessibility. The Trans Sumatra Toll Road (JTTS) project is one of the national strategic projects that is expected to be able to connect various major cities on the island of Sumatra, increase mobility, and accelerate the distribution of goods and services. Asahan Regency, which is crossed by JTTS, has a great opportunity to utilize this infrastructure to improve regional development and encourage local economic growth. However, this infrastructure development also brings a number of challenges and problems that need to be overcome. One of them is the readiness of the region to absorb the positive impacts of the toll road, such as significant land use changes along the toll road, the potential for urbanization, and social impacts that may occur. In addition, without the right development strategy, the potential of JTTS in encouraging development in Asahan Regency may not be maximum. Several problems, such as the lack of direct access from industrial and tourism areas to toll roads, limited supporting facilities, and economic disparities between areas that are accessed and those that are not, are factors that can hinder the optimization of the influence of JTTS on regional development.

The development of the Asahan Regency area through JTTS also requires readiness in terms of human resources, local government, and the private sector. This includes the readiness of communities to adapt to change, local governments in designing policies that support growth, and the private sector to invest in supporting infrastructure. With a mature strategy, the development of JTTS is expected to maximize regional potential, improve community welfare, and make Asahan Regency one of the economic centres in North Sumatra. The phenomenon of infrastructure development of the Trans Sumatra Toll Road (JTTS) has brought a number of significant changes in various regions of Sumatra, including Asahan Regency. This toll road is expected to be a catalyst for improving the economy, mobility, and quality of life of the community. However, there are several problems that arise related to the direct or indirect impact of the development of the JTTS on the development of the Asahan Regency area, which can be described as follows: The development of the JTTS has caused changes in land use, especially around the area crossed by the toll road. Agricultural land and green areas in some areas have been transformed into commercial, residential, and industrial areas to support toll accessibility. These changes have had both economic and ecological impacts, with land value increasing and economic activity increasing, but threats to environmental sustainability and ecosystem balance are of great concern. Not all strategic economic areas in Asahan Regency have direct access to JTTS, which causes the distribution of toll road benefits unevenly. Industrial areas, offices, and local tourist destinations that are not directly connected to toll roads

experience obstacles in obtaining optimal benefits in terms of mobility and accessibility, so that their economic potential has not been developed to the maximum. The presence of JTTS triggered a shift in economic activities from areas that are less accessible to the area around toll gates. This creates a social and economic gap between people who are in areas near toll access and those who do not. This phenomenon has the potential to widen the economic gap in Asahan Regency, where certain groups of people can enjoy faster economic growth than others. Local communities in Asahan Regency, which mostly depend on the agricultural and fisheries sectors, need to adapt to the changes brought by JTTS. This transformation requires readiness in terms of skills and knowledge to switch or adapt in new economic sectors. This unpreparedness can hinder the community from getting the full benefit of regional development due to the existence of toll roads. Although JTTS provides better accessibility, supporting facilities such as rest areas, local transportation networks, and commercial areas along the toll road are still limited. Adequate secondary infrastructure is essential to strengthen connectivity between regions and ensure sustainable economic growth. The absence of this facility limits the optimization of the impact of JTTS on the economy and community welfare. Increased activity around toll gate access leads to congestion and increased emissions, especially in border areas that are less prepared to accommodate the surge in mobility. This raises environmental problems that need to be addressed immediately so that the impact of JTTS does not damage the quality of life of the local community. The phenomena above show that there are challenges that must be managed so that the presence of JTTS really provides long-term benefits for Asahan Regency. Therefore, there is a need for a comprehensive study and strategic steps from the local government and related stakeholders in maximizing the potential of JTTS for inclusive and sustainable regional development.

THEORETICAL REVIEW

Concept of Toll Road Infrastructure Development

Toll road infrastructure is an important component in efforts to accelerate regional development and connect economic centres. According to the Ministry of Public Works and Public Housing (PUPR, 2021), the development of toll road infrastructure, such as the Trans Sumatra Toll Road (JTTS), is designed to reduce economic disparities between regions and increase regional competitiveness. Toll roads that are integrated with the national transportation system are able to reduce logistics costs and accelerate the distribution of commodities between regions (PUPR, 2021). Experts say that the development of toll roads has a multiplier effect on the area it crosses. According to Nasution (2021), the development of toll roads in Sumatra has the potential to optimize the potential of the local economy through increased accessibility, which allows more local and foreign investors to open businesses in the area around the toll road. In addition, Nasution highlighted that toll roads can encourage the development of industrial and residential areas, which increases labour absorption and encourages urbanization.

The Influence of Toll Roads on Regional Development

Regional development through toll road infrastructure involves economic growth, increased accessibility, and land use transformation. According to Rudianto (2021), toll roads are able to expand the market for local products, because better connectivity will shorten travel time and reduce shipping costs. Rudianto emphasized that for areas such as Asahan Regency, JTTS is the main trigger that can drive the agricultural and fishery-based economic sector to reach a wider market. Meanwhile, Setiawan (2021) explained that the construction of toll roads also requires the readiness of local governments and local communities. Setiawan said that the unpreparedness of secondary infrastructure, such as the network of connecting roads from villages to toll roads, can be an obstacle in optimizing regional development. In addition, the role of the community in responding to the opportunities presented by toll roads is an important factor, especially in terms of adapting and taking advantage of new economic opportunities that arise.

Factors Hindering and Supporting the Utilization of Toll Roads

According to Sinaga (2021), the development of toll roads can be hampered by the lack of readiness of local communities, especially those who rely on traditional sectors, such as agriculture and fisheries. Sinaga emphasized that the community needs to be encouraged to adapt to new skills and business potential that develops due to the presence of toll road infrastructure. Another factor that Sinaga identified as an inhibitor is the risk of uncontrolled land use change, which can disrupt local ecosystems and cause environmental problems. On the other hand, Djunaidi (2021) stated that local government support in providing supporting facilities, such as rest areas, commercial areas, and local transportation facilities that connect toll roads with economic centres, is the key to maximizing the benefits of JTTS.

METHODOLOGY

According to Sugiyono (2021), descriptive and qualitative research design can provide an in-depth understanding of the influence of infrastructure on regional development. In this study, a descriptive approach was used to identify the impact of the Trans Sumatra Toll Road (JTTS) infrastructure on regional development in Asahan Regency. With this approach, data can be analysed to describe real conditions related to the effects of JTTS on the economy, land use, and social conditions in the region. This study uses a phenomenological approach, which aims to understand the experiences and perceptions of individuals or community groups towards the development of toll roads. Creswell (2021) states that the phenomenological approach is ideal to explore the meaning of these experiences through the direct views of the participants. Through this approach, the research will reveal the views of local communities, local governments, and business people regarding the benefits, challenges, and socio-economic impacts of JTTS in Asahan Regency.

According to Creswell (2021), qualitative data collection techniques include in-depth interviews, direct observation, and documentation. In this study: In-Depth Interviews – Conducted in a semi-structured manner with local

communities, community leaders, and local government officials (Alfiyyah, et al, 2023; Akbar et al, 2023). This method allows researchers to explore the perceptions, views, and expectations of informants towards the influence of JTTS. Direct Observation - Conducted to observe the condition of infrastructure, land use, and economic activities around toll roads (Aris et al, 2024). This observation aims to see the physical impact of toll roads on the local area and identify potential and challenges that arise (Harmoko et al, 2024; Hidayat, et al, 2023). Documentation Study - Involves reviewing reports, articles, and data from relevant governments and research institutions to obtain additional information regarding the planning and implementation of JTTS.

According to Miles and Huberman (2021 in Nuraini et al, 2023a; Nuraini et al, 2023b; Nuraini & Thamrin, 2017;), qualitative data analysis is carried out through three main stages: data reduction, data presentation, and conclusion drawn. In this study, the steps are: Data Reduction - Involves the process of selecting and simplifying data collected through interviews and observations. Irrelevant data were filtered to focus on information related to the impact of JTTS. Data Presentation - Data is presented in the form of narratives and matrices to facilitate the identification of patterns, relationships, and key findings that emerge from interviews and observations (Moleong, 2000 in Sugiarto et al, 2023; Sugiarto & Ramadhan,2021). Drawing Conclusions and Verification - Initial conclusions are drawn from the results of the analysis, then verified through triangulation of data sources and discussions with experienced parties. This verification aims to ensure that the conclusions drawn are valid and reflect the reality on the ground (Sahara et al, 2023; Nuraini & Nduru, 2024; Sugiarto & Ramadania, 2023a; Sugiarto & Ramadania, 2023b).

RESULTS

The impact of the development of the Trans Sumatra Toll Road on regional development in Asahan Regency

The development of the Trans Sumatra Toll Road (JTTS) in Asahan Regency has a significant impact on various aspects of regional development, which can be divided into economic, social, environmental, and spatial impacts. Here are the details of the impact:

Economic Impact Analysis

The development of the Trans Sumatra Toll Road (JTTS) has a significant impact on economic growth in Asahan Regency, which can be seen through the following aspects: Increased Local and Regional Investment Better access through JTTS increases investor interest in the industrial, trade, and service sectors. Data shows an increase in investment in industrial and residential areas around toll access. Based on interviews with related agencies, it was revealed that the annual investment value in Asahan Regency increased by around 15% after JTTS operated. Labor Absorption: The growth of the industrial and trade sectors around toll access provides new jobs for local communities. A survey of the community showed that about 20% of workers in the new industry in Asahan are locals, which contributes to reducing the unemployment rate in the region. Increased Local Income and Consumption:

Increasing employment opportunities and incomes have made people's purchasing power increase. This has an impact on the increasing number of small businesses such as food stalls, shops, and other services around the area connected to the toll road.

Social Impact Analysis

The social impact of JTTS on the people of Asahan Regency can be seen in the following aspects. Changes in Social Structure and Lifestyle: Easy access to major cities through JTTS affects the lifestyle of the Asahan people, especially the younger generation. With increased mobility, there is a tendency for people to be more connected to big cities, which is changing consumption patterns and social preferences. Interviews with community leaders revealed that the younger generation is increasingly working in the service and industrial sectors in the areas around the toll road, switching from the agricultural sector that has been dominating. Shift in Education and Training Focus: The economic impact of JTTS has also affected public interest in vocational education and industry-related training. Based on data from the local Education Office, there has been an increase in enrollment in job training institutions that teach skills needed in the industrial and trade sectors.

Environmental Impact Analysis and Spatial Planning

The environmental and spatial impacts of JTTS in Asahan Regency include the following aspects. Land Use Change: The development of the JTTS led to land use changes, especially around toll access. Agricultural areas that previously dominated are now partially converted to industrial areas and settlements. Based on data from the National Land Agency, there has been a decrease in the area of agricultural land by up to 10% around the toll road. This requires adjustments in regional spatial planning so as not to sacrifice food security. Environmental Pollution: The construction of toll road infrastructure and industrial activities around it increases the risk of pollution, especially from industrial waste and garbage from commercial facilities. Based on the results of observations in the field, several areas close to the toll area have experienced an increase in the amount of garbage and air pollution. Therefore, stricter environmental management is needed so that this impact can be minimized. Ecosystem Fragmentation: JTTS has the potential to cut off the natural ecosystem flow around Asahan Regency, which can disrupt the habitat of local flora and fauna. To reduce this impact, it is necessary to create ecological corridors or special paths for animals that can connect separate habitats due to the construction of toll roads.

Impact of Supporting Infrastructure and Regional Integration

JTTS also plays an important role in improving infrastructure and regional integration in Asahan Regency. Supporting Infrastructure Development: In addition to toll roads, there is supporting infrastructure that is also developed, such as rest areas, rest facilities, and local transportation facilities that are integrated with toll roads. This makes it easier for people to access and supports economic activities, for example by providing business

space in rest areas for small business actors. Regional Transportation Integration: JTTS facilitates inter-regional access in North Sumatra, allowing for more efficient delivery of goods and mobility of people. Based on interviews with the transportation office, this increase contributed to reducing travel time by up to 30% between Asahan and other North Sumatra regions. This has a positive effect in the goods distribution and public transportation sectors. The development of JTTS has a significant impact on various aspects of regional development in Asahan Regency. Economic impacts include increased investment, employment, and people's incomes. The social impact can be seen from changes in lifestyle, social structure, and educational focus. In addition, there are environmental and spatial impacts that include changes in land use and potential pollution, which require attention and good management. However, there are challenges in the form of land conflicts and economic disparities between regions. Overall, the impact of JTTS on Asahan Regency can be an opportunity for regional development if managed with policies that pay attention to the balance between economic growth, environmental sustainability, and equitable distribution of welfare for all levels of society.

Supporting and inhibiting factors in utilizing JTTS for development in Asahan Regency

Supporting Factors in the Utilization of JTTS

The use of JTTS in Asahan Regency has a number of supporting factors that allow this infrastructure project to be utilized optimally for regional development. Here are the main factors that support the use of JTTS:

- a. **Increased Accessibility and Connectivity:** JTTS improves accessibility and connectivity between regions in North Sumatra. Asahan Regency is now more accessible than major economic centers in Sumatra, which encourages the flow of goods, services, and population mobility. This makes it easier for businesses to reach new markets and accelerate product distribution.
- b. **Government Policy Support:** The central and regional governments fully support the development of toll road infrastructure through policies and regulations that facilitate the implementation of the JTTS project. In addition, the Asahan local government seeks to utilize JTTS for the development of the regional economic sector by encouraging investment policies around toll access.
- c. **Increased Local Economic Potential:** The presence of JTTS opens up great opportunities for the development of local economic sectors, such as trade, tourism, and small and medium industries. Several areas around the toll road, such as rest areas and exit access, are potential locations for local economic development that can absorb labor and increase regional income.
- d. **High Investor Interest:** Improved connectivity makes Asahan Regency an attractive location for investors, especially in the residential, industrial, and commercial sectors. With increasing investor interest,

regional development can be accelerated through the addition of economic facilities, infrastructure, and other public facilities.

- e. **Abundant Natural Resources:** Asahan Regency has the potential for natural resources, especially in the agriculture, plantation, and fisheries sectors. With the existence of JTTS, the distribution of agricultural and plantation products to a wider market becomes easier and more efficient, increasing the competitiveness of local products and encouraging the development of a commercial-based agricultural sector.

Inhibiting Factors in the Utilization of JTTS

On the other hand, there are also a number of inhibiting factors that have the potential to reduce the optimization of the use of JTTS for development in Asahan Regency. These factors are as follows:

- a. **Limitations of Supporting Infrastructure:** Although JTTS has provided good toll access, supporting infrastructure such as connecting roads around toll access, rest area facilities, and public transportation networks are still limited. Without adequate supporting infrastructure, the accessibility and mobility of the community around the toll road is limited, which has an impact on the effectiveness of the use of JTTS for regional development.
- b. **Limited Skilled Human Resources (HR):** The high demand for skilled labor in the new sectors that are developing around JTTS has not been fully met. Many local workers do not have the skills or training that suit the needs of the industry and the commercial sector. This hinders the growth rate of new sectors and reduces the economic benefits that can be enjoyed by the local population.
- c. **Under-Managed Environmental Impacts:** Major infrastructure developments such as JTTS have environmental impacts that need to be managed, such as potential pollution and land-use changes that can disrupt local ecosystems. Suboptimal environmental management can reduce the attractiveness of the area for investors and cause social problems in the future.
- d. **Social Resistance to Change:** Some community groups in Asahan Regency who depend on the traditional agricultural sector for their livelihoods may reject land use change or are not interested in the changes resulting from the development of JTTS. Without education and support to adapt, local communities may find it difficult to accept the social and economic changes that occur as a result of toll road construction.
- e. **Inter-regional Development Inequality:** JTTS tends to increase growth in areas close to toll access, but areas far from toll access may not experience the same benefits. This has the potential to create development inequality in Asahan Regency, where fast-growing areas are around toll roads, while other areas are left behind.

Efforts to Overcome Inhibiting Factors

To maximize the use of JTTS for development in Asahan Regency, the following steps are needed:

- a. **Development of Supporting Infrastructure:** Local governments need to accelerate the development of supporting infrastructure such as connecting roads, rest areas, and public transportation networks around toll roads. This will increase the accessibility and comfort of road users, as well as encourage local economic growth.
- b. **HR Training and Development:** Skills training programs are needed for local communities so that they can compete and take advantage of job opportunities in new sectors. With this training, it is hoped that local communities can adapt to the needs of the new labor market around JTTS.
- c. **Sustainable Environmental Management:** The government and related parties need to carry out stricter environmental supervision and management so that the negative impact of JTTS development on the environment can be minimized. This includes waste management, replanting green areas, and monitoring land conversion.
- d. **Education and Socialization to the Community:** The government and stakeholders need to educate the public about the benefits of JTTS development and provide support to them so that they can adapt to change. With this approach, social resistance to change can be reduced.
- e. **Balanced Development Strategy:** The government needs to develop a balanced development strategy so that areas far from JTTS access also receive attention. For example, by building connecting remote areas to toll roads, or developing local economic centers outside toll access for equitable development.

The right strategy to optimize regional development through JTTS infrastructure in Asahan Regency

To ensure that the development of the Trans Sumatra Toll Road (JTTS) brings an optimal impact to Asahan Regency, it is necessary to develop a comprehensive strategy that involves collaboration between the government, the private sector, and the community. The strategy formulated must include aspects of improving the local economy, connectivity, social development, and environmental conservation.

Local Economic Development Strategy

In order for the economic benefits of JTTS to be widely felt by the community, several local economic development strategies need to be implemented: **Special Economic Zone (SEZ) Development:** Establishing industrial estates or special economic centers around JTTS access can attract investors and create jobs for local communities. This SEZ can be focused on Asahan's leading sectors, such as the plantation industry and agricultural product processing. **Strengthening MSMEs and Creative Economy:** The government can encourage the development of micro, small, and medium enterprises (MSMEs) around toll areas by providing access to capital, training,

and business guidance. This opportunity can help local business actors in marketing their products to toll road users, such as opening culinary or souvenir businesses in rest areas. **Market Facilitation for Local Products:** The government can work with toll operators to provide special spaces for local products in JTTS rest area facilities. Thus, Asahan Regency's superior products, such as plantation products and handicrafts, have wider market access.

Supporting Infrastructure and Connectivity Improvement Strategy

To maximize the use of JTTS, it is necessary to improve connectivity and supporting infrastructure: **Construction of Connecting Roads:** Opening access to connecting roads from villages far to toll roads will increase the accessibility of all areas in Asahan. This will encourage equitable development and allow previously hard-to-reach areas to develop. **Public Transportation Integration:** Integrating JTTS with public transportation, such as intercity buses or local transportation services, will facilitate community mobility and expand the scope of JTTS use for local residents. It will also reduce reliance on private vehicles and help reduce congestion on major roads. **Construction of Public Facilities Around Toll Access:** The provision of public facilities, such as terminals, logistics centers, and commercial areas around toll gates, will facilitate access to services for the public and business people and increase economic growth in the area.

Human Resource Development and Socialization Strategy

To ensure that local communities can participate and benefit from JTTS, human resource development and program socialization are essential: **Job Skills Training and Development:** Skills training programs are needed for local communities to work in new sectors that are growing due to JTTS, such as the service industry, logistics, and manufacturing. The government can partner with job training institutions or private companies to provide relevant training programs. **Socialization on the Benefits of Toll Road Infrastructure:** Socialization to the community regarding the benefits of JTTS for regional development needs to be carried out to reduce resistance and increase their participation. The government and related institutions can provide information about economic opportunities that can be taken by the community, such as business opportunities in rest areas or commercial areas around toll roads. **Community Empowerment Program:** Collaborating with the community in regional development, for example through local economic empowerment programs and partnerships with business actors in rest areas, will encourage sustainable development while improving the welfare of local communities.

Environmental Management Strategy

The development of JTTS infrastructure must consider the impact on the environment so that sustainable development can be achieved: **Application of Sustainable Development Principles:** The government can integrate sustainable development principles in JTTS policies and management, such as

the use of environmentally friendly technology, emission reduction, and waste management in industrial estates that develop around toll roads. Establishment of Green Corridors and Reforestation: Creating green corridors along toll roads or carrying out reforestation in affected areas can help maintain environmental balance and preserve local ecosystems. This program can involve local communities in reforestation activities to increase their participation in environmental management. Periodic Environmental Monitoring: Local governments together with the private sector need to conduct periodic environmental monitoring to monitor the impact of JTTS development on local ecosystems. This can include monitoring air quality, noise, and water pollution around toll road areas.

CONCLUSIONS AND RECOMMENDATIONS

The development of Trans Sumatra Toll Road (JTTS) infrastructure has the potential to have a significant impact on regional development in Asahan Regency. Based on the results of the analysis from the previous chapters, the following are the main conclusions regarding the influence of JTTS on regional development in Asahan Regency:

1. **Improving Accessibility and Regional Connectivity** The presence of JTTS has increased the accessibility and connectivity of Asahan Regency with other regions, especially major economic centers in North Sumatra. With easier access, population mobility, distribution of goods, and investment flows become more efficient, which in turn encourages the development of economic and infrastructure sectors around toll access.
2. **Local Economic Growth** JTTS infrastructure supports the growth of local economic sectors, especially through increasing trade, industry, and tourism potential. The existence of rest areas and commercial areas around the toll road provides opportunities for local business actors to sell their products, which contributes to increasing regional income and creating new jobs for the local community.
3. **Increased Investment Interest** Good connectivity makes Asahan Regency more attractive to investors. This can be seen from the increasing interest in establishing businesses in the housing, logistics, and processing industries in the area around the toll road. The impact is an increase in economic activities and the development of other supporting infrastructure in the area.
4. **Equitable Development** Although JTTS has a positive impact around toll access, the equitable distribution of these infrastructure benefits needs to be increased to areas farther from toll access. Development inequality can be prevented by building connecting infrastructure and developing new economic centres in non-toll areas.

FURTHER STUDY

Further research can examine the effectiveness of supporting infrastructure, such as connecting roads and new economic zones, in reducing development inequality. Additionally, it is important to research the long-term impact of the JTTS on the trade, industry, and tourism sectors, as well as

emerging new investment patterns. The study of community participation in taking advantage of economic opportunities from commercial areas and rest areas can support local empowerment programs. Environmental impact research and mitigation efforts are also needed to ensure sustainable development.

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