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SOCIAL SCIENCE AND POLITICAL SCIENCE
DHARMAWANGSA UNIVERSITY

SPATIAL AND INFRASTRUCTURE PLANNING: INTEGRATION OF TRANS SUMATRA TOLL ROAD IN ASAHAN REGENCY AREA DEVELOPMENT

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Abstract

This research aims to examine Spatial and Infrastructure Planning: Integration of the Trans Sumatra Toll Road in the Development of Asahan Regency. The qualitative approach in this study, which uses data triangulation, in-depth interviews, observations, and thematic analysis, provides a comprehensive guide to assess the impact of toll road infrastructure on regional development. This method allows for a deep understanding of various viewpoints, from governments to local communities, and provides useful information in the planning and development of sustainable and inclusive infrastructure. Research Results With effective integration, the Trans Sumatra Toll Road has the potential to improve the welfare of the people of Asahan Regency through economic growth, job availability, and easier access to various public services. Increasing community income and absorbing local labor are the expected results of the development of this infrastructure-based area. The presence of toll roads provides a basis for the development of other supporting infrastructure, such as educational, health facilities, and commercial areas around the toll road, which will enrich the quality of life of the community and increase the attractiveness of the Asahan Regency area as an economic center in North Sumatra. To optimize the benefits of the integration of the Trans Sumatra Toll Road for the development of the Asahan Regency area, sustainable planning is needed with a focus on inter-agency collaboration and community participation. With adequate policy support, this toll infrastructure can be a catalyst for inclusive long-term economic growth, as well as improve people's welfare equally.

Keywords: Spatial Planning, Infrastructure, Integration of Trans Sumatra Toll Road and Regional Development of Asahan Regency.

Introduction

Spatial and infrastructure planning is a crucial aspect in regional development, especially in the context of economic growth and community mobility. One of the important initiatives in transportation infrastructure in Indonesia is the construction

of the Trans Sumatra Toll Road. This toll road is designed to connect various provinces on the island of Sumatra, facilitate the flow of goods and people, and encourage economic growth in the area it crosses. Asahan Regency, as one of the areas affected by this project, has great potential to develop through the integration of toll roads in its spatial planning. With a strategic geographical location and abundant natural resources, Asahan Regency is expected to be able to take advantage of the existence of toll roads to improve the accessibility and connectivity of its area. The development of transportation infrastructure is one of the important pillars in the economic and social development of a region. In Indonesia, one of the ambitious projects that is underway is the construction of the Trans Sumatra Toll Road. The project is designed to connect various provinces on the island of Sumatra, aiming to facilitate the flow of goods and people, as well as encourage economic growth in the region it crosses. This toll road is expected to be an alternative route that is faster and more efficient compared to the current national road.

Asahan Regency, located in North Sumatra Province, is one of the areas that will be significantly affected by the Trans Sumatra Toll Road project. With a strategic geographical location, Asahan has great potential to develop, both economically and socially. The construction of toll roads in this region is expected to increase accessibility to economic centers, accelerate the distribution of goods, and encourage investment in other sectors such as tourism and agriculture. However, despite the many positive potentials offered by the integration of the Trans Sumatra Toll Road, challenges in spatial planning and infrastructure in Asahan Regency remain. Some of the problems that may arise include inconsistency between infrastructure development and existing spatial plans, potential environmental impacts, and the readiness of other supporting infrastructure such as public transportation and public services. In addition, planning that is not integrated can lead to problems such as congestion on toll road entrances and exits, uneven development of areas, and socio-economic impacts on local communities. Therefore, it is important to conduct an in-depth study on the integration of the Trans Sumatra Toll Road into spatial and infrastructure planning in Asahan Regency.

JOURNAL OF PROCEEDINGS
SOCIAL SCIENCE AND POLITICAL SCIENCE
DHARMAWANGSA UNIVERSITY

The integration of the Trans Sumatra Toll Road in the development of the Asahan Regency area has significant potential in supporting economic growth and improving regional connectivity. This infrastructure project is not only expected to facilitate the flow of goods and people, but also open up opportunities for the development of strategic areas in Asahan. Through proper integration, toll roads can be a catalyst for other economic sectors, such as trade, tourism, and agriculture. With better access, Asahan Regency can accelerate the development of the industrial and distribution sectors. The Trans Sumatra Toll Road opens access to a wider market, both in the North Sumatra region and outside the province. For the local community, this creates jobs and increases business opportunities. In addition, the agricultural sector, which is the mainstay of Asahan, will also feel a positive impact, because the distribution of agricultural products to the market can be carried out more efficiently. Although it has great potential, the integration of this toll road also faces several challenges in its implementation, especially related to existing spatial planning. Asahan Regency must ensure that the toll road infrastructure is in line with the regional spatial and regional plan (RTRW) to avoid development inequality between areas that are close to toll access and those that are not. Some potential challenges that need to be overcome include: The government needs to adjust the RTRW to integrate the area around the toll road as a strategic economic zone. Toll road development planning must consider environmental and social impacts to minimize negative impacts on local ecosystems. Supporting infrastructure needs, such as road access to toll roads, public transportation, and public services, must be met so that the benefits of toll roads can be felt by the entire community.

The right strategy is needed so that toll roads can really be optimized in the development of the Asahan Regency area. Some of the steps that can be taken include: Forming an economic zone around toll exits and entrances that can become a center for logistics, trade, or even tourism. Collaboration with the private sector to develop facilities such as rest areas, hotels, or souvenir centers that can also create new job opportunities. Empowering the community to participate in the development of areas around toll roads, for example by training small and medium enterprises

(SMEs) who can take advantage of toll access. The integration of this toll road is expected to have a long-term impact in the form of improving the quality of life of the Asahan community. With integrated regional development and careful planning, Asahan Regency will be better prepared to become an economic center in the North Sumatra region, which will not only increase regional income but also strengthen regional competitiveness at the national level. With proper planning, the integration of the Trans Sumatra Toll Road will be very beneficial for the development of the Asahan Regency area. Support from all parties, both the government, the private sector, and local communities, is needed to ensure that this infrastructure development has a positive and sustainable impact on the welfare of the community.

Spatial planning and infrastructure in Asahan Regency have an important role in supporting economic growth, improving the quality of life of the community, and optimal utilization of resources. Currently, Asahan Regency is faced with the challenge of integrating its regional development with various national and regional infrastructure projects, such as the Trans Sumatra Toll Road, which is expected to improve connectivity and accelerate regional economic growth. The background of spatial and infrastructure planning in Asahan Regency is very relevant considering the potential of this area as one of the strategic areas in North Sumatra Province. Asahan Regency has abundant natural resources, especially in the agricultural and plantation sectors, as well as a favorable geographical position because it is close to the main crossroads that connect various regions in Sumatra. However, to make optimal use of this potential, integrated and sustainable spatial planning and infrastructure development are indispensable. Spatial and infrastructure planning in Asahan Regency needs to be designed with a comprehensive, sustainable, and inclusive approach. Efforts to optimally utilize the potential of the region must be accompanied by equitable distribution of infrastructure, maintaining environmental sustainability, and involving the community in the development process. Only with this approach, Asahan Regency can achieve sustainable economic growth and equitable community welfare.

JOURNAL OF PROCEEDINGS
SOCIAL SCIENCE AND POLITICAL SCIENCE
DHARMAWANGSA UNIVERSITY

Method Approach

According to Moleong (2020), qualitative research methods are effective in exploring in-depth understanding related to infrastructure planning, especially to study the perceptions and experiences of the community, government, and stakeholders related to development. This study uses a qualitative descriptive approach, which allows detailed data analysis through in-depth interviews, field observations, and document reviews (Hartini et al, 2023; Hidayat et al, 2023; Mulya, et al, 2020). Creswell (2020) said that qualitative methods are suitable for research that requires an in-depth understanding of social and cultural contexts. In the case of the integration of toll roads with regional development, this approach helps in exploring the perceptions of the surrounding communities as well as their response to the changes produced by the existence of new infrastructure. It includes how communities adapt and take advantage of the economic opportunities that arise around toll road construction areas (Nuraini, 2020; Nuraini et al, 2023).

Abdullah (2020) highlighted the importance of data triangulation in qualitative methods to increase the validity and reliability of research results. In this study, triangulation was carried out by combining in-depth interviews, observations, and analysis of planning documents related to the Trans Sumatra Toll Road. Through triangulation, researchers can compare data from various sources so as to obtain a comprehensive understanding of the impact of toll road infrastructure on the Asahan region. Denzin (2020) added that triangulation methods, such as the use of interviews with local residents, discussions with government officials, and direct observation at the project site, can provide a holistic perspective. This triangulation allows a comparison between public perception and stakeholder views so as to provide a more accurate picture of toll road planning and implementation (Pane et al, 2022; Purba et al, 2024).

In data analysis, Creswell (2020) recommends a thematic approach to identify the main patterns that emerge from qualitative data. This approach is used in this study to find themes related to the impact of toll roads on the development of the Asahan region, such as the theme of local economy, community welfare, and social

JOURNAL OF PROCEEDINGS
SOCIAL SCIENCE AND POLITICAL SCIENCE
DHARMAWANGSA UNIVERSITY

change. Coding data by theme allows researchers to identify key issues as well as development opportunities resulting from the integration of this infrastructure. Santoso (2020) added that thematic analysis is effective for grouping diverse data into categories that are easier to understand, such as new economic potential, environmental challenges, and perceptions of access and mobility. This analysis is important to outline the community's views on how toll road construction plays a role in encouraging economic development and social change in Asahan Regency.

Results And Discussion

Concept of Infrastructure Integration and Regional Development

According to Santoso (2020), infrastructure integration, such as toll roads, can accelerate regional growth because good transportation infrastructure improves connectivity between regions and shortens travel time for the distribution of goods and services. This has a direct impact on the economic development of the region because faster and more efficient access will increase regional competitiveness and attract investment. Creswell (2020) added that infrastructure integration must be accompanied by careful spatial planning so that regional development does not only focus on the area around the toll road, but also covers more remote areas. This is necessary so that economic benefits can be spread evenly, as well as reduce the potential for inequality between regions.

Spatial Planning Based on Local Economic Development

Abdullah (2020) emphasized that spatial planning oriented to the integration of toll roads with local economic centers can provide direct economic benefits for the local community. The construction of economic activity centers around toll access allows local business actors to take advantage of existing infrastructure, thereby expanding the distribution network of local products, such as agricultural products and handicrafts. Azizah (2020) also stated that by building economic centers around toll road infrastructure, people can get new jobs, which ultimately has an impact on improving welfare. The economic center can also include logistics facilities, markets,

and rest facilities that support the local economy.

Environmental Approaches in Infrastructure Planning

According to Hidayati (2020), the development of toll road infrastructure also needs to consider environmental impacts, especially in terms of land management and natural resources affected by development. Hidayati suggested an environmentally friendly approach in the construction of toll roads, for example by limiting the use of green land and ensuring a good drainage system so that floods or erosion do not occur. Santoso (2020) also mentioned the importance of integrating sustainability principles in infrastructure planning. This can be done by applying environmentally friendly technology in the construction of toll roads and minimizing negative impacts on the ecosystem around the development area.

Social Benefits of Toll Road Infrastructure Integration

Denzin (2020) revealed that the integration of toll road infrastructure can encourage community participation in regional development. According to him, community participation in infrastructure planning and management can increase citizens' awareness and responsibility for development, so that the community will feel that they have the existing infrastructure. Creswell (2020) also added that the social benefits of infrastructure development are not only limited to better transportation access but also opportunities to strengthen relations between regions. With easier access, there is a more intensive cultural and economic exchange, which ultimately creates social cohesion between communities around the toll road.

The current condition of road infrastructure in Asahan Regency

Regarding the condition of the existing road infrastructure in Asahan Regency, the main focus is to evaluate the current state of the road network and identify the obstacles faced in supporting regional development. Some of the important aspects discussed include:

1. **Physical Condition of the Road**

Currently, road infrastructure in Asahan Regency has variations in physical conditions, depending on the location and intensity of maintenance. The main roads connecting the district center with neighboring cities and districts are generally in relatively good condition because they receive regular maintenance. However, many village roads and connecting roads in remote areas are still damaged, such as potholes, uneven road surfaces, and inadequate road structures. The impact of this condition is limited accessibility to remote areas, which hampers the distribution of public goods and services.

2. **Capacity and Road Width**

   Many roads in Asahan Regency have not been able to accommodate the increasing volume of vehicles, especially in areas experiencing rapid economic growth. These streets tend to be narrow and congested frequently, especially around markets or trading areas. This lack of road capacity slows down the movement of goods and people, which in turn can negatively impact local economic activities.

3. **Maintenance and Care**

   Road maintenance in Asahan Regency is not optimal. The allocation of road maintenance funds is limited, so some roads have suffered repeated damage that is not immediately addressed. This condition is exacerbated by extreme weather that accelerates road damage. The lack of ongoing maintenance also leads to faster damage to roads with less robust construction, especially roads that are frequently passed by heavy vehicles.

4. **Quality of Road Infrastructure in Rural Areas**

   In rural and suburban areas, the quality of road infrastructure is still minimal, often only in the form of dirt roads or gravel roads that are difficult to pass during the rainy season. This limits the mobility of rural communities, especially for farmers and small businesses that need access to the distribution of local agricultural produce and products. Poor road conditions in this region resulted in the isolation of some villages from economic centers.

5. **Accessibility and Inter-Regional Connectivity**

   Road infrastructure in Asahan Regency has not fully supported inter-regional

connectivity, especially between the central area and remote areas. These limitations hinder the potential for economic growth in underserved areas and reduce people's access to health, education, and other public services. Better equitable distribution of road construction is needed so that each region has the same access and can be connected efficiently.

6. **Obstacles in Improving Road Infrastructure**

   Factors that hinder the improvement of road infrastructure in Asahan Regency include limited budgets, constraints in land acquisition, and geographical challenges in several regions. New road development is often delayed due to the time-consuming land acquisition process, as well as coordination issues between the local government and other related parties.

   Overall, the condition of road infrastructure in Asahan Regency needs to be improved in terms of quality, capacity, and equity. Road improvements that are more focused on rural areas and increasing road capacity in urban areas will help in supporting mobility and improving accessibility between regions. Sustainable road development is expected to encourage regional economic growth and improve the quality of life of the people in Asahan Regency.

The expected impact of the integration of the Trans Sumatra Toll Road on the development of Asahan Regency

Regarding the expected impact of the integration of the Trans Sumatra Toll Road on the development of the Asahan Regency area, there are several important points that highlight the positive effects of this infrastructure on economic growth, increased mobility, and overall regional development. Here are the expected impact points:

1. **Increased Accessibility and Inter-Regional Connectivity**

   The integration of the Trans Sumatra Toll Road is expected to be able to increase the accessibility and connectivity of Asahan Regency with other regions in Sumatra, including big cities such as Medan and Bandar Lampung. With the existence of toll roads, travel time between regions will be reduced, thereby accelerating the mobility of the population and the flow of goods. This good

connectivity will also facilitate the access of the Asahan community to economic, health, educational, and other service centers in big cities, which were previously difficult to reach or take a long time.

2. **Increasing Local Economic Growth**

   The toll road is expected to encourage local economic growth in Asahan Regency. This ease of transportation will accelerate the distribution of agricultural products, industries, and other local products, thereby opening up wider market opportunities. This integration can also attract more investors to invest in Asahan, both in the industrial, tourism, and other sectors that have the potential to grow. This will create more jobs and improve the living standards of the local community.

3. **Development of the Tourism Sector**

   Better access also has the potential to support the tourism sector in Asahan Regency. The toll road will make it easier for local and foreign tourists to visit tourist destinations in Asahan. With the increase in tourist visits, regional income from the tourism sector will also increase. This increase in tourism can have an impact on the development of micro-economies and small businesses that support tourism, such as lodging, restaurants, and handicrafts.

4. **Increasing Regional Competitiveness**

   With the existence of toll roads, Asahan Regency can become more competitive than other regions in attracting investment and establishing businesses. Good road infrastructure is often one of the factors considered by companies to open new branches or factories. In addition, the competitiveness of local products also increases because distribution costs become lower and products can reach the market faster, allowing for better efficiency.

5. **Acceleration of Urbanization and Development of New Settlement Areas**

   Integrated toll roads allow for new residential areas around toll areas that were previously less affordable. This can help reduce population density in urban centers by providing easily accessible housing alternatives. The development of settlements around toll roads will also encourage the construction of supporting

facilities such as schools, health centers, shopping centers, and other public facilities that support the quality of life of the community.

6. **Reduced Transportation Costs and Improved Logistics Efficiency**

   The integration of toll roads allows for a reduction in transportation costs for the delivery of goods, both for the agricultural, industrial, and trade sectors. These lower distribution costs can improve the company's operational efficiency and reduce the price of products in the market, which benefits consumers and increases purchasing power. Toll road infrastructure also facilitates smooth logistics and distribution, especially for goods that require fast delivery times.

7. **Strengthening Regional Connectivity in the Context of Sustainable Economic Growth**

   The Trans Sumatra Toll Road also plays a role in strengthening regional connectivity in Sumatra. By strengthening economic ties between regions, Asahan Regency can be part of a larger supply chain in Sumatra, which promotes sustainable economic growth. In the long run, this can reduce development inequality between regions in Sumatra, create a better economic balance, and reduce uneven migration to big cities.

   Overall, the integration of the Trans Sumatra Toll Road in Asahan Regency is predicted to have a significant positive impact on regional development. The effects of increased accessibility, local economic growth, and regional competitiveness will lead to community well-being and a better quality of life. To achieve optimal results, the development of other supporting infrastructure is also needed so that the benefits of this toll road integration can be felt optimally by all people of Asahan Regency.

The challenges and obstacles faced in integrating toll roads into spatial planning in Asahan Regency

Some of the challenges and obstacles faced in integrating the Trans Sumatra Toll Road into spatial planning in Asahan Regency. This challenge needs to be managed effectively so that this integration can provide optimal benefits for

regional development. Some of the main challenges and obstacles:

1. **Land Limitations and Land Use Conflicts**

   One of the main obstacles is the limitation of land, especially in areas that are already developed or dense. Toll road integration requires considerable space, and this often clashes with land used for agriculture, settlements, and commercial areas. Land use conflicts also occur between the government and land owners, especially if the land used is productive or community-owned. Land acquisition that does not go smoothly can cause social conflicts and slow down the development process.

2. **Budget Limitations for Supporting Infrastructure Development**

   The budget available to develop supporting infrastructure such as access roads, bridges, parking areas, and public facilities is often limited. While the toll road itself gets priority, the availability of a low budget can hinder the development of the infrastructure needed to maximize the benefits of the toll road. Budget constraints can also affect the quality and sustainability of supporting infrastructure, so toll integration is not fully optimal.

3. **Lack of Coordination Between Agencies**

   The planning and implementation of toll road integration involves many parties, ranging from local governments, central governments, to private investors. Lack of coordination between agencies can lead to overlap or delays in planning. In addition, the difference in priorities between local and central governments can also hinder the harmonization of planning that should support local needs.

4. **Potential Environmental Impact**

   The construction of toll roads in Asahan Regency can cause environmental impacts, such as changes in water systems, land degradation, and deterioration in air quality during the construction process. This impact needs to be anticipated with more sustainable spatial planning. Additionally, some areas may be habitats for certain species or areas with biodiversity that need to be protected, which could be threatened by major infrastructure development.

5. **Social Resistance from Local Communities**

   Toll road integration also faces resistance from the community, especially if toll road construction is felt to provide less direct benefits or actually interfere with daily life. For example, the land acquisition process often does not go smoothly due to rejection from landowners who are worried about the value of compensation or other negative impacts. Community involvement in the planning stage is also often minimal, so that people feel less involved in decision-making that has an impact on them.

6. **Limitations of Human Resources and Technology in Integrated Planning**

   Another challenge is the limitation of human resources and qualified technology to carry out integrated planning. The integration of toll roads in spatial planning requires experts with high competence in the field of regional planning and infrastructure. Limitations in technology and supporting data, such as up-to-date land maps or social impact analysis, can also be an obstacle to accurate and efficient planning.

7. **Economic Challenges and Resilience to Crises**

   Fluctuating economic conditions can affect the sustainability of toll road projects. In the event of an economic crisis, for example, investors may postpone or even cancel investment plans related to toll roads. On the other hand, the increase in the price of building materials and labor costs can also increase the burden on the budget, thus affecting the quality and continuity of the infrastructure development project.

8. **Adaptation to Spatial Change and Long-Term Development**

   Toll road integration requires spatial adjustments that are in line with long-term needs, such as urban expansion, industrial growth, and changes in settlement patterns. This change in spatial planning can affect other regional development plans, and it takes time to adjust. In addition, large-scale infrastructure development like this must consider sustainable long-term planning in order to accommodate future regional development.

   The integration of the Trans Sumatra Toll Road in Asahan Regency offers

various opportunities for regional development, but faces complex challenges and obstacles. This challenge requires a comprehensive planning approach and synergy between agencies, as well as support from the community in order to be realized effectively. Obstacles such as budget limitations, community resistance, and environmental impacts need to be managed with an adaptive strategy so that the integration of this toll road is able to provide optimal benefits for regional development and the welfare of the people of Asahan Regency.

Conclusion

The conclusion of the spatial and infrastructure planning study related to the integration of the Trans Sumatra Toll Road in the development of the Asahan Regency area shows that the existence of this toll road has significant potential in improving connectivity, spurring economic growth, and accelerating urbanization in the area. With the analysis that has been carried out, there are several main points that can be concluded:

The Trans Sumatra Toll Road increases the accessibility of Asahan Regency to regional and national economic centers, thereby strengthening regional competitiveness and accelerating access to transportation of goods and people. This increased accessibility supports the development of the trade, agriculture, and tourism sectors in Asahan Regency, providing opportunities for local businesses to connect to a wider market. The integration of toll roads triggers investment growth in the industrial and trade sectors. Good infrastructure attracts investors to establish distribution centers, logistics warehouses, and processing industries that can provide jobs for local communities and increase Regional Original Revenue (PAD). This toll road also accelerates the growth of the surrounding area, especially in areas close to the toll gate, which has the potential to become a new economic center in Asahan Regency.

The integration of toll roads into spatial planning provides opportunities for Asahan Regency to develop new areas in a structured manner. Thus, the government can plan regional zoning according to its function and economic potential, thereby

reducing development inequality between regions in Asahan Regency. Spatial planning that is integrated with the toll road also helps direct the development of settlements, industries, and supporting infrastructure in more strategic areas. The study finds that challenges such as land limitations, community resistance to land acquisition, and potential environmental impacts must be managed with an inclusive and sustainable approach. Collaboration between the government, the community, and the private sector is important to solve this obstacle so that toll road construction and regional development can run smoothly. This challenge also shows the need for careful planning in terms of environmental management, especially to maintain the balance of the ecosystem and minimize negative impacts on the surrounding community.

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