Smart Mobility Development Through Public Transportation in the Special Region of Yogyakarta

Raden Rara Dyah Pinasthika PTP[1] (iD), Muhammad Eko Atmojo[2] (iD)

[1]Department of Government Affairs and Administration, Universitas Muhammadiyah Yogyakarta, Indonesia
[2]Department of Government Affairs and Administration, Universitas Muhammadiyah Yogyakarta, Indonesia

Abstract: This research was conducted to determine the readiness of the Special Region of Yogyakarta (DIY) Government in realizing smart mobility through Trans Jogja public transportation services. Amidst the challenges of urbanization and the increasing need for efficient mobility, this research examines the implementation of the smart mobility concept in the context of Trans Jogja as a Bus Rapid Transit (BRT) system. The research method used is descriptive qualitative, with data collection through semi-structured interviews with representatives of the DIY Transportation Agency, PT AMI, and Trans Jogja users. The results showed that the DIY Government has made efforts to develop Trans Jogja services based on smart mobility, including fleet and route upgrades, as well as the utilization of the Trans Jogja application. However, the provision of more efficient and equitable routes, the addition of bus stops, and maximizing service convenience still need more attention.

INTRODUCTION

The Indonesian government consistently strives to provide services in various sectors, including transportation. The transportation sector is closely linked to the provision of public facilities and infrastructure. Transportation plays a vital role in supporting human life, both in maintaining human interaction and as a means of facilitating the movement of goods from one place to another (Nurfadillah et al., 2023). Humans as social beings need to socialize with the wider community, this needs to be supported by transportation facilities and infrastructure as a form of fulfilling the right to social activities.

As a form of public transportation service implementation, the Special Region of Yogyakarta Provincial Government through the Yogyakarta Special Region Transportation Agency provides an inner-city transportation service, namely the Trans Jogja Bus, packaged with a Bus Rapid Transit (BRT) system. The Bus Rapid Transit (BRT) system adopted by Trans Jogja means a bus with a fast and reliable service system, where users can transit quickly and change lines but with a single payment (Bawana & Rachmawati, 2020). With this innovation, Trans Jogja becomes an integrated public transportation and facilitates public mobility.

The Special Region of Yogyakarta Transportation Agency provides flexible services to achieve more efficient public transportation. Trans Jogja operates using a Buy the Service

(BTS) system, offering affordable fares for all levels of society. The Transportation Agency is currently pursuing a free fare scheme for students, the elderly, and people with disabilities. With these efforts, it is hoped that the public will shift from private vehicles to public transportation, thereby reducing various traffic problems (Nurfadillah et al., 2023).

Along with technological developments, the provision of public services also follows the direction of technological progress by prioritizing digitalization as an effort to facilitate accessibility for public transportation users. The use of technology in service delivery is used to optimize operational activities, such as data collection, processing, analysis, and decision-making, with more effective and efficient results or output (Sari et al., 2024a). According to (Perhubungan, 2024), the implementation of digitalization is important to provide convenience and improve services for the public and stakeholders. The development of the Trans Jogja application is one form of readiness of the Yogyakarta Special Region government in providing digitalized public transportation services or e-transportation.

With the various innovations offered by Trans Jogja, it is hoped that the public will gradually shift from motorized vehicles to public transportation to reduce traffic congestion and utilize government facilities. However, considering Yogyakarta's increasingly dense population and inadequate road conditions, the readiness of the Special Region of Yogyakarta Government to manage public transportation is questionable. Often, residents feel that public transportation, such as the Trans Jogja Bus, is not yet optimally operating to reduce traffic congestion in the Special Region of Yogyakarta.

Given the increasing number of passengers, the Yogyakarta Special Region (DIY) government still needs to periodically evaluate its efforts to realize smart mobility through public transportation services. The Yogyakarta government's readiness in realizing smart mobility needs to be improved. The management of the Trans Jogja application still needs to be developed and improved, so that services are centrally integrated through the existing application. There is still a need for widespread public awareness of the Trans Jogja application and an invitation to start reducing the use of private vehicles. Seeing the gap in public transportation in the Yogyakarta Special Region, the author feels that the services provided are still not optimal due to the high growth of private vehicles, minimal road growth and the uneven coverage of areas covered by public transportation, especially Trans Jogja. Therefore, the researcher will discuss the implementation of smart mobility in public transportation carried out by the government.

RESEARCH METHOD

The type of research applied in this study is qualitative research. Qualitative research aims to understand social phenomena based on a holistic picture and to gain in-depth understanding. In the book "Qualitative Research Methods" by (Nasution, 2023), Qualitative research is data-driven and utilizes existing theories to clarify and create a theory. Data in qualitative research is descriptive, such as sentences, narratives, and images. Qualitative research emphasizes a deeper understanding of the meaning, perceptions, and context of the participants being studied (Rumahlewang et al., 2024).

This study obtained data based on two types of data: primary data and secondary data. Primary data is the main type of data collected by researchers directly from research subjects/primary sources/direct sources. This primary data comes from interviews, observations, and documents (Nasution, 2023). In this study, the author conducted interviews with relevant stakeholders who manage Trans Jogja, namely PT. Anindya Mitra Internasional and the Yogyakarta Special Region Transportation Agency. Where for informants from stakeholders numbered 3 people and informants from users were taken as many as 10 people. The sampling determination used purposive sampling by considering user age criteria. Meanwhile, the time limit for this study was 2024-2025. Secondary data for this study consisted of public documents, such as books, journal publications, websites, and scientific articles from various researchers.

RESULT AND DICUSSION

Providing public transportation services to the public is a government effort to reduce the use of private transportation, which can lead to traffic congestion. In the Special Region of Yogyakarta, this effort has been initiated by the Department of Transportation with the creation of the "Trans Jogja" public transportation system. Connectivity between locations and destinations, when supported by easy transportation access, can increase economic and social activity. Locations with high levels of accessibility tend to have high value as well. Accordingly, Yogyakarta, as a city of education and tourism, where economic and social activity increases daily, needs to expand the accessibility of its public transportation network. The level of public transportation accessibility in urban areas can be used to identify the direction of urban physical development.

In Yogyakarta, the level of public transportation accessibility needs to be re-identified. Considering several route changes, the use of technology, and the procurement of environmentally friendly buses, updated information about Trans Jogja is needed. Currently, this analysis can be used as a basis for reviewing the preparation of the Yogyakarta Special Region government in providing public transportation services. According to (Christianto et al., 2016), the concept of "readiness" refers to the potential differences in the context of "ready," "not ready," and "unready" in a city. Therefore, the analysis was conducted based on four main indicators proposed by (Hidayat et al., 2021) namely: Mass Mobility, Individual Mobility, Use of Mobility-Enhancing Technology, Security and Safety.

A. Mass Mobility

Public transportation is a crucial part of urban mobility. Yogyakarta is one of the cities with public transportation systems, including the Trans Jogja system, which supports mobility. Trans Jogja currently has a fleet of 128 vehicles, with 116 ready to operate and 12 as backups. The initial determination of the locations for the Trans Jogja routes was based on the prediction of future passenger traffic. Seeing this opportunity, the Transportation Agency initiated the deployment of Trans Jogja routes in busy locations. In urban areas, for example, Malioboro, a famous icon of Yogyakarta and bustling with thousands of people daily, has three bus stops. Meanwhile, routes and bus stops within the district were selected as Trans Jogja routes, considering factors such as proximity to urban areas and strong public interest.
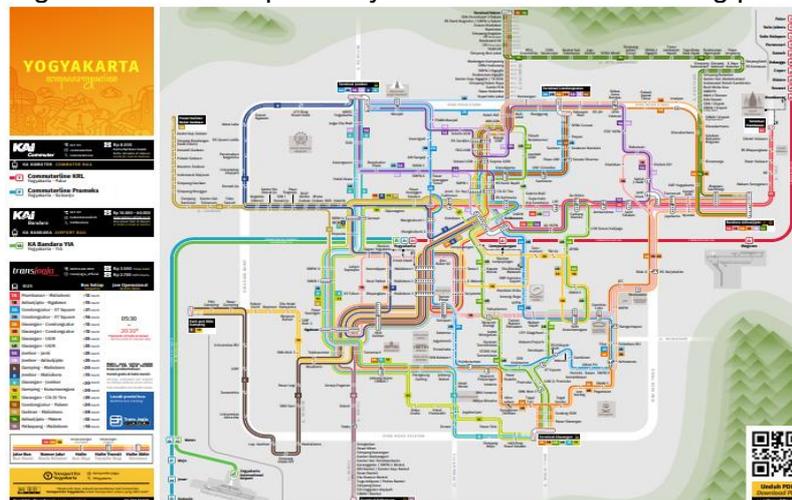

Figure 1. Trans Jogja Route Map
Source: Dinas Perhubungan DIY

Currently, the outermost reaches of the Trans Jogja route are in the east at Prambanan, in the west at Belut Market Godean and Ambarketawang, in the south at Palbapang, and in the north at the Pakem bus stop. Efforts to expand the route to cover several regencies in the Special Region of Yogyakarta will be left to the authority of each regency's government. According to several sources, new routes are indeed needed to reach several areas in the buffer regencies. Trans Jogja's focus has so far been on the city of Yogyakarta. Yet, if we look at most urban residents who carry out activities in urban areas.

Due to the high public demand for additional routes, Trans Jogja management rotated routes, converting the two routes into one. In February 2025, there were reductions and simplifications, for example, on route 6, which originally had two routes (6A and 6B), it was reduced to one. Furthermore, route 7, which originally served from Giwangan Terminal to Babarsari, was discontinued. The reduction in Trans Jogja routes was due to budget constraints, a decision some users regretted as it reduced route options. This indicates the need for a balance between operational efficiency and meeting the mobility needs of the community.

With the reduction in routes, the government is tasked with finding solutions to prevent public distrust. This reduction in routes will undoubtedly have a significant impact on the community, particularly on mobility in urban areas. Furthermore, the reduction in routes will have other negative impacts on the community, including increased use of private vehicles. This use of private vehicles also has negative health and environmental impacts due to the carbon emissions they emit. Therefore, the government must immediately address this issue to prevent environmental pollution, particularly that caused by private vehicles.

B. Individual Mobility

To ensure public mobility in urban areas, the government must provide supporting infrastructure. Of course, when we talk about mobility, it's not just about public transportation; it also includes other supporting facilities and infrastructure, such as bus stops, sidewalks, and so on. Therefore, to ensure effective transportation to support public mobility, collaboration with various stakeholders, including the community, is essential, especially in maintaining public facilities built by the government.

To ensure public mobility, the Yogyakarta Special Region Government has built and provided several supporting facilities, including bus stops, sidewalks, and support facilities for people with disabilities. To date, the government has provided 110 fixed or large bus stops (staffed), 145 portable bus stops that can be moved as needed, 15 newly designed bus stops that can function as sidewalks, and 20 bus stop signs. These facilities are certainly not yet able to fully support public mobility, especially from suburban areas or between districts, considering that not all areas or regions are covered by Trans Jogja as public transportation in Yogyakarta.

Figure 2. Halte Pujokusuman
Source: processed by researchers

When it comes to the ideal of providing public transportation, it's true that all areas in Yogyakarta should be well-covered. Ideally, bus stops should be spaced 1.2 kilometers apart. One strategy the Yogyakarta Special Region government has adopted to address this is by providing bus stop signs. The hope is that these signs will significantly assist the public in their activities, especially for public transportation users. The government isn't providing bus stop signs everywhere; instead, it's selecting specific areas commonly used by the public for public transportation, or areas with high traffic volumes.

To ensure effective public mobility, the government must collaborate with stakeholders, given its limitations in providing public transportation infrastructure in the Special Region of

Yogyakarta. One of the government's limitations in providing this infrastructure is related to location and budget, as not all land along the roadside is government-owned, making it impossible to establish ideal bus stops. One approach the government is taking is to collaborate with surrounding district and city governments to ensure a wide range of public transportation services. Furthermore, the provision of these facilities must also support individual community mobility, given that public transportation users are not limited to ordinary citizens but also include those with special needs.

To ensure the comfort of public transportation users, the government has built Trans Jogja bus stops to support individual mobility, including those with special needs. Several bus stops are equipped with guiding blocks for the visually impaired, the right level of inclination is designed to facilitate wheelchairs, special wheelchair spaces on the bus, announcers for the visually impaired, running text on the bus for the deaf, and flight attendants equipped with knowledge related to handling people with disabilities. Furthermore, the provision of these facilities also involves the disabled community to provide direct suggestions and input to provide comfortable services.

Figure 3. *Guiding Block* Halte Pujokusuman
Source: processed by researchers

To date, the Yogyakarta Special Region Government has not been able to fully meet the needs for public transportation support stops, especially comfortable stops for the public. This will certainly be realized, but gradually, considering the government's budget constraints. However, to date, the government has built at least three large stops considered the most disability-friendly: the SMPN 5 stop, the JEC stop, and the Pujokusuman stop. These three stops are the newest stops built with Special Funds and are supported by supporting infrastructure. These include a moderate slope for wheelchair users, guiding blocks for the visually impaired, and route maps for the speech impaired. The construction of these stops demonstrates the government's commitment to supporting public mobility using public transportation in the Yogyakarta Special Region.

C. Use of Mobility Supporting Technology

To ensure safe and comfortable public transportation for users, the Yogyakarta Special Region Government has implemented innovations in public transportation. One such innovation is the Trans Jogja app, which facilitates public transportation use. The development of the Trans Jogja app demonstrates the adoption of technology to support e-transportation, with features such as e-ticketing, real-time bus tracking, route information, and Augmented Reality (AR) shelters. These features align with the principles of smart mobility, which emphasize ease of access, integration, and service efficiency(Suryanto et al., 2017)(Nushratu, 2024).

In addition to utilizing applications to provide convenience for the public, including payments, bus tracking, and route information, the government is also implementing other innovations, including smartcard payments. To support this convenience, the government and

Trans Jogja management have partnered with several banks, including BCA, BRI, and BNI. Smartcard payments can only be made with Flazz BCA, Brizzi BRI, and TapCash BNI. These smartcards offer more efficient travel time and lower fares compared to cash payments. Smartcard top-up locations are relatively well-located and strategically located, with adequate bus stops and terminals, and staffed by staff. Public transportation payments in Jogja rely not only on smartcards or apps, but also on QRIS, Gopay, Astrapay, or LinkAja. This significantly simplifies public transportation use, contributing to the government's support for improving mobility in the city. To support this technology, all TransJogja vehicles are equipped with Near Field Communication (NFC) technology, ensuring smooth operation (Apriliani, 2025)

The use of technology also greatly facilitates services and can optimize activities so that they are more effective and efficient (Sari et al., 2024b). Meanwhile, according to (Dewi & Larasati, 2018) The use of technology in public services, particularly transportation, can help maximize service by providing convenience for public transportation users. Therefore, payments using technology are also very effective compared to cash payments. This technology certainly makes it easier and faster for users. Cash payments are considered ineffective because not all bus stops have staff and not all bus stop staff have change. Cash tickets are much cheaper than cash tickets. The following is a comparison of cash and cashless tickets:

Table 1. Trans Jogja Payment Methods

No.	Cash	Non-Cash
1.		IDR. 600 (Student Card)
2.	IDR. 3,600	IDR.2,000 (Disability Card and Elderly Card)
3.		IDR.2,700 (Regular/General Card)
4.		IDR. 2,700 (QRis dan E-Wallet, E-Money)

Source: processed by researchers

The table above shows the differences between cash and non-cash payments, with non-cash payments being cheaper than cash. Meanwhile, there are several alternative non-cash payment mechanisms, especially for the regular or general category, where payments can be made using QRIS, E-Wallet, E-Money. Meanwhile, for the disabled and elderly categories, special cards are also used, namely the Disability Card and the Elderly Card, while students use a student card that is directly connected to e-money. Indeed, there is a difference in price for non-cash use, especially for students, which is only IDR 600,- and for the disabled and elderly, IDR 2,000,-. Of course, this policy is an affirmative policy from the government to provide special places for students, the disabled, and the elderly.

The use of technology for both payment and ticket purchases is very effective and efficient. The application certainly allows transportation users to estimate departure times. By utilizing technology, especially the application, transportation users can directly see and monitor the position of the bus they will use, thus streamlining waiting times. Furthermore, CCTV cameras are installed on the buses, which is one part of the use of technology. The presence of CCTV makes passengers safer and more comfortable while using public transportation, especially Trans Jogja.

D. User Safety and Safety

Safety and comfort when using public transportation are crucial, especially when users are waiting at bus stops or on the bus. To ensure this, the government is making every effort to provide the best possible service for public transportation users, particularly Trans Jogja. One of the key factors contributing to user safety and comfort is the availability of facilities such as bus stops, pedestrian walkways, and sidewalks that are accessible for people with disabilities(Pratama, 2024). Trans Jogja management strives to ensure safety and comfort,

including by providing CCTV on every bus, complementing sidewalks, bus stops, and other facilities. Furthermore, to support safety for people with disabilities, flight attendants are provided to assist public transportation users if needed. Security support towards Trans Jogja bus stops is also supported by sidewalks to facilitate pedestrians. Sidewalks leading to Trans Jogja bus stops, both large and portable, are supported by sidewalks that are still functioning properly and are equipped with guiding blocks to make it easier for visually impaired people to reach the bus stop. However, there are still portable bus stops located in limited locations, so they are not supported by sidewalks. One of these is the ATK bus stop, which is located on the edge of a main road (Ringroad), making the bus stop not equipped with a sidewalk.

To maximize the services provided, service managers or developers need to prioritize the comfort experienced by transportation users. One form of comfort, in addition to CCTV, is the need for adequate vehicle condition and procedures. To ensure user comfort and safety, managers will conduct regular bus maintenance. Furthermore, to support the realization of disability-friendly transportation, improvements are also needed, for example, the Trans Jogja low-deck bus, which allows disabled users easier access to public transportation. Strengthening implementation is essential, especially to provide good and comfortable service for public transportation users (Liang et al., 2022). By establishing safe and comfortable public transportation, people can be encouraged to use it. This drive to use public transportation will be created if the government and public transportation operators can create a conducive social environment, which will then encourage people to use public transportation (Hamida & Kurniawan, 2023).

In addition to ensuring good transportation and infrastructure, safety and comfort can be achieved using technology, particularly for complaints. Users can submit complaints or reports through digital channels available on the Trans Jogja app and social media platforms. Trans Jogja's complaints service is available through customer service, which is connected to the WhatsApp app. The complaints service can be used as a platform for providing suggestions, input, and criticism regarding Trans Jogja services. Information about lost items can also be obtained by calling the complaint number or via Trans Jogja's Instagram social media platform.

CONCLUSION

This study evaluates the readiness of the Yogyakarta Special Region (DIY) Government to realize smart mobility through the Trans Jogja service. The analysis shows that efforts to develop Trans Jogja services have been carried out through fleet and route improvements, as well as the utilization of technology such as the Trans Jogja app. However, several aspects still require further attention to achieve optimal smart mobility implementation. Equitable service coverage, especially in buffer areas, is a major challenge. The development of inclusive and comfortable bus stop infrastructure also needs to be improved to support comprehensive individual mobility. In addition, optimizing the Trans Jogja app and increasing user digital literacy are needed to maximize the use of mobility-supporting technology. Finally, improving the security system and responsiveness to user complaints will strengthen public trust in Trans Jogja services. Overall, the DIY Government has demonstrated its commitment to developing smart mobility, but continuous improvement in various aspects of Trans Jogja services is still needed.

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