

The Analysis of Pedestrian Service in Railway Station Area: A Case Tanah Abang Station, Jakarta

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Abstract

Tanah Abang Station is a means of transportation that is in great demand by traders and buyers by passing through the sidewalk, which is currently used to connect pedestrians to move from one place to another. Due to its strategic location and the middle of the city, many visitors pass by the sidewalk near station. This study analyzes the level of service of sidewalk facilities in the Tanah Abang station environment, where the current facilities are whether analysis method used is Index Performance Analysis (IPA) with a value of Satisfaction and Importance of Pedestrian Facilities in the Tanah Abang station area. From the satisfaction and importance comparison table results, an average satisfaction index of 4.14 was obtained, an average interest index of 3.34, and a gap average of -0.76.

Keywords: Pedestrian, Railway station area, service.

1. Introduction

In the current era of advanced transportation, it is common for people to mobilize using modes of transportation even though the distance traveled is not too far. The urgency of everyone also influences this, but walking is repositioned as the potential to 'ease the position,' which reflects social, physical, and individual factors of inequality in walking (Massingue, 2021). Traffic on pedestrian facilities is an initial problem for all traffic. However, users of pedestrian facilities can influence and provide benefits to the surrounding social environment. Historically in Europe, traffic in urban areas began to change for the better by guaranteeing pedestrian rights in 1960. Researchers have developed their research by adding safe areas to traffic, home zones, and *meeting zones*. So that around 2000 '*walkable*' areas and community behavior had to grow (Yoon, 2020).

Based on the research results by a researcher from Stanford University, United States of America, published in the Journal of Nature, states that Indonesia is one of the countries in Asia that is lazy to walk. The study stated that Indonesian citizens only walk 3,513 steps per day, while the global average is 5,000 steps a day (Budiyanto, Priyomarsono, Trisno, & Lianto, 2020). The development of pedestrian infrastructure also faces limited road space. Pedestrians are often neglected in urban development, whereas motorized vehicles have been a top priority for some time. The state does not fulfil the need for pedestrian facilities, and the function of facilities is shifting from public spaces to parking lots or places for street vendors (PKL). The gap that occurs is due to the lack of a facility provision approach that considers environmental characteristics and the behavior and preferences of pedestrians in Indonesia (Isradi, Dermawan, Mufhidin, Sari, & Prasetyo, 2020).

Factors causing the laziness of Indonesian people to walk are inadequate pedestrian facilities and an unfulfilled sense of security and comfort. The direct use of foreign design codes and the unavailability of well-recognized local parameters for pedestrian facilities have become a concern in developing countries.

This study, a study of the movement of pedestrians on the sidewalks in the capital city of Dhaka, Bangladesh, has been carried out to determine the free-flowing walking speed and identify the causative factors' influence. (Rahman, Ghani, Kamil, & Mustafa, 2012).

Sidewalks are pedestrian paths generally parallel to the road and higher than the surface of the road pavement to ensure the safety of the pedestrians concerned. The mode of transportation that cannot be separated from a travel chain is walking. The activity of walking must be involved in all types of transportation used to reach a destination. Walking can support the mode shift from private to public transport (Wibowo & Nurhalima, 2018).

Society continues to develop, and the population continues to grow, so the level of service provided to accommodate this most basic form of transportation is an indicator of the development of a society (Chen, 2017). The level of service is a condition that can be described through the factors that influence it, namely travel time, freedom of maneuver, obstacles, comfort, and security (Henson, 2000). In determining the level of service, a standard or measuring instrument is needed so that a pedestrian can be said to have a good level of service. Several factors affect the level of service of a pedestrian facility, which can be divided into two: external and internal factors. Users of the pedestrian facilities themselves can feel external factors, namely from tangible manifestations, for example, the conditions of the construction of pedestrian facilities, the influence of the speed of the surrounding vehicles, and the availability of separate lanes for vehicles and pedestrians (Raji, 2021). Internal factors, namely the characteristics and behavior of pedestrian facility users themselves

The pedestrian facilities mentioned in the technical planning can be grouped into three groups. The first is the sidewalk, which is a path for pedestrians within the Street Owned Space with the addition of elements of structure and beauty. Sidewalk conditions are usually elevated in elevation more than the pavement surface of the road. The second is the Crossing facility, which is a facility to accommodate conflicts between motorists and users of pedestrian facilities. In designing it, it must prioritize several aspects: safety, security, convenience, smoothness, system integration, comfort, and attractiveness. The third is a facility for people with special needs by adding a material color texture called a *detectable warning*. People with special needs can feel these symbols to detect the situation on the sidewalk (Puspaningtyas & Achmad, 2020). Pedestrian facilities are part of the urban transportation system. Sidewalks should be well-planned to meet the needs of pedestrians. The sidewalk must meet the standards on four essential aspects, such as accessibility, supporting facilities, safety, and comfort. (PUPR, 2018)

Tanah Abang area in Jakarta is famous as a trading center for various kinds of products sold wholesale and retail. A wide selection of products and the low prices make this place a place that many people always visit. Especially is the Tanah Abang station is a means of transportation that is in great demand by traders and buyers by passing through the sidewalks that currently connect pedestrians to move from one place to another. With the increasing number of pedestrians in line with the intensive provision of public transportation, the DKI Jakarta Provincial Government is building new sidewalks massively in several areas in Jakarta. Previous studies have shown that significant investments in sidewalk construction will increase pedestrian interest (McCormack, et al., 2012).

The construction of a new large-scale sidewalk began in 2016, reaching a pavement length of 48 km. Moreover, in 2017, 2018, and 2019, the construction of new sidewalks reached 79 km, 118 km, and 84 km, respectively. In 2020, it was targeted to build a new 97 km sidewalk. However, the realization of the construction of new sidewalks is only 10 km long because the budget is affected by the handling of the Covid-19 pandemic in Jakarta. (DKI Jakarta Provincial Government, 2021). Therefore, this study aims to examine the density that occurs on the sidewalk and has a similar pattern in the flow of motor vehicles on the road. The area of the area that accommodates and the number of obstacles that reduce the effectiveness of the service of a building. These factors that affect the density of sidewalks are used as variables to measure the level of pavement service in Jalan Braga. With the preparation of this paper, it is expected to provide an evaluation and assessment of the existing physical condition, safety, comfort, and practical value of the Tanah Abang Station sidewalk.

2. Literature Review

2.1 Pedestrian Service

The level of Service for Pedestrians can be measured from the satisfaction and interest of the Pedestrian Facilities and the nature of the Pedestrians. The level of service is also influenced by traffic factors, the condition of road facilities, and environmental factors (Shu, 2021). The nature of Pedestrians is complex and multi-dimensional because when we walk, we interact with the entire environment and the people in it (Feng, 2021). Security, comfort, and convenience are systems needed so that pedestrians can walk comfortably (Rifai, 2021). This research is to determine the service level of sidewalk facilities in the Tanah Abang station environment. The level of service is one of the most crucial components for assessing the level of service by considering pedestrians' effective width and flow (Campisi, 2022). The Service Level of Pedestrian Facilities is widely used to assess Pedestrian Facilities (Sangeeth, 2019). In addition, service level is a criterion for quality assessment in modern and practical theory in transportation planning and the design of various types of transportation infrastructure (Kopylova, 2018).

A sidewalk is a pedestrian path that is generally parallel to the axis of the road and higher than the pavement surface of the road to ensure the safety of the pedestrian in question. A pedestrian path or sidewalk is an area used to travel from one place to another and is explicitly intended for pedestrians. Pedestrians zone are also referred to as automatic-free zones, and automobile-free zones are areas of the city where motorized traffic is prohibited.

Sidewalks are pedestrian paths generally parallel to the road and higher than the surface of the road pavement to ensure the safety of the pedestrians concerned. The mode of transportation that cannot be separated from a travel chain is walking. The activity of walking must be involved in all types of transportation used to reach a destination. Walking can support the mode shift from private to public transport (Wibowo & Nurhalima, 2018). Good quality sidewalks are felt to be necessary because they affect the decisions of short-distance pedestrians in choosing their mode of transportation. Furthermore, walkability is an interaction between pedestrian facilities and support for the pedestrian environment (Krambeck & Shah, 2005).

The primary function of the sidewalk is to provide optimal service to pedestrians in terms of safety and comfort. Sidewalks also improve the smoothness of traffic (vehicles) because they are not disturbed or affected by pedestrian traffic. Especially in urban areas, the space under the sidewalks can be used as a space to get utilities and other road accessories. Public sidewalks are an essential infrastructure in the city to provide convenience for urban life (Jiang, Han, Li, Bai, & Wang, 2022). The main function of the sidewalk is to serve pedestrians by increasing their smoothness, safety, and comfort. Sidewalks also facilitate road traffic from being obstructed or affected by foot traffic. Pedestrians are vulnerable when mingling with vehicles, slowing down traffic flow because one of the main functions of the construction of sidewalks is to separate pedestrians from traffic flow without significantly disrupting accessibility through the construction of sidewalks.

2.2 Issue on Pedestrian

Pedestrians carry out activities from one place to another, among others, by walking and both legs as a means of transportation, where a place called a pedestrian path is needed as this means. Pedestrian paths are also known as pedestrian ways (pedestrian ways), including pedestrian ways (in the form of zebra crossings, pedestrian bridges above the road, and pedestrian paths under the road). Pedestrian Facility users face several obstacles when they travel, including conflicts with motorized vehicles, U-turns, other pedestrians, and varying speeds of oncoming vehicles. Several factors, including comfort, safety, and convenience, cause this. Pedestrian safety facilities need to be improved by providing safety facilities and lighting to maintain and reduce the impact of surrounding traffic (Ahmed T. M., 2021).

The current condition of the sidewalk is no longer suitable for its function. Many parties take advantage of the sidewalk, from street vendors (PKL) to parking attendants. This creates new problems, including disrupted vehicle mobility as pedestrians are forced to use the road body to walk, thus disrupting

the comfort of road users. Pedestrians face many obstacles during their daily commute, including conflicts with motorized vehicles, turning motion, motorcyclists, other pedestrians, and varying vehicle speeds, all of which jeopardize their safety, convenience, and comfort (Ahmed, et al., 2021). Need rules governing the use of sidewalks and the division of sidewalk space. In addition, socialization and awareness of each road user are needed to support the creation of security and comfort in public facilities.

3. Methodology

The sidewalks in the Tanah Abang Station area as a connecting place or pedestrian area for KRL, Trans Jakarta, and other public transportation users. The sidewalks in the Tanah Abang Station area must pay attention to the comfort and safety of the pedestrian facilities. Pedestrians in the Tanah Abang Station area have now been well revitalized by adding obstacles in the form of yellow concrete barriers and concrete bollards to secure pedestrian paths. This research was conducted in the DKI Jakarta area. The research location is carried out is located around Tanah Abang station, shown by a blue arrow in figure 1.

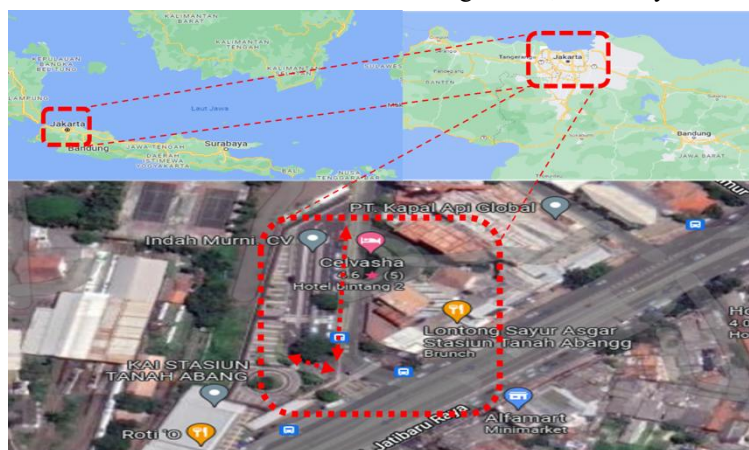


Figure 1. Research Locations

The next step is data collection by distributing questionnaires. The questionnaire consists of questions regarding the identification of sidewalk performance satisfaction facilities and the level of pavement performance in the Tanah Abang station environment, the perception of each variable. In research on sidewalk performance and pedestrian user satisfaction, the minimum sample population used is the Slovin formula. Therefore, the minimum number of respondents used is 100 people. The variables used in determining the level of service refer to Pd-03-2017 Technical Planning Guidelines, which is determined in *Table 1*.

Table 1. Service Level Determination Variables

No	Variables	Source
1	The state around the sidewalk	Pd-03-2017 – B Pedestrian Facilities Technical Planning Guidelines
2	Lighting around sidewalks	
3	Seating facilities	
4	Protective facilities or shelters	
5	Cleanliness and Facilities of trash cans	
6	Facilities for sidewalk disabilities	
7	Curb width	
8	Pavement feasibility facilities	
8	The attendance of vendors in the sidewalk area	
9	Pedestrian safety and security	

4. Result and Discussion

To produce an assessment of sidewalk performance and pedestrian user satisfaction in the Tanah Abang station area using the Importance Performance Analysis (IPA) method, the study began with a preliminary survey, problem identification, literature study, determination of data collection methods, sample preparation of questionnaires, validity, and reliability tests. The actual condition of sidewalks in the morning and evening is shown in figure 2.

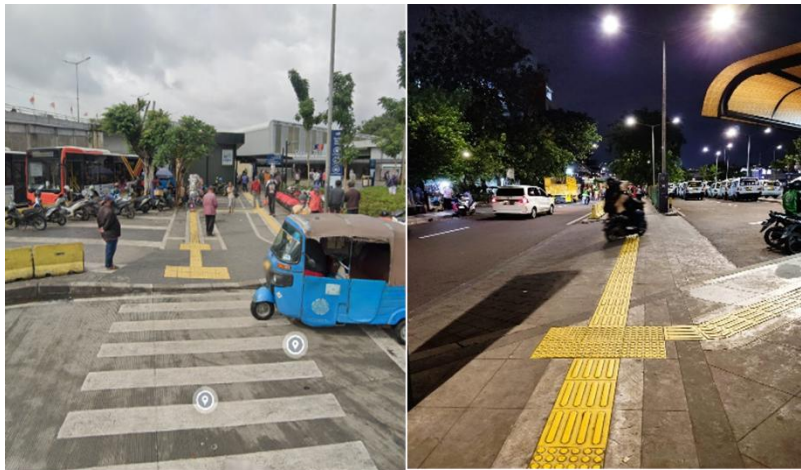


Figure 2. Pedestrians of the Tanah Abang Station area

4.1 Respondent Characteristic

The data obtained were 100 respondents, from the results of the dominant respondents using the Tanah Abang station sidewalk, namely 55% male and 45 female, the average age of sidewalk users were 21-30 years with a percentage of 71%, and the main goal of work was 51. 5%.

Table 2. Respondent Characteristic

No	Respondent Data	Value (%)	
1	Gender		
	Man	55	
	Woman	45	
2	Age	<20	10
		21-30	71
		31-40	13
		41-50	5
		51-60	1
3	Education	Elementary	1
		Junior High	1
		Senior High	26
		Diploma-1	2
		Diploma-2	1

No	Respondent Data	Value (%)	
4	Profession	Diploma-3	31
		Bachelor	36
		Master	2
		Doctoral	1
	Domicile	Government Employees	1
		Private Employees	59
		State Company	6
		Self-employed	11
		Students	15
		Teacher	3
		Transport Officer	2
		Marketing	2
		Health Officer	1
Main Purpose	Outer of Great Jakarta	2	
	Bogor	5	
	Depok	28	
	Banten	8	
	Tangerang	10	
Main Purpose	Jakarta	32	
	Bekasi	4	
	Shop	21	
	Sport	4	
	Holiday	20	
Main Purpose	Work	52	
	Going to School/Campus	3	

4.2 Level of Service

Respondent data was made by assessing satisfaction and interest in sidewalk services in the Tanah Abang station area. The questionnaire that has been distributed and the results are shown in Table 3. Where the satisfaction value is reduced by the importance value so that the gap results are obtained if the results are negative, indicating a discrepancy with the expectations of road users. By knowing the gap value, evaluation and improvement can be carried out on the facilities and the current condition of the sidewalks.

Table 3. The average service level

No	Variable	Importance	Performance	Gap
1	The state around the sidewalk	3,47	3.93	-0.45
2	Lighting around sidewalks	3,44	4,17	-0.73

No	Variable	Importance	Performance	Gap
3	Seating facilities	3,23	4,26	-1.03
4	Protective facilities or shelters	3,26	4,24	-0.98
5	Cleanliness and Facilities of trash cans	3,31	3,97	-0.66
6	Facilities for sidewalk disabilities	3,42	4,12	-0.70
7	Curb width	3,44	3,92	-0.48
8	Pavement feasibility facilities	3,42	4,23	-0.81
9	The Presence of vendors in the sidewalk area	3,05	4,16	-1.11
10	Pedestrian safety and security	3,32	4,36	-1.04
Average		3,34	4,14	-0.76

From the results of the table above, it is obtained that the average importance is 3.34, which can be categorized as an important category in all variables. In the satisfaction category, the average satisfaction is 4.14, which is categorized as a category still not satisfied. If you look at the table, the width of the sidewalk on the Tanah Abang Station sidewalk meets the requirements in the technical planning guidelines, where the value of interest and satisfaction is above average. A Gap value of -0.76 (Negative) is obtained so that it can be said that the width of the sidewalk in terms of importance and satisfaction could be better, and there must be some improvement. The pavement surface of Tanah Abang Station is installed using granite which is not slippery when conditions are wet. In actual condition. Around the sidewalk, there are also shops and other buildings, so ramps are often found at several points. The table above results show good importance and satisfaction values, in which road users feel satisfied and are not disturbed by the existence of ramps at several points of the sidewalk.

The lighting lamps around the sidewalks of Tanah Abang Station are already in the Pedestrian Facilities area. The lighting works fine at night, but it still needs repair at some points. According to the table above results, the value of satisfaction and interest is obtained, which is said to be quite good. Lighting facilities need to be maintained or repaired. Seating facilities in the Tanah Abang Station area are lacking. There are only a few seats around the online motorcycle taxi shelter, making pedestrians need a seat around the Tanah Abang Station sidewalk area. The value of interest and seat satisfaction can be seen in the table with an inferior value of interest and satisfaction. However, in certain conditions, seating facilities are often misused as a place to sell, which sometimes feels annoying.

Tanah Abang Station is a transit point for KRL trains, a destination for workers and traders in the Tanah Abang market. Around the station area, a canopy has been installed for shelter. From the results obtained in the table, the importance level is relatively high, and the satisfaction value is relatively low. In the table results, the importance value is relatively high, and the satisfaction value is quite good. However, in actual conditions, piles of garbage often occur due to a lack of public awareness, and many traders around Tanah Abang Station dispose of waste in its place. It is also supported by the small number of trash cans that make pedestrians throw garbage out of place.

Disability facilities are marked with a yellow textured marker as in the Technical Planning Guidelines Pd-03-2017-B. With this facility, the function of the sidewalk becomes useful for all levels of society. This facility also provides a sense of security for users with disabilities. The table obtained the value of moderate importance and moderate satisfaction value. The security and safety facilities on the Tanah Abang Station Road in the table obtain a good importance value and a moderate satisfaction value. Conditions for protecting security and safety have followed the guidelines, using yellow concrete and concrete bollards. However, several points do not have protection for pedestrians.

4.3 IPA Matrixes

Of the total number of respondents, the IPA method was used using four quadrants with the results as shown in figure 3. There are four quadrants in the IPA analysis. Quadrant I show the main priority, quadrant II is something that must be maintained, quadrant III is a low priority, and quadrant IV is categorized as something excessive.

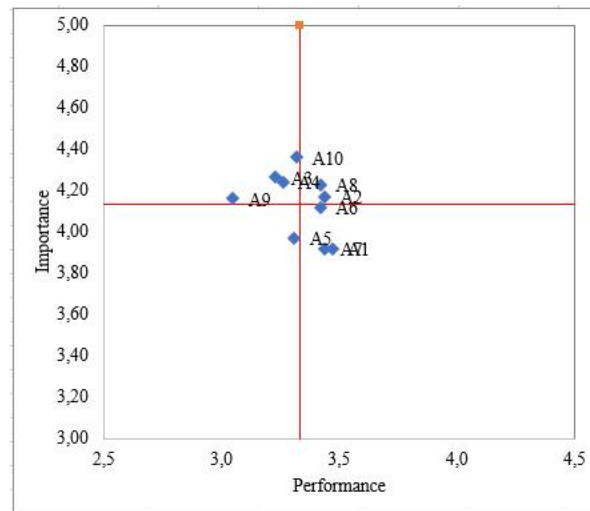


Figure 3. Index Performance Analysis Results

From the results of the IPA analysis, it was found that in quadrant I, there were four indicators, namely Pedestrian Safety and Security (A10), Presence of traders in the footpath area (A9), Protective Facilities or Shelters (A4), Seating Facilities (A3). In quadrant II there is one indicator, namely Pavement Eligibility Facilities (A8), Lighting Around Sidewalks (A2). In quadrant III there is one indicator, namely Cleanliness and Trash Facilities (A4). In quadrant IV there are three indicators, namely Pavement Width (A8), Facilities for Sidewalks with Disabilities (A6), and Circumstances Around Sidewalks (A1).

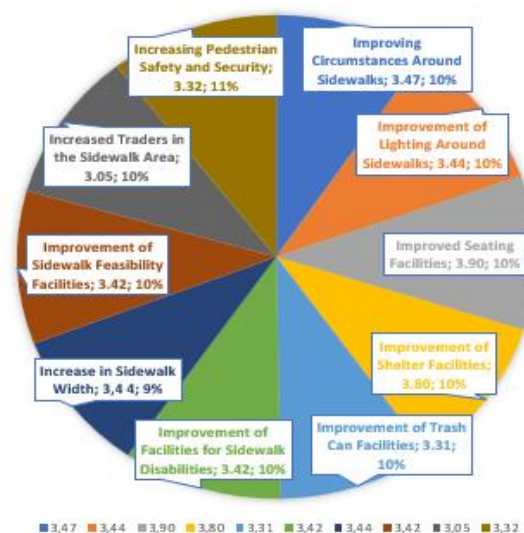


Figure 4. Suggestions for Improvement of Sidewalk Facilities

According to data from respondents, the most suggestions were obtained to improve the comfort and availability of parking spaces, as shown in figure 4. Therefore, with this assumption, it is hoped that an increase in the need for parking lots can be carried out and an increase in comfort on the sidewalks of Tanah Abang Station.

5. Conclusion

From the satisfaction and importance comparison table results, an average satisfaction index of 4.14 was obtained, an average interest index of 3.34, and an average GAP of -0.76. The highest importance value obtained was 3.47 on Circumstances Around Sidewalks and the lowest value of 3.05 on the Presence of Traders in the Sidewalk Area. The highest satisfaction score is 4.36 for Pedestrian Safety and Security and the lowest score is 3.92 for Sidewalk Width Facilities. GAP analysis obtained the highest score of 1.11 for traders in the Sidewalk Area and the lowest score of 0.45 for Circumstances Around the Sidewalks.

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