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Preferences of Users and Service Providers Towards the Road Transportation Network System that Supports Ports in Tanjungbalai City (Case Study: Teluk Nibung Port)

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ABSTRACT

This study aims to examine the Preferences of Users and Service Providers Towards the Road Transportation Network System(Transportation Network System that Supports Ports in Tanjungbalai City (Case Study: Teluk Nibung Port). By using qualitative methods, this study is expected to provide an in-depth understanding of the preferences of users and service providers towards the Transportation Network System system that supports the Port of Teluk Nibung in Tanjungbalai, as well as explore the factors that affect their perception and needs. This chapter provides a methodological foundation for analyzing the data in the next chapter. The results of this study concluded that to increase the effectiveness of the road transportation network system (Transportation Network System) that supports the Port of Teluk Nibung, improvements in road infrastructure and better traffic management are needed. Through synergy between the government, logistics service providers, and port operators, it is hoped that this transportation system can function optimally, support the smooth operation of port activities, and increase the competitiveness of Teluk Nibung Port as the main port in the region.

Keywords: User Preferences, Service Providers, Road Transportation Network System and Teluk Nibung Port

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1. INTRODUCTION

Teluk Nibung Port is one of the important ports in North Sumatra that serves trade activities, both domestic and international. As the main entrance for goods and passengers, the port needs an effective road transportation system to support the fast and efficient flow of logistics. However, the current condition of Transportation Network System often faces problems, such as congestion, poor road conditions, and limited accessibility. These limitations can affect the smooth distribution of goods and the mobility of port service users. Therefore, it is important to understand the preferences of users and service providers towards the ideal Transportation Network System system to support this port. Teluk Nibung Port in Tanjungbalai City is one of the important ports in North Sumatra, which plays a significant role in supporting trade activities both for domestic and international needs. As a gateway for the distribution of goods and passengers, the smooth operation of this port is highly dependent on the availability and quality of the road transportation network (Transportation Network System) system that connects the port with other areas in the city and its surroundings. However, the Transportation Network System infrastructure around the Port of Teluk Nibung still faces various challenges that hinder the movement of goods and service users.

Some of the problems faced include congestion, inadequate road quality, and limited accessibility to the port area. This condition has an impact on long travel times, higher logistics costs, and low comfort levels for port service users. On the other hand, with the increasing need for fast and efficient port services, the repair and arrangement of Transportation Network System around Teluk Nibung Port has become an urgent need. In addition, the preferences of service users, such as logistics companies, entrepreneurs, and the general public, need to be considered to ensure that the transportation infrastructure provided is able to optimally meet their needs. Not only service users, the views and preferences of transportation service providers, such as truck operators and public transportation managers, are also important so that the solutions taken can provide maximum benefits

and support the smooth operation of the port. In this context, understanding the preferences of users and service providers towards the Transportation Network System system that supports the Port of Teluk Nibung is important to identify effective solutions. This study seeks to examine the existing condition of Transportation Network System, identify user needs and preferences, and formulate recommendations that can increase the effectiveness and efficiency of Transportation Network System in supporting the operation of Teluk Nibung Port.

The Port of Teluk Nibung in Tanjungbalai City serves as one of the main gateways for trade and logistics distribution in North Sumatra, connecting various regions in Indonesia with the international region. As an important port, the operational efficiency and accessibility of Teluk Nibung Port are highly dependent on the existence of an adequate road transportation network (Transportation Network System) system. The Transportation Network System system around this port must be able to accommodate large transportation flows and provide smooth connectivity for goods and passengers entering and exiting the port. However, the Transportation Network System around the Port of Teluk Nibung still faces several obstacles, such as traffic congestion, inadequate road conditions, and limited accessibility. This condition leads to longer distribution travel times and high logistics costs, which negatively impacts port effectiveness. In addition, the limited capacity of the Transportation Network System affects the experience of service users, including logistics companies, entrepreneurs, and the general public who depend on this port. On the other hand, transportation service providers such as truck operators and freight forwarders also have special needs and preferences in the Transportation Network System system that is used to support port activities. The involvement of service providers in the planning and development of Transportation Network System is very important to ensure that the solutions taken are relevant and effective in supporting economic activities at the port.

Ports in Tanjungbalai City, especially Teluk Nibung Port, have an important role as a center for the distribution of goods and passenger transportation that supports the local and regional economy. This port is the main entry and exit route for various commodities, which is expected to encourage trade activities and increase regional competitiveness. However, the operational effectiveness of the port is highly dependent on the quality and availability of the road transportation network (Transportation Network System) system that connects it with other regions. Currently, the Transportation Network System system around the Port of Teluk Nibung faces various challenges. Among them are frequent traffic jams, inadequate road conditions, and limited accessibility to and from the port. This suboptimal condition of road infrastructure leads to longer distribution travel times, increased logistics costs, and difficulties in transporting goods to and from ports efficiently. These limitations also have an impact on the comfort and satisfaction of port service users, both from the business community, logistics service providers, and the general public.

In addition, the growth in the volume of activities at the Port of Teluk Nibung requires an increase in the capacity and quality of Transportation Network System in order to meet the growing needs. Without significant improvements and improvements, the current Transportation Network System system is feared to be unable to accommodate the surge in demand and even hamper port growth. An in-depth understanding of the needs and preferences of users and service providers for the Transportation Network System system that supports the Port of Teluk Nibung. This study aims to identify the current condition of Transportation Network System, evaluate the preferences of stakeholders, and formulate solutions that can improve the effectiveness of Transportation Network System in supporting the port. Thus, this research is expected to be able to contribute to the planning and development of transportation infrastructure that is more efficient and responsive to the operational needs of the port in Tanjungbalai City. Therefore, research on the preferences of users and service providers towards Transportation Network System that supports the Port of Teluk Nibung is very important. A deep understanding of the needs and expectations of users and service providers will help formulate the right recommendations to improve Transportation Network System's performance and effectiveness. This research is expected to contribute to the efforts of the government and related parties in planning Transportation Network System infrastructure improvements that are more responsive to the needs of stakeholders at Teluk Nibung Port.

2. LITERATURE REVIEW

Definition of Road Transportation Network System

According to Suharyanto (2021), Transportation Network System is defined as an infrastructure system that connects various points of economic, social, and distribution activities, thus creating a network that facilitates the mobility of goods and people. Efficient Transportation Network

System around the port is essential because it reduces travel time and transportation costs, which ultimately has a positive impact on economic activity around the port.

Transportation Network System's Role in Supporting Ports

Widodo (2021) explained that ports are strategic infrastructure that requires adequate Transportation Network System support for the smooth distribution of goods. Without the support of efficient Transportation Network System, the port will not be able to function optimally as a distribution center, because the flow of logistics will be hampered inside and outside the port. Road quality, traffic capacity, and Transportation Network System connectivity are some of the key aspects that need to be considered in supporting port operations.

User and Service Provider Preferences for Transportation Network System

According to Rachmawati (2021), the preferences of port service users—both logistics companies and general users—towards Transportation Network System are related to convenience, time efficiency, and cost. Users prefer Transportation Network System with high accessibility and good road conditions, thereby reducing the risk of delays in the delivery of goods and cargo damage. Service providers, such as truck drivers and logistics operators, also want Transportation Network Systems that have easy access and minimal congestion, because this has a direct effect on their operational costs and service efficiency.

The Impact of the Transportation Network System System on Port Performance

According to Basuki (2021), an optimal Transportation Network System system has a direct impact on port performance. Effective and efficient Transportation Network System can increase the volume of goods flow, speed up distribution, and reduce logistics costs. On the other hand, if the Transportation Network System is inadequate, the port will experience a decrease in performance due to longer delivery times and high operational costs. Therefore, it is important for port managers and local governments to improve the Transportation Network System in a sustainable manner.

Recommendations for Transportation Network System Repairs Around the Port

Experts also provided recommendations related to Transportation Network System improvements to support the port. Aditya (2021) recommends improving the quality of roads and expanding main transportation routes around the port to reduce congestion and accelerate the flow of goods. In addition, the implementation of an intelligent transportation system can help manage traffic more efficiently.

METHOD APPROACH

According to Sugiyono (2021), a qualitative approach is suitable for use in social research that aims to understand phenomena from the perspective of actors or research subjects. In this context, a qualitative approach helps explore the perception of users and service providers regarding the condition and effectiveness of Transportation Network System that supports the Port of Teluk Nibung. This technique allows researchers to obtain rich and in-depth data related to specific preferences and needs that may not be revealed through quantitative data.

The data in this study was collected through in-depth interviews and observations. Creswell (2021) stated that in-depth interviews are one of the main methods in qualitative research that allow researchers to explore respondents' perceptions and experiences in detail. Field observation is also used to gain a direct understanding of the physical condition of the Transportation Network System around the port.

Miles and Huberman (2021) explained that qualitative data analysis involves data reduction, data presentation, and drawing conclusions. The data obtained from interviews and observations are processed through the following three stages:

1. Data Reduction: The researcher selects, focuses, and simplifies the data from the results of interviews and observations, so that only relevant information is further analyzed.
2. Data Presentation: Data is compiled in the form of narrative descriptions or tables, making it easy to identify patterns of user and service provider preferences towards Transportation Network System.
3. Conclusion: The conclusion was made by interpreting the patterns and themes that emerged from the results of interviews and observations, providing an overview of the preferences of users and service providers towards Transportation Network System around Teluk Nibung Port.

Sugiyarto (2021) emphasized the importance of data validity in qualitative research, which can be achieved through triangulation. In this study, data triangulation was carried out by comparing information from several sources, namely interviews, observations, and supporting documents, to increase the validity of the results. Source Triangulation: Information obtained from users and service providers is compared to find similarities or differences in preferences towards Transportation Network System. Triangulation Methods: The use of interviews and observations as data collection methods helps validate the results through different approaches.

3. RESULTS AND DISCUSSION

What is the current condition of the road transportation network that supports the activities of Teluk Nibung Port

The condition of the road transportation network (Transportation Network System) that supports the activities of Teluk Nibung Port in Tanjungbalai City. This chapter includes an analysis of the aspects of infrastructure, accessibility, and challenges faced in optimizing Transportation Network System to support the smooth flow of goods and passengers to and from the port.

1. Road Infrastructure Condition
   The road infrastructure to the Port of Teluk Nibung currently faces several obstacles that have the potential to hinder logistics and transportation activities. Several main roads leading to the port were damaged, such as potholes and uneven road structures. This damage reduces comfort and safety for large vehicles, such as logistics trucks, which often have to slow down to avoid further damage. According to the Ministry of Transportation (2021), poor road infrastructure can increase travel time and increase operational costs for transportation service users. In addition, limited road capacity is often unable to accommodate the volume of congested vehicles, especially during peak hours or when the port is in full of activity. This has an impact on the occurrence of congestion that reduces the efficiency of the distribution of goods and hinders the smooth flow of transportation.
2. Road Accessibility
   Accessibility to Teluk Nibung Port is still a concern. The main route to the port often experiences congestion due to the high intensity of transportation vehicles and the mobility of local communities. Based on data from the Transportation Agency (2021), the lack of alternative routes causes all vehicles to focus on one main access. This limited road access makes the distribution process of goods slower and can affect tight delivery schedules. Another problem is the lack of supporting facilities along the route to the port, such as clear traffic signs, adequate parking areas, and road repair facilities. This lack of facilities adds to the risk of accidents and inconvenience for road users, especially for trucks and heavy vehicles.
3. Challenges in Transportation Network Systems
   Some of the main challenges faced by Transportation Network System in supporting the activities of Teluk Nibung Port include:
   a. Traffic Congestion: The high volume of vehicles that is not proportional to the capacity of the road causes congestion, especially at certain times. This reduces the effectiveness of freight transportation and makes travel times longer.
   b. Lack of Maintenance and Maintenance of Road Infrastructure: The large amount of road damage that is not repaired immediately worsens the condition of the road. This is due to limited budget and low priority on road maintenance to the Port.
   c. Environmental and Weather Constraints: Often unpredictable weather conditions, such as flooding in the rainy season, worsen road conditions. Inadequate drainage at some points also causes waterlogging that damages the quality of the road surface.
   d. Lack of Coordination with Related Parties: Another challenge is the lack of coordination between local governments, port authorities, and logistics companies in addressing Transportation Network System issues. According to research by the Ministry of Transportation (2021), good collaboration is needed to ensure that road infrastructure needs are in accordance with port logistics needs.
4. The Impact of Road Conditions on Port Activities
   The suboptimal condition of the Transportation Network System has a direct impact on activities at the Port of Teluk Nibung. Some of the impacts include:

a. Delays in Distribution of Goods: Delays occur due to congestion and poor road conditions, affecting customer satisfaction and resulting in additional costs for logistics companies.
b. Increased Operating Costs: Vehicles that frequently suffer damage due to poor roads have to incur additional maintenance costs, which ultimately affects the profitability of service providers.
c. Decline in Port Service Quality: Slow and difficult access to the port leads to reduced operational efficiency, which in turn affects the competitiveness of the Port of Teluk Nibung at the regional level.

5. Efforts to Improve and Develop Transportation Networks
   To improve the efficiency of the Transportation Network System that supports the Port of Teluk Nibung, several efforts can be made, including:
   a. Road Infrastructure Repairs and Improvements: Local governments need to increase road repair budgets and ensure periodic maintenance of critical road sections.
   b. Development of Alternative Routes: With the existence of alternative routes, traffic can be distributed more evenly and reduce congestion at the main access to the port.
   c. Traffic Management System Development: The installation of traffic signs, road timing, and the addition of parking areas can improve comfort and safety for road users.
   d. Cross-Sector Coordination: Collaboration between port authorities, local governments, and the private sector is essential to realize a more efficient road transportation system and support port activities.

What are the preferences of users and service providers for a more optimal Transportation Network System system

User and service provider preferences related to the road transportation network system (Transportation Network System) that supports the operation of Teluk Nibung Port in Tanjungbalai City. By understanding their needs and expectations, it is possible to identify the characteristics of the Transportation Network System that are ideal to support port activities more efficiently and effectively.

1. User Preferences (Logistics Customers)
   Transportation Network System users, including logistics companies, truck drivers, and delivery agents, have several key preferences for optimal Transportation Network System systems: Users want road conditions that are free from damage, such as potholes or uneven road surfaces. Good road conditions not only support the smooth flow of vehicles, but also reduce the risk of accidents as well as vehicle maintenance costs. Congestion along access to the port is a major problem for users. This preference shows the importance of road widening or the creation of alternative lanes to reduce travel time and improve distribution efficiency. Users expect safe road infrastructure, such as adequate street lighting, clear traffic signs, and security patrols on frequently traveled routes. Comfort in driving will also increase user satisfaction. Users want to get accurate and real-time information about traffic conditions along the route to the port. A traffic information system that can be accessed through an application or digital information board will greatly help drivers in choosing a smoother lane.
2. Service Provider Preferences (Port Operators and Logistics Companies)
   Service providers, such as port operators and logistics companies, also have preferences related to Transportation Network System system optimization, which includes: Service providers expect Transportation Network System to have enough capacity to accommodate large volumes of vehicles, especially during peak hours or peak seasons. Wide and adequate lines are essential to support logistics transportation and accelerate distribution. Service providers strongly support the existence of alternative routes that connect directly to the port. This will reduce traffic congestion on the main lanes and allow for faster and more efficient distribution of goods. Facilities such as large parking areas, workshops, and emergency repair facilities are essential for service providers. This facility allows vehicles to stop and make minor repairs without disrupting the flow of traffic. Service providers want support from local governments to improve existing infrastructure. They hope that there will be a cooperation program between the government and the private sector in repair projects or the development of roads to the port.
3. Preferred Transportation Network System System Based on User and Service Provider Preferences

From the above preferences, it can be concluded that users and service providers crave a Transportation Network System system that has the following characteristics: Smooth and well-maintained road conditions, with sufficient capacity to accommodate the volume of heavy vehicles, are a priority. The Transportation Network System system that allows the distribution of goods quickly, without being hindered by congestion, is the main preference. Alternative roads or special routes for freight transportation can be a solution. Increased security with street lighting and patrols will make users feel more comfortable. A technology-based traffic management system that provides real-time traffic information along the lane will help drivers avoid congested lanes and choose the best route.

4. Improvement Recommendations Based on User and Service Provider Preferences
   To realize a Transportation Network System system that is in accordance with these preferences, several recommendations that can be made include: Road repairs, lane widening, and improving asphalt quality on critical sections to the port will greatly support the smooth flow of transportation. The construction of alternative routes to ports and special lanes for logistics vehicles will reduce congestion and accelerate distribution travel times. The local government can work with service providers to build a traffic information system that provides information on road conditions and congestion to service users. Government partnerships with port operators and logistics companies can be the basis for joint planning in the management and improvement of Transportation Network System.

What are the main factors affecting the effectiveness of Transportation Network System around the port

Factors that affect the effectiveness of the Road Transportation Network (Transportation Network System) that supports the Port of Teluk Nibung in Tanjungbalai City. The effectiveness of Transportation Network System around the port is crucial because it affects the smooth distribution of logistics, transportation safety, and the efficiency of the time required to transport goods to and from the Port.

1. Road Infrastructure Condition
   The condition of road infrastructure is one of the most significant factors that affect the effectiveness of Transportation Network System. Damaged, potholes, or narrow roads will hinder the flow of vehicles, increase the risk of accidents, and slow down the distribution time of goods. Some aspects of road conditions that affect the effectiveness of Transportation Network System include:
   a. Road Surface Quality**:** A smooth and damage-free road is essential for smooth traffic.
   b. Road Width**:** Narrow roads are not able to accommodate large volumes of vehicles, especially heavy vehicles carrying logistics.
   c. Drainage**:** Good drainage prevents flooding that can damage roads and disrupt traffic flow.
2. Capacity and Traffic Density
   Road capacity and traffic density levels also greatly affect the effectiveness of Transportation Network System around the port. During peak hours or high seasons, the roads around the port are often congested causing delays and additional operational costs. To increase the effectiveness of Transportation Network System, it is necessary:
   a. Traffic Volume Regulation**:** Reduces the volume of non-logistics vehicles on the route to the port during peak hours.
   b. Alternative Routes**:** The provision of alternative routes can reduce the load at the main access of the port.
3. Traffic Security and Safety
   Security and safety are important factors that affect the effectiveness of Transportation Network System, especially for heavy freight transportation. Ports that have roads with adequate security facilities will be more effective in supporting logistics activities. Some of the important elements related to security and safety around Transportation Network System are:
   a. Street Lighting**:** Adequate lighting reduces the risk of accidents, especially at night.
   b. Road Signs and Marking**:** Clear traffic signs and a good road marking system help drivers to understand road conditions and follow the applicable rules.
4. Supporting Facilities Along the Road
   Adequate supporting facilities also affect the effectiveness of Transportation Network System around the port. These facilities include parking areas, rest areas, and emergency repair

workshops. The existence of these supporting facilities will help the smooth distribution of logistics because:

a. Reduce the Risk of Congestion**:** Adequate parking facilities reduce congestion due to vehicles that stop carelessly.
b. Supports Vehicle Maintenance**:** An emergency vehicle repair shop or repair shop allows for quick repairs for vehicles that are disrupted on the road.

5. Traffic Management System
   A technology-based traffic management system can improve the effectiveness of Transportation Network System by providing real-time information regarding road conditions. This allows drivers to choose the best lane to avoid congestion or poor road conditions. Some of the technologies that can be applied are:
   a. Real-Time Traffic Information System**:** A system that can be accessed through an app or digital information board to provide information on road conditions, congestion, and weather.
   b. Peak Hour Access Control**:** Restrict access at certain hours for certain vehicles to reduce traffic load.
6. Support and Collaboration Between Stakeholders
   Collaboration between the government, port operators, and logistics companies is crucial in maintaining the effectiveness of Transportation Network System. Good support and coordination will accelerate road repairs, traffic management, and the addition of supporting facilities. Some forms of collaboration that support the effectiveness of Transportation Network System include:
   a. Cooperation in Infrastructure Development**:** Local governments and the private sector can work together to build or repair roads.
   b. Joint Planning for Traffic Management: Coordination in managing vehicle volumes and port accessibility during peak hours.
7. Economic Factors and Government Policies
   Government policies related to the development of transportation infrastructure and traffic regulations also affect the effectiveness of Transportation Network System around the port. Budget support from the government or policies that support road maintenance will be very helpful in improving the quality of Transportation Network System. Policy-related and economic aspects include:
   a. Budget Allocation for Infrastructure**:** The government needs to allocate a budget for the repair and development of road infrastructure that supports ports.
   b. Regulation on the Distribution of Operating Hours**:** The regulation of the operating time of heavy vehicles can reduce congestion and maintain road quality.

4. CONCLUSION

The results of the research on *the Preferences of Users and Service Providers Towards the Road Transportation Network (Transportation Network System) System that Supports the Port in Tanjungbalai City (Case Study: Teluk Nibung Port),* can be concluded several important things that are a reference to increase the effectiveness of the Transportation Network System that supports the port activities. Here are the conclusions obtained:

Most road users, especially drivers of goods vehicles, want an improvement in road quality that supports smooth transportation to Teluk Nibung Port. They prioritize easy accessibility, safe and comfortable road conditions, and congestion reduction. The existence of supporting facilities such as rest areas is also a factor that is highly appreciated by drivers. Logistics and transportation service providers place more emphasis on improving road infrastructure that can support the smooth flow of goods. They want an increase in road capacity, especially on the main road to the port, as well as an improvement in a more efficient traffic management system, including setting operational hours for heavy vehicles.

The road transportation network to Teluk Nibung Port still faces several obstacles, such as significant road damage, the narrowness of several road sections, and the lack of adequate supporting facilities. This condition affects the smooth flow of goods and causes congestion that occurs quite often around the port. To support more efficient port operations, it is necessary to improve road quality,

increase road capacity, and build other supporting facilities, such as driver rest areas and parking areas for heavy vehicles.

Traffic density is one of the main problems faced by Teluk Nibung Port. Especially during peak hours, freight vehicles heading to the port often cause congestion along the route to the port. Regulating operating hours for goods transport vehicles and providing alternative routes to reduce congestion is urgently needed. In addition, the use of technology to monitor traffic flow and provide real-time information to drivers can also help smooth the journey.

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