

Analysis of Public Transport Network Services on Area Development in Doloksanggul District Humbang Hasundutan Regency

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Abstract

Transportation plays a big role in the development of an area. The movement of people, goods and services from one place to another can be facilitated by good transportation. Transportation has a significant relationship to regional development. Currently, public transportation services in Humbang Hasundutan Regency, especially Doloksanggul is considered still less than optimal due to the fact that the existing public transportation is not on a fixed and regular route, causing uncertainty in waiting for public transportation. The objectives of this study are to: 1) Analyze the effect of the number of fleets, passenger capacity and route routes on the accessibility of the community in the District. Doloksanggul, 2) Analyzing the effect of the number of fleets, passenger capacity and route routes on road connectivity in Doloksanggul District, and 3) Analyzing the effect of community accessibility and road connectivity on regional development in Doloksanggul District. The research was conducted in Doloksanggul District, Humbang Hasundutan Regency. The analytical method used in this research is multiple regression analysis with the number of respondents as many as 100 people. The results showed that the number of fleets, passenger capacity and route routes had a positive and significant effect on community accessibility in Doloksanggul District, the number of fleets, passenger capacity and route routes had a positive and significant effect on road connectivity in Doloksanggul District, community accessibility and Road connectivity has a positive and significant effect on regional development in Doloksanggul District.

Keywords

number of fleets; passenger capacity; route routes; community accessibility; road connectivity; regional development

I. Introduction

Development is a systematic and continuous effort made to realize something that is aspired. Development is a change towards improvement. Changes towards improvement require the mobilization of all human resources and reason to realize what is aspired. In addition, development is also very dependent on the availability of natural resource wealth. The availability of natural resources is one of the keys to economic growth in an area. The relationship between inflation and economic growth is one of the debatable issue and the most important macroeconomic discussions among macro economists, policy-makers and monetary authorities in all countries (Wollie in Shah, M. et al. 2020).

All aspects of development, including the economic sector, urgently need adequate transportation to improve regional accessibility and accelerate the process of regional economic development. In addition to economic goals, there are also non-economic goals, namely to enhance inter-regional integrity, enhance resilience and defense. Therefore, based

on the above objectives, the existence of transportation is one of the relevant factors in the process of regional economic development. Doloksanggul District, which is also the capital of Humbang Hasundutan Regency, has now undergone many changes since it was formed in 2003 through the Law of the Republic of Indonesia Number 9 of 2003 concerning the Establishment of South Nias Regency, Pakpak Bharat Regency and Humbang Hasundutan Regency in North Sumatra Province. The area of Doloksanggul District is about 20,929.53 Ha and a population of 49,582 people spread over 28 villages/kelurahan (BPS, 2018). Population settlements grew and spread along with the establishment of government offices, public facilities, health facilities and other facilities as a result of the formation of Humbang Hasundutan Regency in 2003. The increasing number of residents in Doloksanggul District directly affects the level of community activity in supporting daily activities.

Currently, public transportation services in Humbang Hasundutan Regency, especially Doloksanggul District, are considered still less than optimal due to the fact that the existing public transportation is not on a fixed and regular route, causing uncertainty in waiting for public transportation. Private vehicles are the most dominant means of transportation used by the local community, while people who do not have private vehicles prefer rickshaws as a means of transportation, and some even choose to walk to meet their needs. In addition, students also impose private vehicles as transportation to school even though they do not have a driver's license (SIM), which is a traffic violation. Humbang Hasundutan Regency is faced with transportation problems that can support regional economic improvement. Based on temporary observations in the field, it can be seen that the condition of transportation (facilities and infrastructure) is very small, while the need and intensity of use for the community is very high in meeting the needs of movement for economic continuity in this area. This is the background and interest of researchers in discussing the analysis of public transport route network services for regional development in Doloksanggul District, Humbang Hasundutan Regency.

II. Review of Literature

2.1 Theory of Regional Planning

In the context of transportation, transportation planning is a systematic transportation system planning activity that aims to provide transportation services, both facilities and infrastructure, tailored to the transportation needs of people in an area and other social goals. Transportation planning will study the factors that affect people's needs for the movement of people or goods. These factors can be in the form of land use, economy, socio-culture, transportation technology and other factors that may be related. Recent developments have led to the planning of sustainable transportation systems that combine transportation efficiency, economic growth and resource sustainability. Broadly speaking, transportation can be seen as a system with 3 (three) main components that influence each other. The three components are: land use sub-system, supply transportation sub-system, and traffic.

2.2 Transport

Transportation at this time has become a basic need for community activities. These activities make transportation an important choice with an increasing number of populations using transportation modes, especially public transportation. (Agussani, 2020). The transportation system of an area can be defined as a system consisting of infrastructure/facilities and service systems that allow movement throughout the region, so that population mobility is accommodated, goods movement is possible, and access to all areas is possible. Transportation provides services to the community, which is called

transportation services. Transportation services are the outputs of transportation companies of various types according to the number of types of transportation equipment (such as shipping services, train services, aviation services, bus transportation services and others). On the other hand, transportation services are one of the input factors for production, trade, agriculture and other uses (Nasution 2003).

2.3 Factors for Choosing Mode of Transportation

According to Miro (1997), there are 4 (four) factors that are considered to have a strong influence on the behavior of travelers and each factor is divided into several variables. These factors or variables are: 1. Travel characteristics factor. The variables are; the purpose of the trip, the time of the trip and the length of the trip. 2. Factors characteristic of travellers. The variables are; income, vehicle ownership, vehicle condition, other socio-economic variables. Factors characteristic of the transportation system. The variables are: time variable, travel cost variable, service level variable, variable level of access / ease of reaching the destination, variable level of reliability of public transportation in terms of time, availability of parking space and tariffs.

2.4. Transportation Service

The concept of service, there are two types of service actors, namely service providers and service recipients. Service providers or service providers (Barata, 2003) are parties who can provide certain services to consumers, either in the form of services in the form of providing and delivering goods or services. Service receiver or service receiver is customers or consumers who receive services from service providers.

2.5. Accessibility Concept

Accessibility is one part of the analysis of the interaction of activities with the transportation network system which aims to understand how the system works and use the analytical relationship between system components to predict the traffic impact of different land uses or transportation policies. Accessibility is often associated with distance, travel time and travel costs (Suthanaya, 2009). The level of regional accessibility can be determined based on several variables, namely the availability of the road network, the number of means of transportation, the length, width of the road, and the quality of the road. In addition, what determines the level of access is the pattern of land use arrangements. The diversity of patterns of arrangement of public facilities from one region to another. For example, the diversity of patterns of arrangement of public facilities occurs due to the geographically dispersed locations of public facilities and different types and intensity of activities. This condition makes the distribution of land in an area uneven (heterogeneous) and the distance factor is not the only element that determines the level of accessibility (Miro, 2004).

2.6. Road Connectivity

Connectivity is defined as a road network that provides multiple routes and is connected between residential neighborhoods and destinations, such as schools, workplaces and shopping areas. The main benefit of road connectivity is how to distribute traffic across the road network. A well-connected road network will provide alternative choices for road users to choose the road to be traversed so that it is expected to speed up travel time to their destination. Improved connectivity encourages the choice of modes of transportation for residents as shorter distances can be made by connecting local roads to destinations. Road connectivity can also increase the efficiency and effectiveness of the community, where trips with short travel times can reduce travel costs (Rodrigue, 2009).

2.7. Area Development

Regional development basically means an increase in the value of the benefits of the area for the community, a certain area is able to accommodate more residents, with a level of community welfare that is on average many facilities/infrastructure, goods or services are available and the business activities of the community are increasing, both in terms of type, intensity, service and quality (Sirojuzilam, 2005). Mulyanto (2008) defines regional development as every government action that will be carried out together with the actors with the aim of achieving a goal that is beneficial for the region itself and for the administrative unit in which the region is a part, in this case the Unitary State of the Republic of Indonesia.

2.8. The Role of Transportation in Regional Development

a. The Role of Public Transport in Regional Development

Public transportation plays an important role in economic growth, especially in urban areas. This is due to the fact that economic development requires adequate transportation services. With the construction of transportation facilities, community economic activities can potentially be developed more easily. These economic activities will develop if they are supported by adequate transportation facilities and infrastructure for accessibility. In addition, transportation also has an important role for urban communities in order to provide access to meet the needs of daily goods and services, as well as improve socio-economic life. Access to information, markets and public services and specific locations, as well as new opportunities is an important requirement in the development process. The existence of public transportation as a supporter of community movement will have a positive impact on the increasing growth and development of a city. Increased mobility of people requires adequate, safe, comfortable and affordable transportation facilities and infrastructure for the community. The increase in income/capita makes people able to buy vehicles such as motorbikes and cars as a means of personal transportation. The increase in the regional economy also causes the need for other means of transportation such as buses/public transport and trucks to increase. As a result, the number of traffic flows and the types of vehicles that use road sections are increasing day by day.

b. The Concept of Accessibility in Relation to the Number of Fleet, Passenger Capacity and Routes

Increasing development efforts require adequate transportation facilities to support population mobility and smooth distribution of goods to and from the regions. The means of transportation in Doloksanggul District, Humbang Hasundutan Regency in the form of passenger public transportation with a capacity of 11 passengers (area 3.6 m²) currently reaches 59 microbus public transport units with 11 routes for urban and rural transportation respectively. The transportation capacity serves most of the movement of the population of villages/cities and surrounding areas on fixed routes with an average of 5-8 trips per day with operating hours between 06.00-22.00 every day. The operation of rural/city transportation which is divided into several routes or routes served by several operators each has a character, both related to the length of the route, the level of passenger density and the distribution of public transportation on each route. The pattern of urban public transportation services that follow the pattern of spreading activities and use of urban land in a radial manner causes some of the roads through which these transportation routes will overlap.

c. The Role of Accessibility and Road Network on Regional Development

Regional accessibility is the ability or condition of an area to be accessed by outside parties either directly or indirectly. The accessibility consists of existing infrastructure (road network system) along with the availability of facilities to carry out its movement. The region cannot be separated from the availability of transportation facilities, namely the road network. To measure the accessibility index in an area, this study uses a method by comparing the number of road networks in an area with other areas (Nurhidayani, et al., 2019). Accessibility is a concept that connects geographic land use regulation systems with transportation network systems that connect them. One of the important dimensions of urban accessibility is the relationship formed between housing and workplace locations through the provision of an existing road network. Accessibility consists of infrastructure (systems) road network) that exist along with the availability of facilities to carry out their movement (private transportation and public transportation). One of the variables that can be stated whether the level of accessibility is high or low can be seen from the number of network systems available in the area the lower the level of accessibility obtained, the more difficult it is to reach the area from other areas (Bintarto, 1982).

The road network is one of the factors that affect the smooth running of public services which is very important, the availability of road infrastructure both quality and quantity greatly determines whether or not an area is reached (accessibility level). If the accessibility in an area is high then the development of the region will experience smoothness. So that the better the road network system in an area, the smoother the distribution of goods, services and other information that can spur the development of the region. Facilities and infrastructure in an area in the form of roads, bridges, telecommunications networks, vehicles (land, air, and sea), terminals, ports, and others provide the basis for the smooth planning and implementation of regional development. Transportation facilities and infrastructure will support and support physical development (Sumaatmadja, 1988). In this case, to facilitate services and avoid congestion, it is necessary to develop a road network and internal services by involving the role of local government and the community as well as the business world. Accessibility factors play an important role in regional development efforts because without being supported by a transportation system, adequate transportation facilities and infrastructure, the development of an area will be difficult to develop.

III. Research Method

This type of research according to the level of explanation is quantitative descriptive. The research approach carried out in this study is quantitative/associative/correlational, namely the data analysis uses inferential statistics, with the aim of knowing the degree of relationship and the form of influence between the independent variable and the dependent variable. (Rusiadi, et al, 2014). The research was conducted in Doloksanggul District, Humbang Hasundutan Regency. Information from the Department of Transportation of Humbang Hasundutan Regency obtained that the data on the number of passengers in 2020 was 106,215 people with the number of urban and rural public transportation companies being 8 companies. The research sample was determined to follow the Slovin formula which obtained a total sample of 99.91 people and rounded up to 100 respondents. The data collection techniques used are library research, observation, and questionnaires. To analyze the data using quantitative descriptive multiple regression analysis was carried out on respondents' answers to questions about road quality, transportation smoothness and regional development.

IV. Result and Discussion

a. Effect of Fleet Number, Passenger Capacity and Route on Community Accessibility in Doloksanggul District

The results showed that the number of fleets had a positive and significant effect on community accessibility. These results indicate that the number of public transportation fleets is something that is considered important and meaningful because it can have an influence or impact and cannot be separated from a problem in public accessibility. This means that the more the number of fleets, the public's response to accessibility in Doloksanggul District will increase, and vice versa the fewer the number of public transport fleets, the public's response to accessibility in Doloksanggul District will decrease. People in Doloksanggul District need public transportation to meet the needs of their movement and activities to their destination. The more public transportation fleets that operate, the easier and faster the community will get to their destination without having to wait long to get a public transportation mode of transportation. The number of fleets moving from Doloksanggul Terminal and Public Transport Bases in the period 06.00-12.00 and 12.01-20.00 shows 10 units each. The movement time between public transport fleets is around 20-40 minutes. The waiting time for the public transport fleet to move is about 25-40 minutes.

Empirical evidence of the influence of the number of fleets on community accessibility can be seen when field observations are made where public transport fleets operating during the school entry/home hours period entirely serve route routes that cross schools such as the TR.09 route which crosses SMAN 1 Doloksanggul and SMKN 1 Doloksanggul, the TR.08 route which crosses STM/SMKN 2 Doloksanggul and the TR.02 and TR.03 routes which cross SMAN 2 Doloksanggul, so that the other route routes are not served. The number of fleets for the four routes in this particular hour period may be more, but the number of fleets crossing other routes will be reduced or even non-existent. For the period of school entry / return hours, many transportations do not operate in one full cycle, so there is a shortage at other stopping points. On holidays, there are very few fleets operating, this is due to the lack of user activity on holidays so that more public transportation stops operating or even no one operates. The smaller the headway value indicates the higher the frequency of vehicles so that it will cause a low waiting time, this is a favorable condition for passengers, but on the other hand it will cause traffic disturbances. A good public transportation service is a fairly high headway both at busy times and outside busy. This is because the headway also affects the waiting time for the public transport fleet. The bigger the headway, the smaller the waiting time, and vice versa. In terms of passengers, of course expect to get a public transportation fleet as soon as possible and not have to wait too long.

Passenger capacity has a positive and significant impact on community accessibility. These results indicate that passenger capacity is something that is considered important and meaningful because it can have an influence or impact and cannot be separated from a problem in community accessibility. This means that the more passenger capacity of the public transport fleet, the public's response to accessibility in Doloksanggul District will increase, and vice versa, the less passenger capacity of the public transport fleet, the public's response to accessibility in Doloksanggul District will decrease. The reason is because the public transport fleet will move if all the passenger seats have been fulfilled or in other words the passenger load has 12 people. The reality on the ground during the school entry/department period shows that the passenger capacity is more than 12 people so that the passengers in the fleet are huddled together and there are even students who have to hang on the side door of public transportation.

In other hour periods, passenger capacity varies, but generally no more than 8 passengers. It is different with Friday, which is a big weekend in Doloksanggul District, the passenger capacity of the public transport fleet to and from Doloksanggul Market is more than the transport capacity because in addition to transporting passengers, it also transports agricultural products and shopping products at the market. The passenger load factor is a measurement of passenger capacity each time a trip, so that from the passenger load data, it can later be known whether each vehicle from each route is able to carry passengers in the maximum capacity of each vehicle. The number of passenger loads has an inverse relationship between service users and managers. When viewed from the interests of the service user community, a small passenger load will please the service user community because it is more flexible to use their seats. However, for transportation service entrepreneurs, a small passenger load will be detrimental to them, because the carrying capacity of each fleet is not optimal.

The route route has a positive and significant impact on community accessibility. These results indicate that the route is something that is considered important or meaningful because it can have an influence or impact and cannot be separated from a problem in community accessibility. This means that the more routes of public transportation fleet routes, the public's response to accessibility in Doloksanggul District will increase, and vice versa, the fewer routes of public transportation fleets, the public's response to accessibility in Doloksanggul District will decrease. The ease of reaching the nearest route or by public transport is part of the accessibility for users of public transport services. This is indicated by the distance traveled or travel time in achieving the trajectory of the route either on foot or by foot using other forms of transportation such as motorized tricycles. Based on field observations, most of the route routes are only through the main roads in Doloksanggul District. On certain route routes, people who use transportation services are willing to walk up to 1 Km more to arrive at the route of the route. The route service has not been able to reach all residential areas on the outskirts of the city.

4.2. The Effect of Fleet Number, Passenger Capacity and Route Routes on Road Connectivity in Doloksanggul District

The results showed that the number of fleets, passenger capacity and route routes had a positive and significant effect on road connectivity. These results indicate that the number of public transport fleets, passenger capacity and route routes is something that is considered important or meaningful because it can have an influence or impact and cannot be separated from a problems in road connectivity. This means that the more the number of fleets, passenger capacity and route routes, the public's response to road connectivity in Doloksanggul District will increase, and vice versa the fewer the number of public transport fleets, passenger capacity and route routes, the public's response to connectivity roads in Doloksanggul District will continue to decline. Observations in the field tend to have more public transport fleets crossing the main city roads than those that do not cross the main city roads. The main roads are generally in good condition with hot mix pavement structures while the others are in moderate and poor condition with lapen pavement structures. For roads in moderate and bad conditions, the passenger capacity in the public transport fleet will decrease by itself, because the condition of the fleet will no longer be stable if it has to meet the transport load capacity.

This condition causes several routes to overlap and pile up on several main roads and cause traffic jams during peak hours. TR route. 06, TR. 07, and TR. 10 is a route that slightly crosses the main city streets, while the other routes mostly cross the main city roads. The development of transportation facilities is a significant component of the city transportation

system, because the condition of transportation facilities that are not good will cause a decrease in the effectiveness and efficiency of the city transportation system as a whole, both in terms of meeting the needs of movement community and in terms of the quality of city life. The increasing number of users of public fleet transportation facilities, while in terms of providing very few public fleet facilities, causes an excess from the demand side for public fleets, so that not all movement needs will be met. Meanwhile, the use of operating public fleets is an important assessment for the development of public fleets, especially in terms of service for the fulfillment of these public fleet services. The passenger fleet in bulk or commonly referred to as the General Fleet is a passenger fleet using public transportation and carried out with a rental or payment system. With this pay or lease system, the existing costs can be shared together, so that the general fleet system becomes efficient because fleet costs are very cheap. The main purpose of the existence of the public passenger fleet (AUP) is to provide good, safe and appropriate public fleet services for its users (public). Because the general passenger fleet is a mass fleet, there needs to be similarities between the passengers, including the similarity of origin and destination. This similarity is intended to achieve a way of collecting passengers at the terminal or stop.

4.3. The Influence of Community Accessibility and Road Connectivity on Regional Development of Doloksanggul District

Community accessibility and road connectivity have a positive and significant impact on regional development in Doloksanggul District. This means that the higher the value of road accessibility and connectivity, the community's response to regional development in Doloksanggul District will increase, and vice versa, the lower the value of road accessibility and connectivity, the community's response to regional development in Doloksanggul District will decrease. Community accessibility and regional development have a unidirectional or directly proportional relationship, if community accessibility increases, regional development will also experience the same thing. Observations in the field, Pasar Doloksanggul Village, Bonanian Village, Pasaribu Village, Sirisirisi Village, and Lumban Tobing Village are areas with a high level of mobility and accessibility. This may be because these areas are located around the core of the city of Doloksanggul which is also the capital of Humbang Hasundutan Regency so that it is a shopping centers, markets, offices, health, education and dense residential areas. In some other areas, they are centers of agriculture and plantations with moderate levels of mobility and accessibility. Areas that are far from the city center of Doloksanggul and in remote areas tend to have low levels of mobility and accessibility.

Road connectivity has a very strong and influential relationship with regional development in Doloksanggul District. Road connectivity has a role or contributes to the success of regional development activities seen from economic growth, increasing human resources, improving land use and environmental protection. In general, residential areas and agricultural centers in Doloksanggul District have been connected to the road network, but the condition and type of road surface are different for each region. Road conditions in Doloksanggul District based on data from the Public Works and Spatial Planning Office of Humbang Hasundutan Regency are generally good and stable. Product prices for different regions are not too different, this indicates that connectivity between regions is high. With adequate road connectivity, other economic sector activities will grow and develop (trade follows the ship).

The provision of transportation infrastructure in an area/region will have a very large impact on the development of the area/area, namely: a) Increased production, food distribution, industry, export/trade, tourism, agro-industry and business, will have an impact on the economic growth of a region. urban and rural areas/areas, and b) Improvement of

welfare through poverty alleviation, improvement of public health quality, development of isolated areas, improvement of community accessibility and mobility. Physical infrastructure, especially transportation networks, has a very strong relationship with the economic growth of a region as well as the socio-cultural conditions of people's lives. Regional development is very necessary because socio-economic, cultural and geographical conditions differ from one region to another, but basically regional development must be adapted to the conditions, potentials and problems of the region concerned. In the economic context, infrastructure is the supporting capital for the community and is the foundation for movement to increase population activity and mobility. It is undeniable that roads are the most dominant transportation network used by residents for activities.

V. Conclusion

- 1) The number of fleets, passenger capacity and route routes have a positive and significant impact on community accessibility in Doloksanggul District.
- 2) The number of fleets, passenger capacity and route routes have a positive and significant effect on road connectivity in Doloksanggul District.
- 3) Community accessibility and road connectivity have a positive and significant impact on the development of the Doloksanggul District area.

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