Journal of Information Technology, computer science and Electrical Engineering (JITCSE)
Vol. 1, No. 3, October 2024, pp. 129~136
ISSN: 3046-4900, DOI: 10.30596/jitcse

Integrated Mass Transportation Planning for the Development of Medan City Area

Edwart Haloho[1], Abdi Sugiarto[2]
[1,2]Universitas Pembangunan Panca Budi
[1]retta_hita2017@yahoo.com, [2]abdi_sugiarto@dosen.pancabudi.ac.id

ABSTRACT

This study aims to examine the Integrated Mass Transportation Planning for the Development of Medan City Area. The type of research used in this study is a type of descriptive research with a qualitative approach. To analyze the Integrated Mass Transportation Planning for the Development of Medan City Area, various research methods were used. First, a literature study was carried out that involved a review of official documents related to transportation policies in Medan City, including local regulations, official government reports, and related publications. The data obtained from literature studies, observations, and interviews were then analyzed qualitatively. The results of this analysis are expected to provide a comprehensive picture of the success of the policy in improving Integrated Mass Transportation. The results of the Integrated Mass Transportation Policy research in Medan City can be considered a significant step in efforts to improve public transportation services in the city. By providing coordinated transportation system integration, improved accessibility, and a focus on energy efficiency and passenger safety, Integrated Mass Transportation provides concrete solutions to address various challenges in the provision of public transportation services. Overall, Integrated Mass Transportation is a progressive step that shows the commitment of the City of Medan to improving the quality of life of its residents through the provision of better and sustainable public transportation services. With collaboration between the government, transportation operators, and the community, Integrated Mass Transportation has the potential to be an example for other cities in an effort to improve the quality of public transportation services as a whole.

Keyword : Integrated Mass Transportation Planning and Development of Medan City Area

Corresponding Author:
Name,
Department of Urban and Regional Planning
Panca Budi Development University
Jl. Gatot Subroto KM. 4.5 Medan, Indonesia
Email : retta_hita2017@yahoo.com

Article history:
Received Oct 11, 2024
Revised Oct 22, 2024
Accepted Oct 30, 2024

INTRODUCTION

Transportation is a basic need for human beings because transportation includes several aspects of people's lives that are closely related to moving from one place to another, such as the need for mobility access to the development of the economic value of an area as a whole. Mass transportation is an alternative form of transportation system available in the middle of an urban area that can be used by the general public to carry out their daily activities and use a rent or pay system (Laloma et al., 2018). The mass transportation system is a form of interconnection, regularity and attachment between facilities, infrastructure, goods and passengers as the main consumers in a transportation system with the intention of the movement of people and goods that are arranged both naturally and artificially. Several types of transportation that operate and can be felt by the public are land, sea and air transportation. Land transportation is a form of attachment between passengers, goods, facilities and infrastructure of land space. Land transportation includes various types of transportation modes such as highway transportation and rail transportation (Azis, 2014).

The lack of awareness by all parties involved about the systematic handling of transportation, the local government's perspective in making policies that are too biased towards the users of private transportation and the institutional system of public transportation that does not favor the community at large are the main roots of the transportation problems that occur. As time goes by, the number of people in Medan City is increasing, while the number of available modes is inadequate in terms of quantity, not feasible in terms of quality and inefficient. Various government efforts to meet people's needs for comfortable and decent transportation have been carried out through various policies and public transportation procurement. The city of Medan already has various types of mass transportation facilities that have been operating such as city transportation and Mebidang buses, but

along with the development of community activities, existing mass transportation is no longer the answer to meet community activities.

The Ministry of Transportation (Kemenhub) chose Medan as one of the six cities in the metropolitan category for the development of a mass transportation system. In addition to Medan, there are also the cities of Jakarta, Surabaya, Semarang and Makassar. The mass integrated transportation called Bus Rapit Transit (BRT) connects Medan, Binjai and Deli Serdang (Mebidang). The project is included in the 2020-2024 national medium-term development plan (RPJMN) and is worth Rp 1.9 trillion. The budget from the World Bank and AFD France is intended for the construction of corridors, bus stops, depots, IT equipment to bus procurement. The Ministry of Transportation, the North Sumatra Provincial Government, the Binjai City Government, the Medan City Government and the Deli Serdang Regency Government have signed an agreement on the Mebidang BRT project on Monday, October 16, 2023. This mass transportation is expected to change people's habits from the use of private vehicles to mass transportation.

Figure 1.1 Corridor design for BRT Mebidang on Jalan Gatot Subroto, Medan. (Photo: Doc. Medan Transportation Agency)

The existence of integrated mass transportation between Medan, Binjai and Deli Serdang is urgently needed. Based on the records of the Medan Transportation Agency, the number of residents active in Medan reached 5 million people during the day. Even though at night or based on official data, the population of Medan is only around 2.7 million people. The rest are residents of buffer areas who are active and working in Medan. Most of them use private transportation when doing activities. Traffic jams are also inevitable due to the high use of private vehicles. Therefore, the existence of comfortable and cheap mass transportation is needed to reduce community activities with private vehicles. An integrated bus between Medan, Deli Serdang and Binjai was also chosen. Reducing emissions that cause air pollution from vehicle activities is also considered. So environmentally friendly vehicles such as electric buses are chosen.

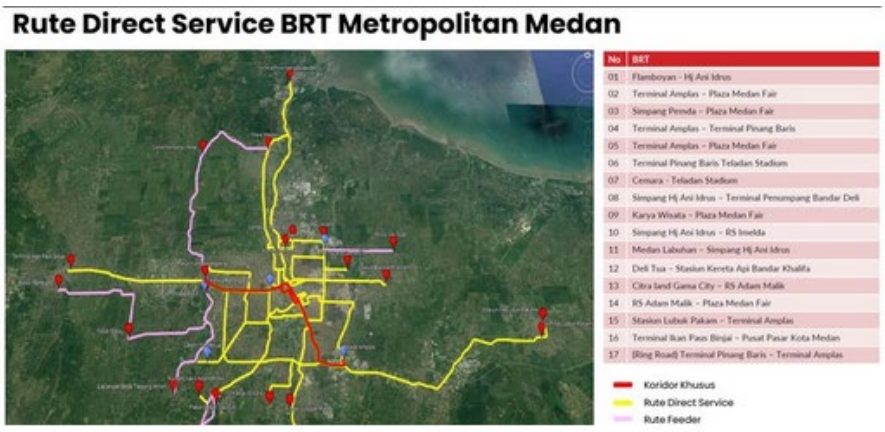

Figure 1.2 Mebidang BRT Corridor

In 2024, the project will enter the construction stage of corridors, bus stops, depots, IT equipment, and bus procurement. There will be 515 buses with 31 stops and a track length of 21 kilometers. "The Data Flow Diagram (DFD) process is completed in January 2024, the BRT Mebidang has a track of 21 km, a dedicated link with 31 large bus stops, has 17 routes reaching Medan, Binjai and Deli Serdang with 515 buses, depot support, bus stops, ITS bus special lines with a budget of IDR 1.9 trillion," said Acting Governor of North Sumatra Hassanudin after the signing of the MoU for the construction of the Mebidang BRT on Monday, October 16, 2023. 30 percent of the 515 BRT that will operate will use electric buses or around 154 buses. To operate electric buses, of course, it needs support from PLN, especially in terms of infrastructure such as Electric Vehicle Charging Stations (SPKL), Hassanudin hopes that the agreement that has been signed will later become a guideline for related parties to implement the Mebidang Masstran. At the same time to realize better transportation in the future.

LITERATURE REVIEW

Integrated Mass Transportation Planning

The development of community activities and the high mobility of the population are sometimes not balanced with their supporting facilities and infrastructure, especially in the field of transportation, so that the problem of road congestion always occurs in several big cities. Congestion management can be done through a transportation plan. Transportation planning itself can be interpreted as a process whose goal is to develop a transportation system that allows people and goods to move or move safely and cheaply (Pignataro, 1973) in (Tamin, 2017). According to Eddu Pandika (2015), transportation planning is an effort to estimate the number and location of transportation needs to be used in the future or in the planning year, especially in urban areas.

Regional Development

Sembiring (2012) stated that regional development in the long term is emphasized on the introduction of natural resources and the potential for local development of the region that is able to support (produce) economic growth, and social welfare of the community, including poverty alleviation, as well as efforts to overcome existing development obstacles in the region in order to achieve development goals. Santoso (2016) in Putra (2018) stated that regional development is an effort to build and develop a region based on a spatial approach that considers socio-cultural, economic, physical environment, and institutional aspects in an integrated development planning and management framework. The approach to regional development always considers the spatial aspect, because each spatial unit has certain characteristics, which require different treatment.

METHOD APPROACH

The type of research used in this study is a type of descriptive research with a qualitative approach. The reason for using this approach is because this research is carried out to obtain an overview and explain all existing problems and data in more depth that are in accordance with the problems and objectives of the research. Bogdan and Taylor in Moleong (2015) provide an explanation of the qualitative approach as follows: "Qualitative method is a research procedure that produces descriptive data in the form of curated or spoken words from people and observable behaviors.

To analyze Integrated Mass Transportation Planning for the Development of Medan City Area. Various research methods were used. First, a literature study was carried out that involved a review of official documents related to transportation policies in Medan City, including local regulations, official government reports, and related publications. This literature study helps in understanding the background, objectives, and implementation. Furthermore, the observation method is carried out to directly observe the implementation of the Integrated Mass Transportation policy Observations are carried out at various important points such as bus stops, track lines, and bus operations themselves. The data obtained from this observation includes the frequency of bus arrivals, passenger density, delays, and the quality of services provided to users.

The data obtained from literature studies, observations, and interviews were then analyzed qualitatively. The results of this analysis are expected to provide a comprehensive picture of the success of the policy in improving Integrated Mass Transportation. Data collection techniques are the most strategic step in research, because the main purpose of research is to obtain data. Without knowing the data collection technique, the researcher will not get data that meets the set data standards (Sugiyono 2012). Sugiyono (2016) distinguishes

data collection techniques into four parts, namely observation, interview, documentation and a combination of the three (triangulation).

DISCUSSION

Development of Integrated Mass Transportation in Realizing an Efficient Medan City

The population growth in the city of Medan is increasing along with the development of time. This can certainly have an impact on mobility problems in the city, such as congestion due to the use of many private vehicles and the emergence of pollution that can interfere with the health of the surrounding community. In addition, the existence of *urban sprawl* phenomena in several major cities in Indonesia has also caused the development of residential areas in *urban fairy* areas where some residents have several activities in the city. This will certainly add to mobility problems in the city such as increased congestion, especially if the city does not provide public transportation facilities that have an impact on people's dependence on private vehicles in moving or mobility. Therefore, it is necessary to implement the concept of *Transit Oriented Development* (TOD) to reduce the use of private vehicles and realize the optimization of the use of public transportation, such as trans buses and trains so that it can realize an efficient city.

Figure 4.1 Illustration *of Transit Oriented Development* (TOD)

Transit Oriented Development (TOD) can be interpreted as the concept of urban development or development by maximizing mixed and integrated land use and promoting the use of mass public transportation and healthy lifestyles, such as walking and cycling (Ayuningtyas, 2019). In addition, Susilowati (2021) also explained that *Transit Oriented Development* (TOD) is a concept of urban development with the maximum use of public transportation equipped with road network facilities for pedestrians or bicycles, as well as public vehicle stops and parking facilities. Judging from the definition of *Transit Oriented Development* (TOD), TOD can support and describe the definition of an efficient city, namely a city that does not cause economic waste, congestion, congestion and can encourage various activities in the city productively and sustainably. The efficiency referred to in an efficient city can be in the form of efficiency in the arrangement and use of urban spatial planning, the implementation of public services, and the development of infrastructure and facilities in the city. In this case, the development of *Transit Oriented Development* (TOD) can be done by developing public transportation facilities in the city to reduce congestion and congestion.

The development of *Transit Oriented Development* (TOD) in the city of Medan, especially big cities in Indonesia, can have several positive impacts, such as reducing the use of private vehicles so that the number of congestion, air pollution, and greenhouse gas emissions produced decreases. In addition, urban people will also have a more active and healthy lifestyle because people will tend to walk when accessing locations with short distances. The development of public transportation equipped with adequate and comfortable facilities and infrastructure is also expected to increase public interest in using public transportation so that this can have an impact on increasing regional revenue from existing transportation fares. This is of course also in line with the increasing potential for added value through the increase in sustainable property value in accordance with

transportation investment. The development of public transportation from an economic perspective can also be seen in its positive impact on increasing access to jobs and economic opportunities for urban communities. Meanwhile, in terms of urban mobility, mobility that occurs in cities can be expanded while still reducing dependence on private vehicles and can reduce transportation costs.

Figure 4.2 *Transit Oriented Development Is the Key to Better Cities*

Transit *Oriented Development* (TOD) has principles and keys to its implementation in accordance with the TOD standard performance goals. Wirasmoyo (2019), stated that the principles and keys to the implementation of TOD standard performance goals consist of *walking* or walking, *cycling* or cycling, *connecting* or connecting, *transit* or public transportation, *mixing* or blending, *densify* or compacting, *compact* or close, and *shift* or switching. The principle of *walk* can be carried out appropriately supported by the development of pedestrian infrastructure that is safe, complete, and accessible to various groups, including people with disabilities, equipped with road facilities such as lighting, protective trees, and road directions. The cycle principle is intended to give priority to affordable non-motorized transportation to achieve short-distance goals. Meanwhile, the principle *of connect* can be done by creating a network of roads and pedestrian paths that are congested and connected to each other. The transit principle was developed by placing development around the public network of mass transportation with access to fast and periodic public transportation services, as well as connecting and integrating road users. The principle of mixing is carried out by considering balance, such as development planning while still paying attention to land use, income and demographics in order to produce short-distance travel so that it can be reached by walking, cycling, and maximizing public transportation. Meanwhile, *the densify principle* was developed by optimizing space density and adjusting public transportation capacity. The compact principle is carried out by the development and development of public transportation in areas with short service needs in an integrated manner. The last principle, namely shifts, is carried out by increasing the mobility of public transportation, parking regulations, and road use.

As a widespread area, the concept of developing transportation infrastructure based on mass transportation must be inevitable. Mass transportation is developed in the framework of increasing accessibility and mobility and increasing equitable development for all groups. In this case, there are several things that must be considered in the development of mass transportation in accordance with the characteristics of the agglomeration area of Medan City and its surroundings, namely by paying attention to:

1. Existing transportation infrastructure conditions
   Traffic is not too congested (not as bad as Jakarta or other big cities) so the determination of transportation modes can be more flexible. There is still the possibility of developing several new modes of transportation that can be implemented in the agglomeration area of Medan City and its surroundings.
2. Future transportation needs

Based on population projections and projections of the number of motorized vehicles, there is a considerable potential for movement, for which a public transportation system with a large enough carrying capacity is needed (mass transportation with a reliable feeder route network system).

3. The land use is not too dense by buildings, making it easier if the construction of new transportation infrastructure is needed. With land use that is still not dominated by built land, the transportation network can direct development to priority areas for regional development. This is to avoid the possibility of congestion due to inefficient land use.
4. The system of community activities in the agglomeration area of Medan City and its surroundings gives rise to the existence of functional areas in an administrative area. Sometimes in one administrative area there is more than one functional area. These functional areas are then called activity centers which are also centers for the rise and pull of movement.

Positive Impact of Integrated Mass Transportation Development on the Development of Medan City Area

The many positive impacts of the development of *Transit Oriented Development* (TOD) in the city of Medan, such as the development of public transportation facilities and infrastructure, do not guarantee a lot of enthusiasm from the city community. This can be seen from the number of urban people who lack or even do not support, and are interested in using public transportation due to their dependence on private vehicles. As happened in several cities in Indonesia, many people are less interested and interested in using public transportation for several reasons, such as the placement of transit points that do not pay attention to the distribution of land use in the form of representation of the rise and pull zones as demand points (Purbo, 2017). In addition, the absence of facilities that can provide convenience and comfort for the community to go to modes and intermodal transfers, such as unclear public transportation routes in the city is also one of the causes of public disinterest in using public transportation.

The decline in public interest in the use of public transportation results in a high dependence on private vehicles as a way to meet the movement or mobility of urban people so that this can hinder the development of *Transit Oriented Development* (TOD) to realize an efficient city. This indicates that in the development of *Transit Oriented Development* (TOD), the right methods and policies are also needed by the government. Some of the ways and policies that can be done are by establishing strong cooperation and collaboration between *stakeholders* in the entire TOD development process, planning TOD policies in an integrated manner with the urban transportation master plan that contains the aspirations of community needs, developing and implementing a more effective TOD development coordination mechanism, and prioritizing improving comfort and safety for users of transportation facilities. In addition, what can be done is to formulate TOD policies by balancing public and private interests through coordination of transportation planning and spatial planning based on the characteristics of the area.

Planning Implications The implementation of some of these policies properly and appropriately is expected to realize the development of *Transit Oriented Development* (TOD) to realize an efficient city.

1. Inter-Mode Connectivity: Developing connectivity between modes of transportation to ensure easy and efficient switching between different types of transportation. According to Cervero (2011), *inter-modal connectivity* is the key to increasing the use of public transportation and reducing dependence on private vehicles.
2. Public Transportation Infrastructure Development: Investments in public transportation infrastructure to improve accessibility and convenience. As stated by Litman (2019), the development of public transportation infrastructure can reduce traffic congestion and provide a more efficient and affordable alternative for the community.
3. Integration of Land Use and Transportation: Land use planning that is integrated with transportation systems to reduce travel distances and improve efficiency. Bertolini and Spit (1998) emphasized that the integration of land use and transportation is fundamental to creating sustainable and efficient cities.
4. Improving Livability: Improving the quality of the environment around transit stations through the development of public facilities, open spaces, and affordable housing. Research by Ewing and Cervero (6) shows that a well-designed environment can improve people's quality of life and health.

The Main Obstacle to the Development of Integrated Mass Transportation to the Development of Medan City Area

The provision of adequate mass transit services is often faced with a variety of complex obstacles. One of the main obstacles is the lack of adequate investment and funding from the government or the private sector.

Public transportation requires large investments in infrastructure, fleet of vehicles, and quality maintenance, but often the allocated budget is insufficient to meet these needs. As a result, public transportation services can become less reliable and inadequate for the community. In addition, complex regulations and lack of coordination between agencies are also major obstacles. Complicated licensing and regulatory processes can slow down the development of transportation infrastructure, including the construction of efficient rail networks or bus lines. Poor coordination between transport operators, local governments, and related institutions can also hinder operational efficiency and the development of better services

The imbalance between urban growth and available transportation infrastructure is also a serious problem. Fast-growing cities often face severe traffic congestion and limited space for transportation infrastructure development. This can make it difficult to provide efficient and accessible public transportation services to all levels of society. In addition, technological challenges and changes in people's behavior also affect the provision of public transportation services. Technological developments such as ridesharing apps and self-driving vehicles are changing the way people travel and can affect demand for traditional public transportation services. Adapting to these developments requires innovative and adaptive strategies from relevant parties to remain relevant and competitive in the ever-changing era of transportation. In addition to these factors, social and environmental aspects also play a role in the provision of quality public transportation services. In the social context, awareness of the importance of environmentally friendly transportation is increasing among the public. The demand for sustainable transportation such as energy-efficient and environmentally friendly mass transportation is getting higher. Therefore, public transportation service providers must consider environmental aspects in the development of their infrastructure and operations.

Integrated Mass Transportation Development Policy for the Development of Medan City Area

The Integrated Mass Transportation Policy can be used as an effective solution to improve public transportation services in the city of Medan. First of all, the integration of the transportation system in Trans Metro Deli helps reduce congestion and optimize the use of road sections. By providing fast and coordinated bus services, people can easily switch from using private vehicles to public transportation, reducing the number of vehicles on the road and improving the city's overall traffic. In addition, Trans Metro Deli also provides better accessibility for the community. With extensive bus routes and regular schedules, people from all walks of life can access public transportation more easily, both for daily activities and long-distance travel. This helps reduce inequality in transportation access and provides a more affordable option for those who do not own a private vehicle.

This policy also has the potential to improve energy efficiency and reduce greenhouse gas emissions. By encouraging the use of more mass public transportation such as buses, as opposed to private vehicles that are often only filled by one or two passengers, Trans Metro Deli can help reduce fuel consumption and negative environmental impact. In addition, passenger safety and comfort are also the main focus in this policy. The use of well-maintained buses, efficient payment systems, and driver training in friendly and safe service can improve the experience of public transportation users. This is important to increase public trust and encourage more people to choose public transportation as their main travel option in the city of Medan.

CONCLUSION

Based on the results of the research and discussion in the previous chapter, it can be concluded as follows:

The Integrated Mass Transportation Policy in Medan City can be considered a significant step in efforts to improve public transportation services in the city. By providing coordinated transportation system integration, improved accessibility, and a focus on energy efficiency and passenger safety, Integrated Mass Transportation provides concrete solutions to address various challenges in the provision of public transportation services. This policy has succeeded in reducing congestion, increasing community mobility, and reducing environmental impact by reducing the use of private vehicles. In addition, by providing more affordable and convenient transportation options.

Overall, Integrated Mass Transportation is a progressive step that shows the commitment of the City of Medan to improving the quality of life of its residents through the provision of better and sustainable public transportation services. With collaboration between the government, transportation operators, and the community, Integrated Mass Transportation has the potential to be an example for other cities in an effort to improve the quality of public transportation services as a whole. Integrated Mass Transportation can continue to optimize existing bus routes based on analysis of people's travel patterns. Ensuring adequate frequency and

regular schedules will improve service reliability and user satisfaction. Cooperation with private companies in infrastructure development and the provision of modern and environmentally friendly transportation fleets can improve the quality of services. Private investment can also help in the maintenance and expansion of transportation networks.

REFERENCES

Ayuningtias, S.H., (2019). The Implementation of Transit Oriented Development (TOD) as an Effort to Realize Sustainable Transportation. Journal of Urban Regional Planning, Vol. 24 No. 1.

Azis, Rudi and Asrul. (2014). *Introduction to Transportation Systems and Planning*. Yogyakarta: Deepublish. Central Statistics Agency. 2016. Depok District in Numbers.

Laloma, A., Rompis, S. Y., & Longdong, J. (2018). The Effect of Online Transportation on the Selection of Public Transportation Modes in Manado City (Case Study: Malalayang-City Center Route). Static Civil Journal, 6(8).

Litman, T. (2019). Evaluating Accessibility for Transport Planning Measuring. People's Ability to Reach Desired Goods and Activities. Victoria. Transport.

Moleong, L. (2015). *Qualitative Research Methods*. Bandung: Remadja Karya.

Pandika, Eddu, (2015). The effect of land use change on the provision of road networks in the city of Kepanjen, Journal of Civil Engineering Vol 9 No.2, ISSN 1978-5658, UNBRAW, Malang.

Pignataro, L.J. (1973), Traffic Engineering: Theory and Practice, Prantice. Hall Int., Englewood Cliffs, N.J.

Putra, D. W. T. and *Putra*, J. J. (2018). Designing a job vacancy search information system. Journal of TechnoIf.

Santoso, (2012). Urban development strategy in the Gerbangkertasusilo area based on the regional competitiveness approach. ITS Regional and Urban Planning National Seminar.

Sembiring, M. (2012). *Organizational Culture and Performance*. Bandung: Focus Publishers. Media. 132 p. Sumbarprov.go.id.

Sugiyono. (2012). *Quantitative, Qualitative, and R&D Research Methods*. Bandung: Alfabeta.

Sugiyono. *(*2016*).* Quantitative, Qualitative and R&D Research Methods, 24th Edition. Bandung: Alfabeta.

Tamin, Ofyar Z. (2017). *Transportation Planning and Modelling* (sixth edition). Bandung: ITB.

Wirasmoyo, W., Ratriningsih, D., & Rahman, M. I. A. A. (2019). Trans Jogja Bus Transit Room Based on Conformity with Transit Oriented Development (Tod) Standards Case Study: Trans Jogja Malioboro 1 Bus Stop and Ngabean Parking. SENTHONG Journal, 2, 213–224.

Sugiarto, A., Sos, S., Si, M., Muhammad Ade Kurnia Harahap, M. T., Riduan, A., Sos, S., & AP, M. (2024). PERENCANAAN PEMBANGUNAN WILAYAH. Saba Jaya Publisher.

Harahap, M. A. K., Sugiarto, A., Harmain, U., & Nasution, A. A. (2024). Exploring understudied areas of urban regional planning through bibliometric analysis. Journal of Infrastructure, Policy and Development, 8(9), 6310.

Abdi Sugiarto, Rini Kustiah Ramadania (2024). Management of Deli Riverbank Land for Sustainable City Development Based on Regional Regulations (RTRW/RDTR) (Case Study: Deli Riverbank, Medan Maimun District), Journal of Economics & Sharia Economics, 7 (1), 618-626

Purba, B., Sugiarto, A., Nuraini, C., Dian, R., & Kurniawan, H. (2024). KAJIAN PEMANFAATAN RUANG TERHADAP SISTEM TRANSPORTASI PADA KAWASAN PERKOTAAN BATANG KUIS. Jurnal Darma Agung, 32(4), 188 - 199. doi:10.46930/ojsuda.v32i4.4621