

Study of Pedestrian Pathways in the Medan Railway Station Area Based on Transit-Oriented Development (TOD) in Supporting the City's Heritage Area

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Abstract. Economic growth and increasing urbanization in urban areas have led to a surge in motor vehicle use, contributing to air and environmental pollution—including in Medan. This growth has resulted in higher traffic volumes in Medan's city center. In response, the Medan city government has begun planning public transportation systems such as bus rapid transit and railways to support daily mobility needs. As public transportation infrastructure is being developed—particularly around Medan Railway Station—there is a growing need for pedestrian pathways to facilitate smooth transitions between different modes of transport. Therefore, this study focuses on examining pedestrian routes in the Medan Railway Station area through a Transit-Oriented Development (TOD) approach. Using a qualitative descriptive method, the study aims to assess the current condition of pedestrian pathways in the area and evaluate the implementation of the TOD concept to improve mobility between public transport systems while supporting the area's function.

Keywords: Transit Oriented Development, Pedestrian Pathways, Urban Areas..

1 Introduction

Cities are constantly evolving, particularly in their infrastructure, to support the mobility of their residents. Rapidly growing cities require sustainable transportation solutions to meet the needs of their populations. A key principle in designing a sustainable city is ensuring that urban mobility and transportation systems are safe, affordable, accessible, and sustainable for everyone. This is achieved by developing user-friendly, efficient, and safe infrastructure that supports affordable public transportation. Additionally, emphasis is placed on promoting non-motorized transport options such as walking and cycling, as well as creating Transit-Oriented Developments (TOD) (Kementerian PUPR, 2017).

Transit-Oriented Development is a city planning concept centered around transit areas such as train stations, MRT stations, and bus stops. According to the Institute for Transportation and Development Policy (2017), TOD aims to create integrated urban designs that bring together people, activities, buildings, and public spaces. According to Wijaya (2018), the revitalization of station areas should not only focus on buildings and transportation systems, but also on the comfort, safety, and continuity of pedestrian pathways. Pedestrian routes that are integrated with mass transit modes can enhance accessibility, reduce dependence on private vehicles, and stimulate activities within the area. The implementation of Transit-Oriented Development (TOD) through pedestrian-oriented planning is considered capable of creating station environments that are more walkable, sustainable, and human-centered.

Tiara (2017), in a study on intermodal connectivity in the Transit-Oriented Development-based development of Manggarai Station, concluded that integration among transportation modes—such as railways, buses, public transport, and pedestrian pathways—plays a crucial role in creating an efficient and easily accessible transportation system. Good connectivity is not only determined by the physical distance between modes, but also by the ease of transfer, clarity of circulation, and user comfort. This study emphasizes that TOD-based station development should prioritize the integration of transportation systems and land use in order to support sustainable urban mobility. Meanwhile, Renne (2016) explains that Transit-Oriented Development (TOD) aims to create areas with high density, mixed land uses, and optimal access to public transportation, particularly within walking distance of transit nodes. The study also highlights the importance of policies, governance, spatial planning, and stakeholder participation in achieving effective TOD implementation. TOD is viewed as a strategic approach to reducing private vehicle use, improving urban environmental quality, and supporting sustainable urban development. This concept prioritizes easy connectivity through walking or cycling and places these areas near high-quality public transit that connects the entire city. Walking is a fundamental mode of transportation used by nearly everyone. As the most basic and economical form of mobility, walking requires adequate infrastructure to create a comfortable and pedestrian-friendly (walkable) environment. This infrastructure is a crucial component of urban planning, as outlined in various regulations and policies related to pedestrian facilities.

A pedestrian walkway is a designated area for people to walk and engage in other activities. Separated from motorized and non-motorized traffic, these paths are designed to provide a safe space that enhances the flow, safety, and comfort of pedestrians. In Indonesia, these walkways are commonly called **trotoar** and are typically 1.5 to 2 meters wide or more, running alongside public roads. Walkways serve as connectors between buildings, creating a safe zone for pedestrians away from high-speed vehicle traffic. By prioritizing pedestrians, these paths provide physical spaces that support human activity, making cities more walkable and people-friendly.

Medan, the capital of North Sumatra and one of Indonesia's largest metropolitan cities, has experienced rapid development in infrastructure, the economy, and other sectors. The city's population is also growing significantly, with 2020 BPS data showing 2,435,252 residents and a population density of 9,522.22 people per square kilometer. While its land area of 265.10 km² is relatively small—only 3.6% of the province—it hosts a large population. Geographically, Medan is located between 3° 30'–3° 43' North latitude and 98° 35'–98° 44' East longitude.

As one of the largest cities in western Indonesia, Medan attracts tourists, migrants, and students from both within the country and abroad. High urbanization and rapid economic growth have led to a significant increase in the use of motorized vehicles. In this context, intermodal transit facilities and transit areas are essential. The areas around Medan's transit points offer great potential for development, providing easy access and opportunities to enhance local activities. The relationship between transit activity and urban development is a key focus in urban planning and design, especially for managing Medan's continued growth.

Medan Train Station, located in the Medan Barat District, is a major transit hub in the heart of the city. As a bustling area, the station is a key node for various public transportation routes and is surrounded by office buildings and heritage sites. This strategic location makes it an ideal site for a Transit-Oriented Development (TOD) in Medan.

The area around the train station is highly appealing to both commuters and tourists. Its central location and proximity to historical buildings such as Pos Bloc, London Sumatera, the Bank Indonesia Building, and the Tjong A Fie Mansion attract people who are either working in or exploring the city's heritage. The pedestrian walkways in this area are essential for supporting the TOD concept and the surrounding urban life. They are vital for people transferring between different modes of transport or simply enjoying a walk through the city center, which also includes shopping areas like Jalan Ahmad Yani and Pasar Ikan Lama.

The pedestrian walkways around Medan Train Station are critical, given the area's central role as a transit hub and its proximity to key heritage sites. Initial observations reveal that the current walkways lack sufficient safety, comfort, and continuity. To truly support the Transit-Oriented Development (TOD) concept and enhance the city's heritage district, these paths need to seamlessly connect the station to bus stops, historical buildings, office areas, and shopping centers.

While the local government has improved vehicle routes around the station, pedestrian access has been largely overlooked. The current conditions are unsafe for walkers and inaccessible to people with disabilities. Therefore, further research is needed to study the Assessment of Pedestrian Walkways in the Medan Train Station Area Based on Transit-Oriented Development (TOD) to Support the City's Heritage District.

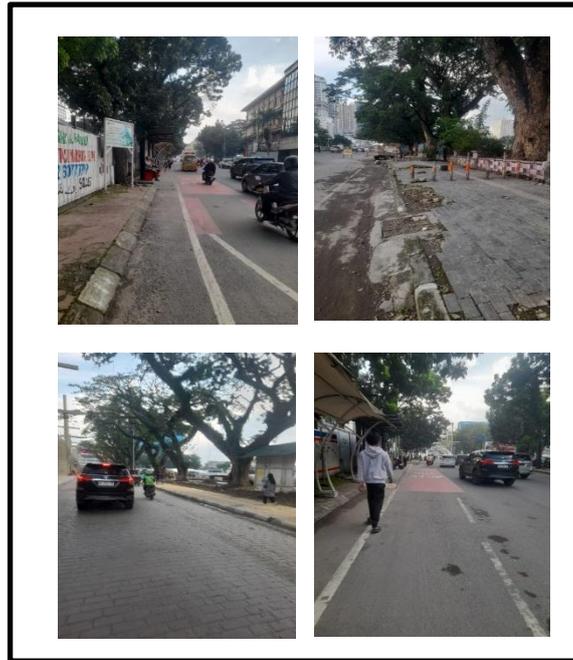


Fig. 1. Documentation of Pedestrian Pathways in Medan Train Station Area

2 Research Methods

The research method employed is a qualitative descriptive approach. The scope of the study encompasses the Medan Train Station area, specifically within a 500-meter radius of the station. Data collection was conducted over the course of one week. The primary focus of this research is to directly observe and analyze the pedestrian walkways in the Medan Train Station area. The study aims to evaluate the accessibility and integration of these pathways with public transportation facilities, particularly within the framework of Transit-Oriented Development (TOD). The ultimate goal is to determine how these pedestrian routes can better support and connect with the city's heritage district. This makes the area a strategic location for observing pedestrian pathways. The Medan Train Station area is divided into six segments: Java Street, Stasiun Street, Pulau Pinang Street, Ahmad Yani Street, Putri Hijau Street, and Raden Saleh Street.

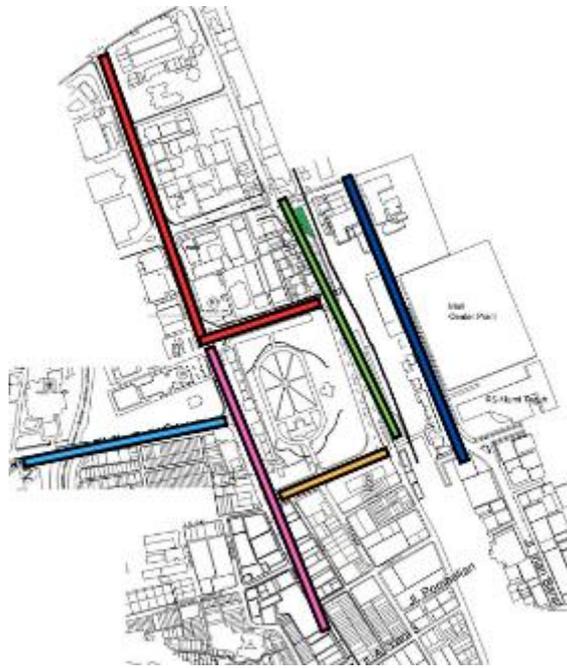


Fig. 2. Documentation of Pedestrian Pathways in Medan Train Station Area

The data collection techniques involve reviewing literature and similar studies, as well as conducting one week of observations on pedestrian walkways. A qualitative descriptive method is employed to:

1. Describe the condition of pedestrian walkways leading to public facilities in the Medan Train Station area.
2. Analyze the implementation of the Transit-Oriented Development (TOD) concept in the Medan Train Station area.

Following this, the data is processed and analyzed descriptively to examine the function of pedestrian walkways within the Transit-Oriented Development (TOD) concept at Medan Train Station, in order to support the city's heritage district.

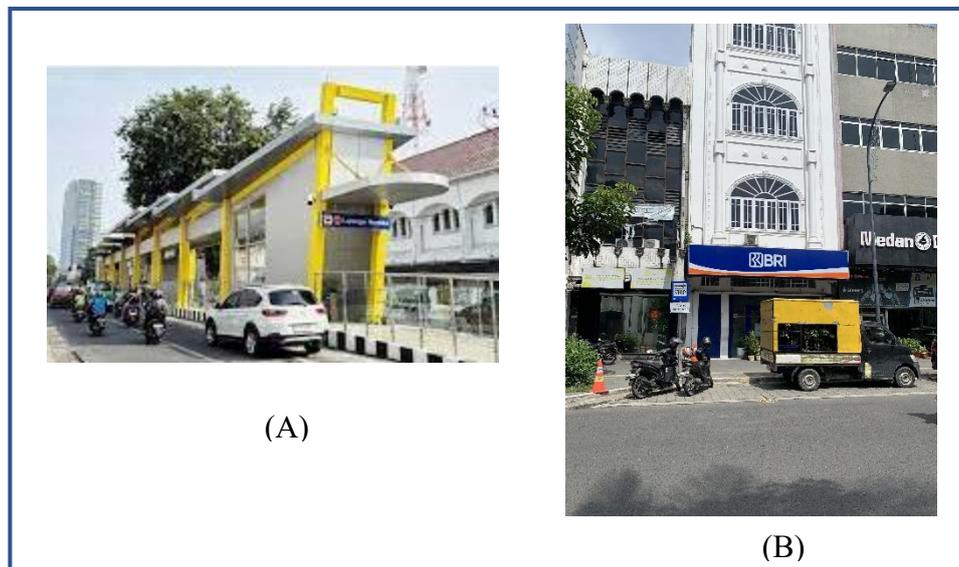


Fig. 3. Documentation of Halte in Medan Train Station Area

Based on the image provided, there are a total of six bus stops near Medan Train Station. One of them is a Bus Rapid Transit (BRT) shelter, shown in Figure A, located next to the Pos Bloc building, approximately 550 meters from the station. The remaining five bus stops, such as the one in Figure B, are scattered around the station area, with the farthest located about 750 meters away.

3 Results and Discussions

3.1 Descriptive Analysis of Pedestrian Pathways

The observation area for pedestrian walkways includes six streets: Jalan Jawa, Jalan Stasiun, Jalan Pulau Pinang, Jalan Ahmad Yani, Jalan Putri Hijau, and Jalan Raden Saleh. The analysis is conducted based on three main variables: surface condition, walkway dimensions, and the availability of supporting facilities. Based on field observations and surveys, the current condition of the pedestrian walkways is as follows:

a. Jalan Jawa

The pedestrian walkway along Jalan Jawa has an uneven surface. While certain sections—particularly in front of the Centre Point Medan building and parts of Uniplaza—are relatively smooth, the majority of the path is inconsistent and rough. Moreover, several segments are obstructed by street vendors, limiting the space available for pedestrian movement.



Fig. 4. Documentation of Description Pedestrian Pathways in Jalan Jawa, Medan.

b. Jalan Stasiun

The pedestrian pathway on this street is in poor condition. Only a small section features a smooth, non-slip surface. The width of the walkway is also insufficient, often forcing pedestrians to walk along the road shoulder. In addition, the street lacks basic pedestrian facilities, despite its strategic role as a direct connection between the train station and the nearby bus stop.



Fig. 5. Documentation of Description Pedestrian Pathways in Jalan Stasiun, Medan.

c. Jalan Pulau Pinang

The pedestrian pathways on Jalan Pulau Pinang generally meet good standards regarding surface quality, width, and available facilities. Nonetheless, the addition of tree shade and benches would greatly enhance the comfort and attractiveness of these paths for pedestrians.



Fig. 6. Documentation of Description Pedestrian Pathways in Jalan Pulau Pinang, Medan.

d. Jalan Ahmad Yani

The pedestrian pathway along Ahmad Yani Street is considered the best in the Medan Train Station area. Following its renovation in 2023, the path has become a comfortable and inviting space for both residents and visitors. It features a consistently smooth, non-slip surface and is wide enough to accommodate a high volume of foot traffic. In addition, the street is well-equipped with lighting and other supporting facilities, making it a model of high-quality urban design and a standout among the area's pedestrian routes.



Fig. 7. Documentation of Description Pedestrian Pathways in Jalan Ahmad Yani, Medan.

e. Jalan Putri Hijau

The pedestrian pathways in this area are generally in poor condition. Although certain segments—particularly in front of Podomoro Mall and a BRI bank—have relatively smooth surfaces, the sections near showrooms and government offices are uneven and pose safety risks.

In terms of width and supporting infrastructure, many of the walkways are level with the road surface and lack any pedestrian amenities. As a result, the area is unsafe and does not align with the principles of Transit-Oriented Development (TOD).

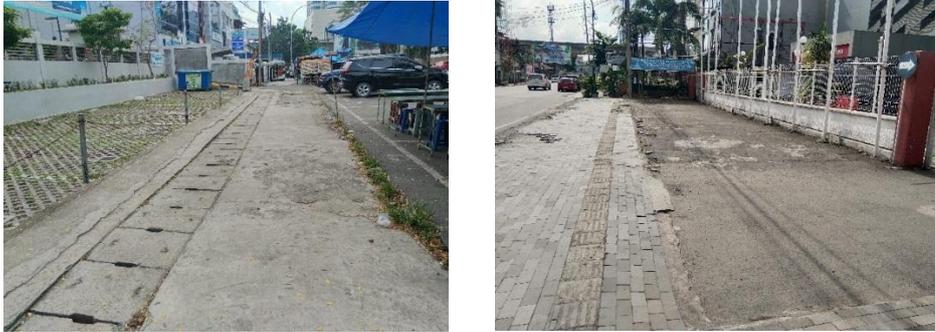


Fig. 8. Documentations of Description Pedestrian Pathways in Jalan Putri Hijau, Medan.

f. Jalan Raden Saleh

The pedestrian pathway along Raden Saleh Street is in fairly good condition, featuring a relatively smooth surface and sufficient width. However, it lacks several essential amenities for pedestrians, including seating, accessible paths for individuals with disabilities, and adequate shading.

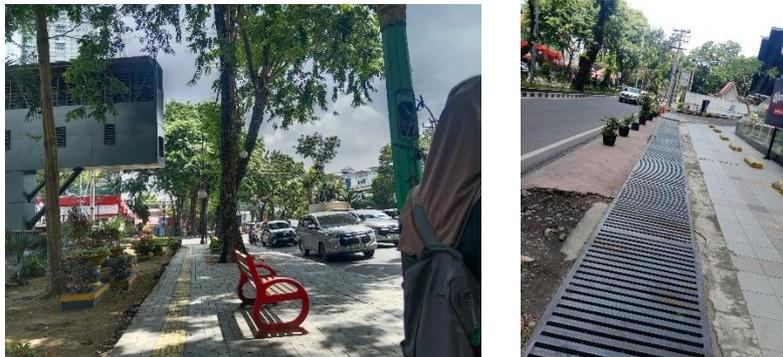


Fig. 9. Documentation of Description Pedestrian Pathways in Jalan Raden Saleh, Medan.

3.2 Analysis of Implementation TOD in Medan Train Station Area

This analysis assesses the extent to which the Medan Train Station area aligns with the principles of Transit-Oriented Development (TOD), focusing on five key criteria:

a. Walkability

- Pedestrian Pathways: Sidewalks are generally present, with the southern section of the station (Jalan Ahmad Yani and Jalan Pulau Pinang) being approximately 90%

developed. In contrast, the northern section, which includes Jalan Putri Hijau and Jalan Stasiun, is only around 60% complete.

- Crosswalk: Pedestrian crossings are minimal and limited to basic zebra crossings at selected locations to link sidewalks.
- Building Frontage: The most vibrant and pedestrian-friendly building facades are found along Jalan Ahmad Yani.
- Shading: Shade is mainly provided by existing roadside trees.

b. Cyclability

Cycling Infrastructure: The area lacks dedicated bicycle lanes. Cyclists must share lanes with motorcyclists, and there are no designated bicycle parking facilities.

c. Connectivity

- Route Efficiency: Walking and cycling routes are not more direct or efficient compared to routes for motorized vehicles.
- Transit Integration: The connection between the train station and the nearby Metro Deli bus stop is weak and underdeveloped.

d. Transit

Transit Accessibility: The walking distance to the nearest bus stop on the western side of the station is less than 750 meters.

e. Land Use Mix

- Complementary Land Use: The area features a mix of land uses that supports a more efficient and sustainable urban environment.
- Public Spaces: A public plaza offers space for relaxation and recreational activities.

4 Conclusion

Overall, pedestrian ways exist around the Medan Train Station, but many are not up to standard. Some sections have even been privatized and are used by vendors.

The local government's focus for pedestrian path improvements has been primarily on the southern side of the station, specifically on Ahmad Yani street and Pulau Pinang Street, where the walkways have been revitalized. In contrast, the northern side has been largely neglected. Any well-maintained sections on the northern side are typically a result of being in front of private buildings like a mall.

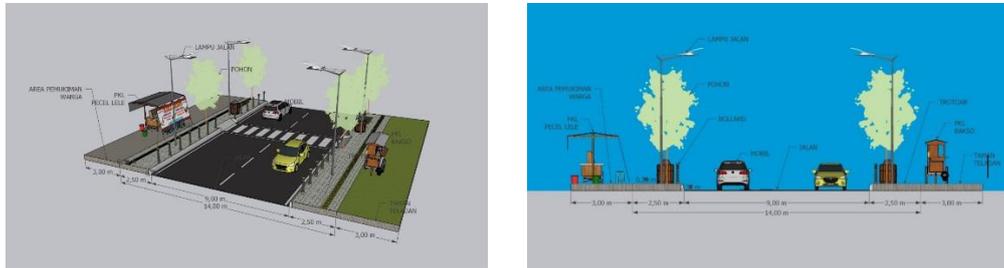


Fig. 10. Design of Pedestrian Pathways and section of street in Medan Train Station.

Figure 10 showcases effective pedestrian walkway designs that support smooth foot traffic while accommodating street vendors. These designs reflect the implementation of TOD principles, including walkability, connectivity, transit access, cyclability, and sociability in the Medan Train Station area.

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