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ANALYSIS OF PENGGARON TERMINAL USER ACTIVITIES USING PERSON-CENTERED MAPS, PLACE-CENTERED MAPS, AND PHYSICAL TRACE METHODS

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Abstrak

Terminal Penggaron Kota Semarang, sebagai salah satu terminal utama, menghadapi masalah terkait penggunaan ruang yang belum optimal. Banyak pengguna lebih memilih beraktivitas di sekitar lampu merah pintu masuk terminal daripada di dalam terminal itu sendiri, yang menyebabkan penumpukan kendaraan dan parkir liar bus. Penelitian ini bertujuan untuk mengoptimalkan penggunaan terminal dan mengatasi masalah parkir liar dengan menggunakan metode Person Centered Maps, Place Centered Maps, dan Physical Trace. Metode ini digunakan untuk memetakan pola pergerakan pengguna, mengidentifikasi penggunaan ruang, dan menganalisis jejak fisik yang ditinggalkan di terminal. Hasil penelitian menunjukkan bahwa pengguna lebih sering berkumpul di luar terminal, serta terdapat ketidakteraturan dalam pengelolaan ruang dan parkir yang memengaruhi kelancaran lalu lintas. Berdasarkan analisis tersebut, disarankan penataan ulang area parkir, peningkatan fasilitas di dalam terminal, serta pemasangan rambu yang jelas untuk mengoptimalkan fungsi terminal. Implementasi solusi ini diharapkan dapat meningkatkan keamanan, kenyamanan, dan efisiensi penggunaan terminal, serta mendukung kelancaran arus lalu lintas di sekitar area Terminal.

Kata Kunci: Terminal Penggaron, Parkir liar, Person Centered Maps, Place Centered Maps, Physical trace, Pengelolaan Ruang.

Abstract

Penggaron Terminal in Semarang City, as one of the main terminals, faces problems related to the use of space that is not optimal. Many users prefer to do activities around the red light at the terminal entrance rather than inside the terminal itself, which causes vehicle congestion and illegal bus parking. This study aims to optimize the use of the terminal and overcome the problem of illegal parking by using the Person Centered Maps, Place Centered Maps, and Physical Trace methods. These methods are used to map user movement patterns, identify space usage, and analyze physical traces left at the terminal. The results of the study indicate that users gather more often outside the terminal, and there is irregularity in the management of space and parking that affects the smoothness of traffic. Based on this analysis, it is recommended to rearrange the parking area, improve facilities inside the terminal, and install clear signs to optimize the function of the terminal. The implementation of this solution is expected to improve the safety, comfort, and efficiency of terminal use, as well as support the smooth flow of traffic around the Terminal area.

Keywords: Terminal Penggaron, Illegal Parking, Person Centered Maps, Place Centered Maps, Physical Trace, Space Management.

1. INTRODUCTION

Semarang City is one of the big cities in Indonesia with a population that continues to grow every year. Along with the increase in population in an urban area, the need for public transportation also increases, so the number of existing transportation fleets needs to be increased to avoid a shortage of transportation modes for residents who will travel (Warpani, 1990). Transportation involves the demand and supply of services. The demand for transportation services arises because of the need to move people and goods from one area to another (Setyobudi NI et al., 2024). According to Nasution (2004), the demand for transportation services arises because of underlying needs, such as the desire to go on vacation, go to school, shop, visit sick family, and so on. Therefore, the supply of transportation services must be seen from the aspect of the capacity of the transportation facilities available to meet this demand.

Terminals are important elements in the transportation system that have a primary role as a temporary stopping point for public vehicles to pick up and drop off passengers and goods before continuing their journey to their final destination. In addition, terminals also function as a center for control, supervision, regulation, and operation of passenger and goods transportation flows, which aims to facilitate the process of movement and distribution of passengers and goods (Department of Transportation, 1996). Based on Law Number 22 of 2009 concerning Traffic and Road Transportation, a terminal is defined as a base for public motorized vehicles that functions to regulate arrivals and departures, pick up and drop off passengers or goods, and as a transfer point between modes of public transportation.

Public transportation has a very important and strategic role in supporting the development and construction of cities, both in the economic, social, cultural, and educational sectors. Therefore, the management of public transportation must be carried out properly. Public transportation on the highway cannot be separated from the existence of terminals, which function as a place to transfer passenger flow from one mode of transportation to another, in order to facilitate and increase the efficiency of movement (Ngara PM et al., 2024).

Penggaron Terminal in Semarang City is one of the main terminals that plays an important role in supporting transportation mobility in Semarang City and its surroundings. As one of the centers of intercity transportation activities, Penggaron Terminal should be able to function optimally to meet the needs of transportation service users. However, in reality, this terminal still faces problems related to inefficient use of space. Many users prefer to do activities around the red light at the terminal entrance rather than inside the terminal itself. This causes a buildup of vehicles and unorganized activities, including illegal parking of intercity buses in the terminal entrance area.

This problem not only disrupts the smooth flow of traffic around the terminal, but also causes various other negative impacts, such as potential accidents, passenger discomfort, and wasted time. Therefore, this study aims to optimize the use of the Penggaron terminal so that it can function optimally, and eliminate illegal parking of intercity buses around the red lights that hinder the smooth flow of vehicles. Thus, the terminal is expected to become an efficient and safe transportation center for transportation service users.

The expected benefits of this research are very important, including to improve the safety of terminal users, smooth traffic around the terminal area, the comfort of passengers using terminal facilities, and increase the efficiency of terminal usage time as a whole. By achieving these goals, it is hoped that Penggaron Terminal can be an example of good and efficient terminal management in the city of Semarang.

This study uses user activity mapping as an analysis to obtain a more comprehensive picture of human interaction patterns with terminal space using the behavioral mapping method. In environmental and behavioral architecture studies, behavioral mapping is often used to improve design quality, especially through a technique known as Post-Occupancy Evaluation (Zohrah, Hartono, 2005). Here are some methods used for behavioral mapping:

1) Person Centered Maps

This method focuses on human movement over a certain period of time. In Person Centered Mapping, researchers observe individuals or groups who are the subjects of the study. The process includes following the movements and activities carried out by the people being observed. Observations are made by sketching and recording activities on a base map (Setiawan, 2010)

2) Place Centered Maps

This method is used to understand how individuals or groups utilize, use, or adjust their behavior in certain situations of time and place. The focus of this method is on one specific location, both small and large scale (Zohrah, Hartono, 2005).

3) Physical Trace

Physical traces are a research method in the study of human behavior that aims to identify traces that can be used as a reference for design improvements. Physical traces can also be used to analyze the design of an environment and assess whether the environment has functioned effectively (Utami, 2003).

Based on the research theory used, recommendations are then formulated to optimize terminal usage, reduce illegal parking, and improve the quality of service for users.

2. METHODS

This study is a qualitative study with an exploratory-descriptive approach, which aims to observe the object of research and explain the conditions that occur in the physical aspects and user behavior of the space. This study also analyzes the influence of physical background on user behavior at the terminal, and explores the attributes that exist at the Penggaron Terminal.

Qualitative research focuses on understanding the uniqueness of something specific. Researchers try to explore these aspects through in-depth observation of individuals, community groups, or certain locations (Fatchan, 2011).

The implementation of the research method using mapping, the mapping method is considered an effective approach to understanding and exploring various aspects, such as typology, time, gender, age, and human activities in a certain space that has a spatial distribution. Therefore, behavioral mapping can produce a picture of the use of space in spatial form (Shirazi, 2019). Mapping is carried out with Person Centered Maps, Place

Centered Maps, and Physical Trace at the Penggaron Terminal in Semarang City which can be carried out regularly through several stages, as follows:

1) Preparation and Initial Data Collection

The preparation stage is carried out in two parts, the first is location selection: determining the area that will be the focus of research at the Penggaron Terminal, especially the parts that experience less than optimal use. Then the second is problem identification. Based on the initial analysis, determine the main problems that exist at the terminal, such as illegal bus parking, vehicle congestion at the entrance, or activities that are mostly carried out around red lights.

2) Observation and interviews

Conducting direct observation of user movement patterns at the terminal. Observing how passengers and bus drivers choose locations for activities, such as waiting or stopping places. In addition, interviews were conducted with several terminal users to obtain information about their habits and preferences in carrying out activities at the Penggaron Terminal.

3) Mapping User Movements

The results of the observation are then used to create maps or diagrams that show user movement paths at the terminal. This map can show places that are frequently visited by users, as well as places that are not used optimally. This stage will show the mapping of Person Centered Maps and Place Centered Maps.

4) Behavioral Pattern Analysis

Conducting an analysis after creating a mapping aims to find out whether there is a tendency for users to prefer to gather or wait outside the terminal (for example, around red lights) compared to inside the terminal. This can help identify areas that need improvement or facility enhancement.

5) Analysis and Preparation of Recommendations

After data is collected from the three methods, conduct a thorough analysis to identify the main problems that hinder the optimization of terminal use. Pay attention to the results obtained from Person Centered Maps, Place Centered Maps, and Physical Trace.

Use the data to analyze the relationship between user behavior and the physical condition of the terminal. The results will show any deficiencies in the design or management of space that can be improved. This can be the basis for providing recommendations for improvement, such as rearranging parking areas, installing clear signs or road markings, or improving facilities that better support users.

Based on these findings, prepare recommendations that include practical solutions to eliminate illegal parking, optimize space use, and improve the comfort and efficiency of terminal use.

6) Solution Implementation and Evaluation

Based on the existing recommendations, make improvements or changes to the terminal management, such as rearranging the intercity bus parking area, installing signs, or improving the passenger waiting room.

After implementing the solution, conduct an evaluation to measure whether the changes made are effective in improving traffic flow, security, and comfort for terminal

users. Further observation and analysis can be carried out to ensure that the terminal functions optimally according to needs.

The following steps will be used in the research so that it can provide a clear picture of the problems that exist at the Penggaron Terminal in Semarang City and practical solutions that can be applied to optimize the use of the terminal and improve the quality of service for users.

3. RESULT AND DESCUSSION

Penggaron Terminal, located in East Semarang, is one of the type B terminals that has a strategic location near the main road intersection. This terminal is surrounded by several facilities such as TransMart, Central City Mall, KFC, and gas stations. With this strategic position, Penggaron Terminal is expected to become a busy and efficient transportation center. However, in reality this terminal tends to be quiet, even though it has quite complete facilities.

Facilities available at Penggaron Terminal include a waiting room, BRT corridor 1 stop on the Penggaron-Mangkang route, a place to eat, an information room, a terminal officer's office, a prayer room, and a fairly large parking area for buses and private vehicles. However, the comfort and smoothness of activities at this terminal are still hampered, which results in less than optimal use of space. One indication of this problem is the presence of illegal intercity bus parking around the terminal entrance which disrupts traffic flow and reduces the comfort of terminal users.

This study aims to identify the causes of the low level of use of the Penggaron Terminal and provide solutions to optimize the utilization of the terminal. Through better space management, improved facilities, and rearrangement of parking areas, it is hoped that this terminal can function more effectively, support the smooth flow of transportation, and increase comfort for its users.

Penggaron Terminal is located approximately 200 meters from the main road which is an illegal parking area, below is a sketch of the terminal location.

Figure 1. Location of Penggaron Terminal
(Source: Anggraini DS et al, 2025)

Penggaron Terminal Details

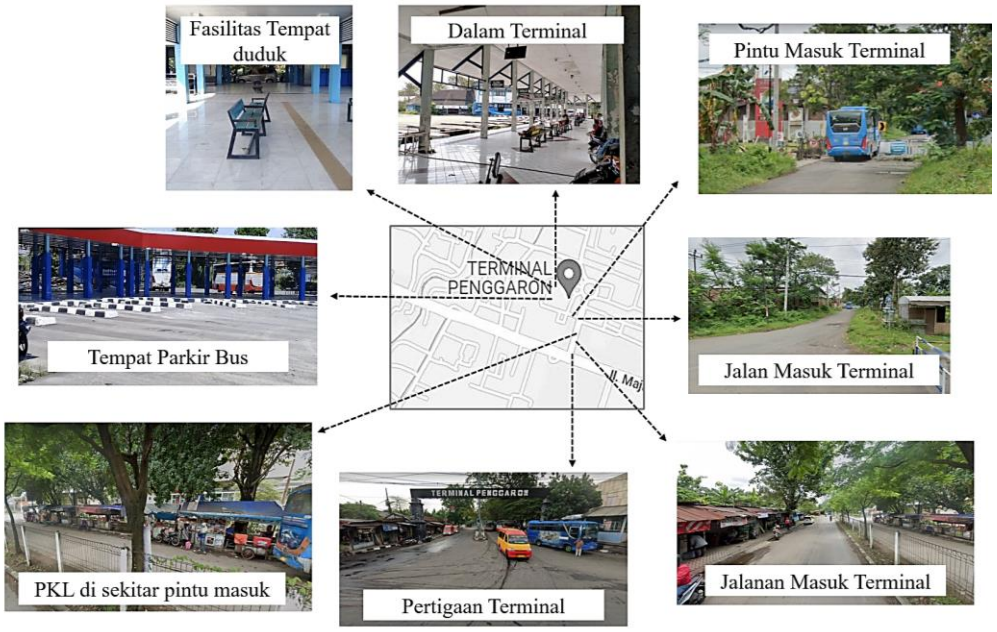


Figure 2. Penggaron Terminal Details
(Source: Anggraini DS et al, 2025)

In this study, several main facilities in Penggaron Terminal will be discussed that are related to the comfort, smoothness, and efficiency of terminal space usage. Several facilities that are the main focus are the waiting room, bus parking area, terminal entrance access, illegal parking problems, and the presence of illegal street vendors that can affect the comfort and smoothness of terminal operations.

1) Waiting Room

The waiting room at Penggaron Terminal plays an important role in providing comfort for passengers waiting for departure. However, the problem of suboptimal utilization of the waiting room needs to be analyzed, such as whether the space is adequate to accommodate passengers or whether the condition of the facilities in the waiting room needs to be improved to create a more comfortable and safe atmosphere for users.

2) Bus Parking Area

The bus parking area at Penggaron Terminal is quite large, but its utilization still needs to be evaluated. Poorly organized arrangements can cause congestion and suboptimal use of parking space. This study will examine whether the bus parking area has been managed properly, whether the parking flow is efficient, and whether there is a need to rearrange the bus parking area to better support the smooth flow of vehicles and user comfort.

3) Access to the Terminal

Access to the terminal is very important in ensuring the smooth flow of users, both passengers and buses, who will enter and exit the terminal. The sidewalks in this area are badly damaged, this can hinder pedestrian travel and the comfort aspect is certainly not met properly.

4) Illegal parking

One of the significant problems in Penggaron Terminal is the illegal parking that often occurs around the terminal entrance. This illegal parking not only disrupts the smooth flow of traffic but also has the potential to create a dangerous situation for terminal users. This study will explore the main causes of illegal parking and provide recommendations to overcome this problem.

5) Street vendors

The presence of illegal street vendors that often appear around the terminal is also one of the factors that can affect comfort and smoothness in the terminal. In addition to disrupting aesthetics, these illegal street vendors often utilize areas that should be designated for vehicle or pedestrian traffic. This study will analyze the impact of the presence of illegal street vendors on terminal operations and provide solutions related to better space management.

By discussing and analyzing these five facilities, this study aims to provide a clearer picture of the problems at the Penggaron Terminal and formulate solutions to optimize terminal usage and improve the comfort and smoothness of terminal operations as a whole.

Architectural Feature Maps

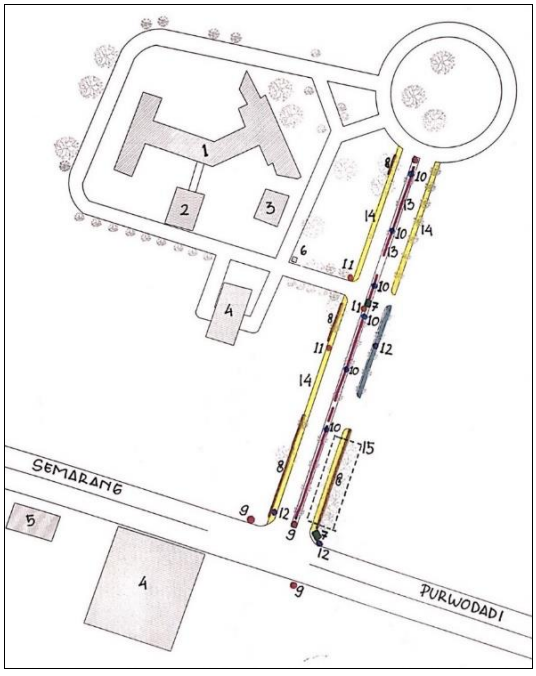


Figure 3. Architectural Feature Maps
(Source: Anggraini DS et al., 2025)

Table 1. Feature maps description

Keterangan :
1. Terminal
2. Halte BRT Terminal
3. Kantor
4. SPBU
5. Halte BRT JL. Majapahit
6. Pos Satpam
7. Pos Jaga
8. PKL di Pinggir Trotoar
9. Lampu Merah
10. Lampu Jalan
11. Penunjuk Arah Terminal
12. Rambu-Rambu Dilarang Berhenti
13. Pajar Jalan
14. Trotoar
15. Properti Alamiah Pohon

(Source: Anggraini DS et al., 2025)

There are several aspects of natural properties that can be found along the road to Penggaron Terminal. One of them is shade trees with large canopies that provide shade and comfort for road users, as indicated by number 15. This condition creates a more comfortable environment, especially during the day.

Along the road to the terminal, there is a 1 meter wide sidewalk that functions as a pedestrian path. However, this sidewalk is often used by street vendors (PKL) to sell, which can interfere with the comfort and safety of pedestrians. This is illustrated by the number 8 in the existing sketch.

Around the intersection area between Penggaron Terminal, KFC, and Transmart, there are three no-stop signs installed around the intersection. However, public transportation drivers still violate the rules by stopping around the intersection to wait for passengers. This shows that there is disorder in the implementation of traffic signs that can affect the smooth flow of vehicles around the terminal.

Figure 4. No Stopping Sign
(Source: Anggraini DS et al., 2025)

Person Centered Maps

The movement pattern of public transportation at Penggaron Terminal can be divided into two main routes, namely the route to Semarang City and the route to Purwodadi, as well as the travel route that will be taken by each public transportation according to the final destination. In the Person Centered Map, this travel sketch illustrates how terminal users, both passengers and drivers, interact with the physical space of the terminal. The following is a travel sketch.

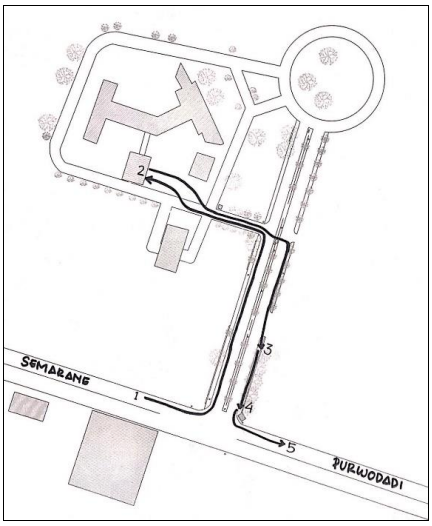


Figure 5. Person Centered Maps
(Source: Anggraini DS et al., 2025)

On the route to Semarang City indicated by number 1, public transportation vehicles usually stop in the area provided inside the terminal, although sometimes there are vehicles that stop outside the official terminal area, such as around the entrances indicated by numbers 3 and 4, which can cause traffic disruption. Meanwhile, on the route to Purwodadi, public transportation tends to be more orderly, but sometimes also experiences congestion due to irregular parking in areas closer to the terminal exit.

This map identifies two main patterns of terminal user movement: first, passengers moving towards bus stops or public transportation stops according to their destination routes, and second, drivers waiting or in the process of picking up and dropping off passengers. In addition, the Person Centered Map also shows important interaction points such as where passengers gather and where public transportation waits to depart. Mapping these patterns will help in identifying areas that need to be reorganized to improve the smoothness of movement and comfort of terminal users.

Place Centered Maps

Mapping using Place Centered Map around Penggaron Terminal illustrates the pattern of user activity that is focused in the area around the terminal entrance, especially at the T-junction connecting the terminal to the main road. This sketch shows that most users tend to be active outside the terminal, precisely around the meeting point of the road leading to the terminal, with various types of activities carried out.

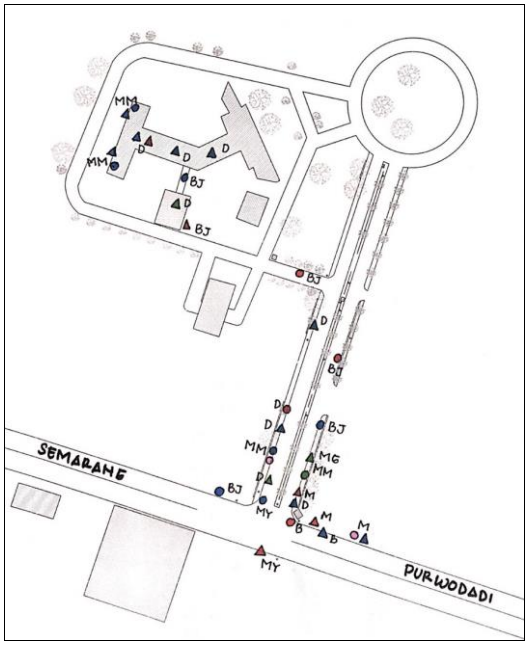


Figure 6. Place Centered Maps Sketch
(Source: Anggraini DS et al., 2025)

Table 2. Place Centered Map Description

Jenis Kelamin	Keterangan :
Pria : ▲	BJ : Berjalan
Wanita : ●	MM : Makan / Minum
Umur	M : Menunggu
0 – 11 Tahun (Anak-anak)	D : Duduk
12 – 25 Tahun (Remaja)	MG : Mengobrol
26 – 45 Tahun (Dewasa)	B : Berdiri
40 Tahun Keatas (Lansia)	MY : Menyebrang
Tanggal 3 Oktober 2024 Pukul 09.35	

(Source: Anggraini DS et al., 2025)

There are various activities clearly visible, including: walking, eating or drinking, waiting for transportation, sitting, chatting, standing, and crossing the road. Walking activities are dominant because many users cross towards the bus stop or vehicle stop. Eating and drinking activities occur around stalls or places available in this area, while waiting activities are mostly done by passengers waiting for public transportation.

Crossing the street is also part of a fairly visible activity pattern, considering that many users are trying to reach certain places across the street. This condition indicates that the area around the terminal entrance is a center of activity leading to various destinations, while the space inside the terminal is not optimally utilized.

The results of this mapping show that the area around the terminal entrance is the center of activity concentration, even though facilities inside the terminal are already available. This indicates the need to improve the comfort and attractiveness of facilities inside the terminal to attract more users to do activities in the space provided, as well as to reduce density and disorder outside the terminal.

Physical Trace

The Entrance T-junction to Penggaron Terminal, especially in the part marked with a red box, shows significant crowding or density. This area is a meeting point for passengers who are going to get on or off the bus. This indicates that the T-junction is a very busy location,especially when public transportation stops to wait or pick up passengers.

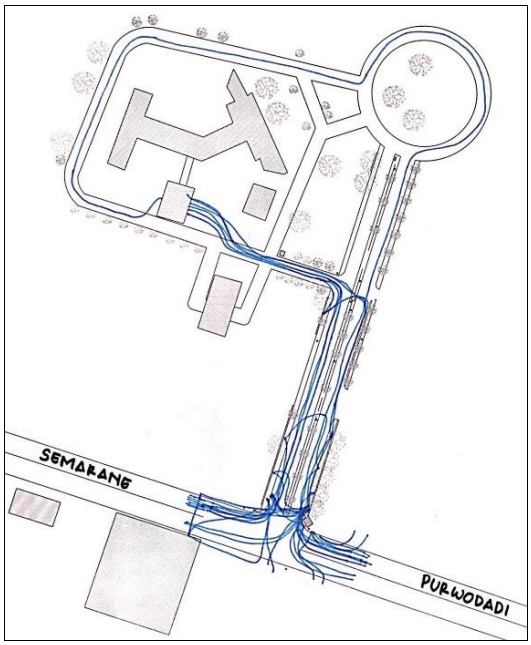


Figure 7. Physical Trace Sketch
(Source: Anggraini DS et al., 2025)

Figure 8. illegal vehicle parking
(Source: Anggraini DS et al., 2025)

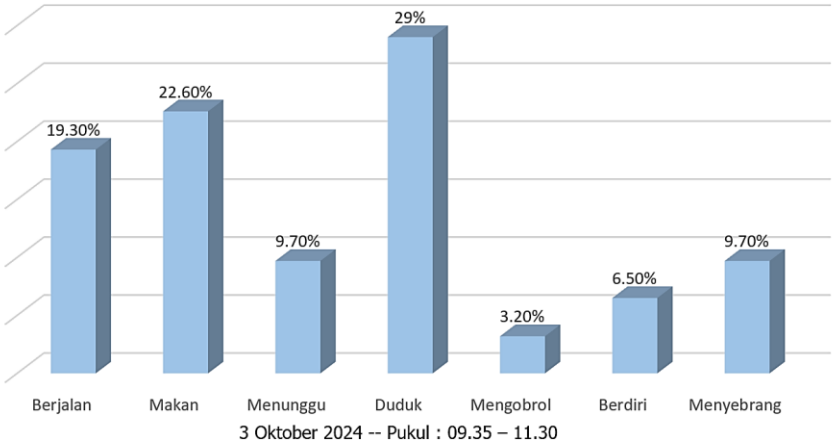
Buses that dominate this area mostly head towards Purwodadi and Gubug. Bus drivers tend to choose to park their vehicles in this T-junction area, because the location provides quite good shade thanks to the existing shade trees, and is easily accessible by passengers who want to get on or off. The decision of bus drivers to stop here is also influenced by the high convenience and accessibility, although this causes problems in the smooth flow of traffic and creates irregular conditions around the terminal.

The physical traces left behind, such as the traces of passengers who often gather or wait around this area, indicate that the place is a focal point of activity, but is not well planned. This worsens the existing crowding conditions, hinders the smooth movement of vehicles, and creates potential disturbances to the order and comfort of other terminal users. Mapping these physical traces provides important insight into the need to redesign the management of parking spaces and lanes around the terminal to reduce congestion and improve the efficiency of space use.

Diagram Activity

The following is a diagram of activities carried out by people around the Penggaron Terminal, on October 3, 2024 from 09.35 to 11.30. The most common activity is sitting, and the least common activity is chatting.

Diagram 1. activity diagram



(Source: Anggraini DS et al., 2025)

4. CONCLUSIONS

The main problem that occurs in Penggaron Terminal is that terminal users or passengers from Penggaron Terminal who are going to Purwodadi tend to look for buses in the T-junction area, without first entering the Terminal. This was identified because in the T-junction area users feel more attribute aspects than being in the Terminal, for example easy visibility, there are also scientific property aspects, namely shady trees, and because the Terminal does not meet the attribute aspects for users.

From the results of observation and mapping, it can be concluded that the main problem faced by the terminal is the irregular use of space, which results in disruption of traffic flow, decreased user comfort, and the potential for accidents. Therefore, a comprehensive analysis of user movement patterns, space management, and physical traces left by activities at the terminal is the basis for formulating solutions that can optimize the function of the terminal.

Suggestions

Based on the research findings, several suggestions that can be given to increase the use of the Penggaron Terminal in Semarang City include:

1) Rearrangement of the Parking Area

It is necessary to rearrange the intercity bus parking area around the terminal entrance. Providing clearer signs or road markings and more organized parking arrangements can reduce congestion and illegal parking.

2) Evaluation of Natural Properties

Natural properties that provide shade in the entrance traffic light area must be removed so that activities in this area are not hot and uncomfortable, natural properties can be a necessary consideration in the terminal so that visitors feel comfortable when they are in the Terminal.

3) Improvement of Facilities in the Terminal

To attract more users to do activities in the terminal, it is important to improve existing facilities, such as seating, supporting facilities (toilets, stalls, information places), and a more comfortable and safe waiting room.

4) Improvement of Design and Space Management

Terminal space management must be adjusted to user needs. Rearranging the layout of the terminal area to separate bus and pedestrian lanes and improving accessibility can improve traffic flow and user comfort.

5) Installation of Clear Signs and Information

Installation of more informative and clear signs throughout the terminal area will help users to more easily understand the traffic flow and use of space in the terminal.

6) Routine Evaluation and Monitoring

After the implementation of the solution, routine evaluations need to be carried out to measure the effectiveness of the changes implemented. Periodic observations will ensure that the terminal continues to function optimally according to needs and anticipate problems that may arise in the future.

By implementing these suggestions, it is hoped that the Penggaron Terminal in Semarang City can become a more efficient, safe, and comfortable terminal for all users, and support the smooth flow of transportation in Semarang City.

5. REFERENCES

Dirjen Perhubungan Darat (1996). Pedoman Teknis Penyelenggaraan Fasilitas Parkir Evaluasi Kelayakan Terminal Angkutan Umum Di Kecamatan Tobelo Tengah di susun oleh Meyanti Sartin Gumabo 1, Dr. Ir. James Timboeleng, DEA², & Ir. Papia

Fatchan. 2011 . Metode Penelitian Kualitatif. Surabaya: Jenggala Pustaka Utama.

Nasution, N. (2004). Manajemen Transportasi. Yogyakarta: Ghalia Indonesia.

Ngara PM, Tamelan PG, Selan MM (2024). Evaluasi kelayakan terminal angkutan umum di Kota Wikabubak Kabupaten Sumba Barat. Universitas Nusa Cendana, Nusa Tenggara Timur.

Republik Indonesia (2009). Undang-Undang Nomor 22 Tahun (2009) Tentang lalu lintas dan Angkutan Jalan. Jakarta.

Setyobudi NI, Mudiyono R, Soedarsono (2024). Efektivitas dan Efisiensi Transportasi Publik Trayek Penggaron-Kalibanteng Kota Semarang (Trans Semarang Koridor 1). Universitas Islam Sultan Agung, Semarang.

Setiawan, Haryadi (2010). Arsitektur, Lingkungan dan Perilaku: Pengantar ke Teori, Metodologi,dan Aplikasi, Gadjah Mada University Press.

Shirazi, M. R. (2019). Mapping neighbourhood outdoor activities: space, time, gender and age. Journal of Urban Design, 24(5), 715–737. https://doi.org/10.1080/13574809.2018.1458607

Utami, Wahyu, (2003). Children Physical Traces in Open Space (Case Study Ahmad Yani Park, Medan).

Warpani, S. (1990). Merencanakan sistem perangkutan.Bandung: Penerbit ITB, 48. ISBN 979-8001-40-X.

Zohrah Laila, Hartono Rudi (2005). Studi Perilaku Mahasiswa Arsitektur Terhadap Kantin Jurusan Teknik Arsitektur Fakultas Teknik Universitas Lambung Mangkurat. Universitas Lambung Mangkurat, Kalimantan Selatan.