JRSSEM 2025, Vol. 04, No. **11**, 2025
E-ISSN: 2807 - 6311, P-ISSN: 2807 - 6494

Efforts to Improve Pedestrian Facility Services in the Jati Mulya – Bekasi LRT Station Area

Rizky Setyaningsih, Panji Pasa Pratama
Politeknik Transportasi Darat Indonesia
Email: rizky.setyaningsih@ptdisttd.ac.id, panji.pratama@ptdisttd.ac.id
Submitted: June 2025, *Revised:* June 2025, *Accepted:* June 2025

The *Jatimulya Bekasi* LRT station plays a crucial role as a public transportation hub, and the surrounding pedestrian facilities require assessment to meet the needs of users. Dissatisfaction with pedestrian facilities can hinder the success of the public transportation system. This study aims to assess satisfaction with pedestrian facilities at the station. The method used is *Importance-Performance Analysis (IPA), which categorizes service attributes based on their* importance and performance. Assessments were conducted on 24 facility attributes, as outlined in the Minimum Service Standards, including pedestrian paths, crossing facilities, surveillance cameras, security personnel, waiting areas, and facilities for individuals with disabilities. The analysis results showed that 84.4% of service attributes met expectations, while 15.6% still required improvement. The four attributes that need immediate improvement are crossing facilities, *CCTV* security systems, waiting areas for advanced transport, and pedestrian path design. Recommendations for improvement include enhancing crossing facilities, installing *CCTV* and adequate lighting, providing comfortable waiting areas with shaded facilities, and designing pedestrian lanes that separate vehicles and pedestrians to ensure smooth traffic flow and safety.

Keywords: Pedestrian Facilities, Service Performance, Importance Performance Analysis (IPA)

INTRODUCTION

In urban areas, the provision of pedestrian facilities such as sidewalks, crosswalks, pedestrian crossings, and pedestrian-friendly infrastructure is essential to ensure pedestrian safety and comfort. The level of satisfaction with pedestrian facility services is an important aspect of urban planning and development (Anciaes & Jones, 2018; Bhuiyan et al., 2024; Muhammad Mulyadi et al., 2022; Rankavat & Tiwari, 2016; Tolegen et al., 2023). This includes an assessment of the quality, accessibility, maintenance, and overall user experience of pedestrian infrastructure and facilities. Understanding the factors that affect pedestrian satisfaction with the facilities provided is critical to improving urban mobility, encouraging walking as a mode of transportation, and creating an inclusive and sustainable city (E. J. Kim et al., 2019; S. Kim et al., 2014; J. Lee et al., 2022; S. Lee et al., 2021).

Bekasi is one of the urban centers that is currently developing rapidly. In facing this, the government has significant challenges regarding the mobility of the Bekasi population, which is increasingly complex and affects services in the transportation sector. In response to this problem, the government has developed one of the major projects to reduce the use of private vehicles, namely the construction of the Integrated Rail Crossing (LRT) in Bekasi, which was inaugurated on August 28, 2023, under the name of the Jabodebek Lin Bekasi LRT and operates across Jatimulya–Dukuh Atas and vice versa, where PT Kereta Api Indonesia operates this line.

However, people's travel needs are not only limited to using one mode; there needs to be another mode as a link in the process of switching these modes. The problem in the practice of

switching modes is often ignored and, unconsciously, has a significant impact on the failure of transportation services. The Jatimulya Bekasi LRT Station has a central role as a public transportation center, and it is important to understand the extent to which the surrounding pedestrian facilities can meet the needs of users. Dissatisfaction with pedestrian facilities can hinder the success of the public transportation system (Kadi et al., 2021; Leather et al., 2011; Sangeeth & Lokre, 2019). Therefore, this study aims to assess the level of satisfaction with pedestrian facility services that can be applied at the Jatimulya Bekasi LRT Station in order to improve the experience of sustainable transportation users.

Through a better understanding of the factors that affect the level of service satisfaction of LRT station pedestrian facilities, it is hoped that the results of this study can provide guidance for interested parties, including local governments, transportation operators, and urban designers, to develop infrastructure policies that support sustainable mobility in Bekasi.

Service parameters regarding the completeness of station facilities have been regulated by the Government through the Minister of Transportation Regulation No. 63 of 2019 concerning Minimum Service Standards for Transportation of People by Train (Galkin et al., 2022; Hermawan & Kusuma, 2023; Suhana et al., 2023; Sun et al., 2021; Zhang et al., 2021). One of the station facilities is a path for pedestrians. For this reason, it is necessary to improve the service of pedestrian facilities at the Jatimulya Bekasi LRT Station. This can affect the level of service of pedestrian facilities and lead to damage to existing infrastructure if they are not repaired immediately, causing discomfort for users of this railway infrastructure. Any damage that occurs should be immediately followed up with good maintenance so that railway infrastructure users feel comfortable.

Based on the results of the calculation of the level of suitability of the performance of pedestrian facilities at the Jatimulya Bekasi LRT Station, it is known that of the 24 service quality attributes, 84.4% have met expectations, while 15.6% still need to be improved to enhance pedestrian comfort and safety. Performance analysis and service level based on passenger perception showed that there were four attributes included in quadrant 1 and became the top priority for improvement, namely the condition and availability of crossing facilities (x2), the availability of security systems or CCTV (x4), waiting places for advanced transportation with sitting or standing facilities (x7), and the design of pedestrian paths that do not interfere with smooth traffic (x14).

Recommendations for improvement include the provision of crossing facilities that suit the needs of pedestrians, paying attention to the volume of pedestrians and vehicles to ensure safety, ensuring the availability of adequate CCTV, increased lighting and routine security patrols, the provision of comfortable waiting areas with sitting or standing facilities and shade to protect passengers from the weather, as well as the installation of clear information on schedules and routes of onward transport. In addition, the design of pedestrian lanes with pedestrian bridges that separate vehicle and pedestrian lanes, effective traffic signals, safe crossings, and clear signs are also needed to ensure smooth traffic at the station.

METHOD

The method used is Importance Performance Analysis (IPA), which groups service attributes based on importance and performance. The following research design is a plan or framework that is prepared before the implementation of the research to direct and guide the

process of data collection, data analysis, and interpretation of research results. The research design outlines the steps to be taken to answer the research question or achieve the research objectives that have been set. The importance of research design is to ensure that research is conducted in a systematic, objective, and valid manner. In analyzing pedestrian facility services with a technical approach, the aspect that needs to be assessed is the level of satisfaction with pedestrian facility services. Meanwhile, the analysis approach used in this study is with passenger preferences analyzed using the Importance Performance Analysis (IPA) method.

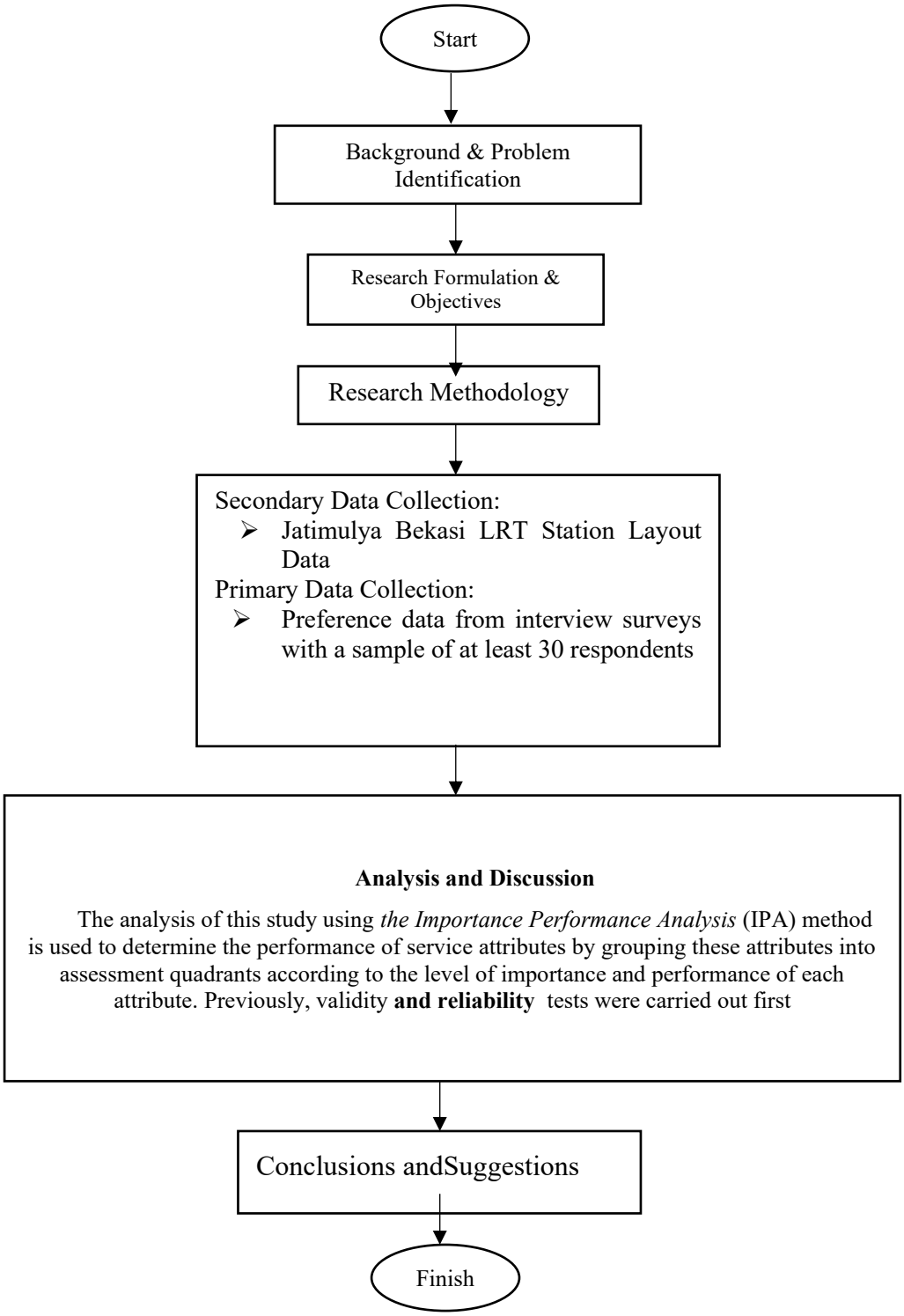


Figure 1: Research Design

In this study, primary data was collected through observation and direct surveys in the field, which included an inventory of pedestrian facilities and interviews with users of the facility. The sample determination for the interview used preference data from the survey, with a feasible sample size of between 30 and 500 respondents, according to Sugiyono (2011). In this study, researchers used 55 respondents as a sample to measure satisfaction levels. The determination of the service attributes of pedestrian facilities is carried out by Importance-Performance Analysis (IPA), which identifies service attributes based on the level of importance and performance. The validity test is carried out statistically by calculating the correlation between each problem using SPSS version 26 to ensure the accuracy of the measuring tool. Reliability tests were also carried out using SPSS version 26 to test the consistency of the data. The IPA method is used to evaluate the performance and importance of facilities based on two aspects: importance and performance. The steps in the IPA analysis include the identification of attributes, the measurement of importance and performance levels, and the analysis of quadrants to determine the strengths and weaknesses of the service. The first quadrant (Top Priority) includes attributes that are important but not yet in line with customer expectations, the second quadrant (Maintain Performance) shows attributes with high performance and expectations, the third quadrant (Low Priority) contains attributes that are less important and have regular performance, and the fourth quadrant (Overperform) contains attributes with low expectations but good performance, considered redundant by customers.

RESULTS AND DISCUSSION

Attribute Determination

The determination of attributes and questions for the analysis of the Importance and Performance of Pedestrian Facility Services at the Jatimulya Bekasi LRT Station, can be seen in the table below:

Table.1 Research Questionnaire

No	Aspects	Attribute	Code
1	**Security**	a. Pedestrian Paths that avoid conflicts with vehicles	X1
		b. Crossing Facilities	X2
		c. Safety Support Facilities such as Signs, Markings, Lighting, Safety Fences and Apparatus	X3
2	**Security**	a. Surveillance Cameras and Officers	X4
		b. Security guard	X5
		c. Complaint Facility	X6
3	**Comfort**	a. Place to wait for advanced transportation in the form of an area with sitting or standing facilities	X7
		b. Facilities that can protect pedestrian facilities from heat, rain, wind, and pollution	X8
		c. Sloping stair facilities	X9
4	**Facilities**	a. Signs and directions for the mode shift location	X10
		b. Information board containing location maps, map of time transfer points and transportation fares	X11
		c. Point of sale / Ticket balance filling machine	X12
		d. Parking lot	X13
		e. Pedestrian path design that does not interfere with smooth traffic	X14
5	**Accessibility**	a. Shortest distance intermodal connecting line	X15
		b. Direct access to advanced modes without any obstacles	X16

No	Aspects	Attribute	Code
6	**Equality**	a. Facilities for the disabled including elevator and Guiding Block	X17
		b. Gender separation	X18
7	**Regularity**	a. Special Spaces/Lanes to Pick Up and Drop Off Passengers	X19
		b. Officers who supervise public transportation order	X20
8	**Beauty**	a. Clean and tidy environment	X21
		b. The environment has aesthetic value	X22
		c. Reflects cultural character	X23
		d. Decorative vegetation landscape	X24

Source: 2023 analysis results

Validity Test

The questionnaire was distributed to users of pedestrian facilities totaling 55 respondents. The results of the initial questionnaire distribution will get initial data containing questions in valid and reliable questionnaires that will be used later in the survey. After that, the questions are compiled and given symbols.

The validity test in this study was carried out statistically by calculating the correlation between each problem and the score using SPSS version 26 with the abbreviation of Statistical Package for the Social Sciences, to understand the accuracy and accuracy of the measuring tool in the implementation of questionnaire testing with the corrected item correlation method.

One way for the questionnaire to be declared valid and invalid, we need to find out the table first. The formula from the r table is df = n – 2 so in the questionnaire the number of samples in the study is 55 respondents so df = 53, then with a confidence level of 10% for r table = 0.2241. The critical value for the validity value is 0.2241, if the value is relevant or if r is calculated < from 0.2241 then the questionnaire data is declared invalid, on the other hand, if the value r is calculated > from the value of 0.2241 the questionnaire question is considered valid. The following results of the validity test of the research tool (questionnaire) of each variable taken can be seen in table 4.13 it can be seen that r count > r of the table with a total of 24 questionnaires shows that the performance attribute variable is declared valid. The validation table of variable importance and performance can be seen in the following table:

Table 2. SPSS Validation Test Results of Important Attributes

No	Attribution	Coefficient	Status
1	Pedestrian Lines That Avoid Conflict with Vehicles in the Jatimulya - Bekasi LRT Station area	0.6820	Valid
2	Crossing Facilities in the Jatimulya - Bekasi LRT Station area	0.5000	Valid
3	Safety Support Facilities such as Signs, Markings, Lighting, Safety Fences and Fire Extinguishers	0.7260	Valid
4	Surveillance Camera and Security Officer Facilities	0.5040	Valid
5	Security Guard Facilities	0.7850	Valid
6	Complaint Facility	0.7580	Valid
7	Facilities for Waiting for Connecting Transportation in the form of areas with sitting or standing facilities (HALTE)	0.7310	Valid

No	Attribution	Coefficient	Status
8	Facilities that can protect pedestrian facilities from heat, rain, wind as well as air and noise pollution	0.7760	Valid
9	Sloping Staircase Facility	0.6540	Valid
10	Signs and directions for the mode shift location	0.7060	Valid
11	Information board containing location maps, map of timetable transfer points and onward freight rates	0.7700	Valid
12	Point of sale / Ticket balance filling machine	0.7120	Valid
13	Parking lot in the Jatimulya - Bekasi LRT Station area	0.6800	Valid
14	Pedestrian path design that does not interfere with smooth traffic	0.6200	Valid
15	Connecting lines between the shortest modes in the station area	0.7680	Valid
16	Direct access to advanced modes without any obstacles	0.8100	Valid
17	Facilities for the disabled including elevator and Guiding Block	0.4990	Valid
18	Facilities Gender segregation in pedestrian facilities	0.6170	Valid
19	Special Space/Lane for boarding and lowering passengers	0.5720	Valid
20	Officers who supervise the order of public transportation / online motorcycle taxis / taxis / private transportation	0.6760	Valid
21	Clean and tidy environment in the Jatimulya - Bekasi LRT Station area	0.6640	Valid
22	An environment that has aesthetic value in the Jatimulya - Bekasi LRT Station area	0.6350	Valid
23	An environment that reflects the cultural character of the Jatimulya - Bekasi LRT Station area	0.7310	Valid
24	An environment that has a landscape of decorative vegetation (Green Space/Garden Decoration) in the Jatimulya - Bekasi LRT Station area	0.6310	Valid

Source: 2023 analysis results

From table 3, it can be seen that the r calculation > r of the table is 0.2241 with a total of 55 questionnaires, showing that the Interest attribute variable is declared valid.

Table 3. SPSS Validation Test Results: Performance Attributes

No	Attribution	Coefficient	Status
1	Pedestrian Lines That Avoid Conflict with Vehicles in the Jatimulya - Bekasi LRT Station area	0.7050	Valid
2	Crossing Facilities in the Jatimulya - Bekasi LRT Station area	0.8080	Valid
3	Safety Support Facilities such as Signs, Markings, Lighting, Safety Fences and Fire Extinguishers	0.7990	Valid
4	Surveillance Camera and Security Officer Facilities	0.8180	Valid
5	Security Guard Facilities	0.7860	Valid
6	Complaint Facility	0.8090	Valid
7	Facilities for Waiting for Connecting Transportation in the form of areas with sitting or standing facilities (HALTE)	0.8210	Valid
8	Facilities that can protect pedestrian facilities from heat, rain, wind as well as air and noise pollution	0.8080	Valid
9	Sloping Staircase Facility	0.7600	Valid

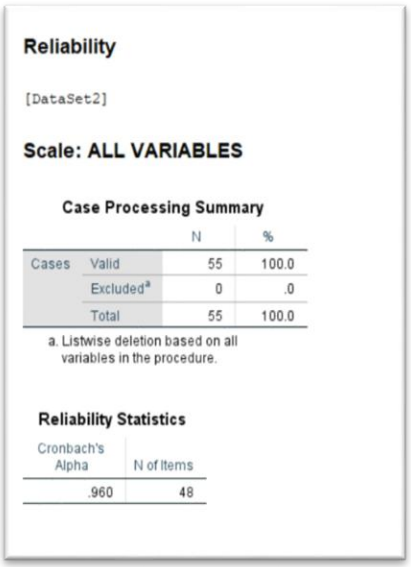
No	Attribution	Coefficient	Status
10	Signs and directions for the mode shift location	0.8210	Valid
11	Information board containing location maps, map of timetable transfer points and onward freight rates	0.8400	Valid
12	Point of sale / Ticket balance filling machine	0.6800	Valid
13	Parking lot in the Jatimulya - Bekasi LRT Station area	0.9800	Valid
14	Pedestrian path design that does not interfere with smooth traffic	0.8400	Valid
15	Connecting lines between the shortest modes in the station area	0.8270	Valid
16	Direct access to advanced modes without any obstacles	0.8500	Valid
17	Facilities for the disabled including elevator and Guiding Block	0.7340	Valid
18	Facilities Gender segregation in pedestrian facilities	0.6800	Valid
19	Officers who supervise the order of public transportation / online motorcycle taxis / taxis / private transportation	0.7100	Valid
20	Clean and tidy environment in the Jatimulya - Bekasi LRT Station area	0.8180	Valid
21	An environment that has aesthetic value in the Jatimulya - Bekasi LRT Station area	0.7670	Valid
22	An environment that reflects the cultural character of the Jatimulya - Bekasi LRT Station area	0.8070	Valid
23	An environment that has a landscape of decorative vegetation (Green Space/Garden Decoration) in the Jatimulya - Bekasi LRT Station area	0.7220	Valid

Source: 2023 analysis results

From table 3, it can be seen that the r calculation > r of the table is 0.2241 with a total of 55 questionnaires, showing that the performance attribute variable is declared valid.

Reliability Test

Reliability Test This research must be measured by a reliability test to prove and test the results of the questionnaire in the study used to have an influence on the variables X_1 and X_2. This test was carried out using the SPSS version 26 system, SPSS itself stands for Statistical Package for the Social Sciences is an application used to conduct advanced statistical analysis, using machine learning algorithms, and data analysis that can be integrated. The results of the feasibility in this study can be seen in the image below:



Reliability

[DataSet2]

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	55	100.0
	Excluded[a]	0	.0
	Total	55	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.960	48

Figure 3: Reality Test Results

The figure above shows the overall Cronbach's Alpha value of each variable in each variable is reliable (reliable), because the chonbach alpha coefficient > from 0.70 WITH A RELIABILITY VALUE OF 0.960. From the results of the validity and reliability analysis on the side, the questionnaire can use statement items from each variable and distributed to all respondents through a questionnaire of 55, because each problem shows valid and reliable results, so that further analysis can be carried out.

Attribute Fit Levels

In the science analysis, there is a so-called suitability level. The comparison result attributed between the expectation score and the perception score is used to determine the priority order of improvement of the measured performance factors. The level of conformity can be used to determine whether it needs to take action or maintain its service attributes, as well as determine which attributes are prioritized for improvement from factors that affect consumers. The level of suitability of the attributes of this research can be seen in the following table:

Table 4: Attributes Fit Levels

No	Attribution	Interests	Performance	Conformity
1	Conflict-Avoidant Pedestrian Paths	4.69	3.95	84.1%
2	Crossing Facilities	4.62	3.71	80.3%
3	Safety Support Facilities such as Signs, Markings, Lighting, Safety Fences and Fire Extinguishers	4.62	3.85	83.5%
4	Surveillance Cameras and Officers	4.65	3.76	80.9%
5	Security guard	4.60	3.87	84.2%
6	Complaint Facility	4.47	3.69	82.5%
7	Waiting place for advanced transportation in the form of an area with sitting or standing facilities	4.49	3.69	82.2%
8	Facilities that can protect pedestrian facilities from heat, rain, wind as well as air and noise pollution	4.36	3.69	84.6%
9	Sloping Staircase Facility	4.38	3.64	83.0%
10	Signs and directions for the mode shift location	4.42	3.82	86.4%
11	Information board containing location maps, map of timetable transfer points and onward freight rates	4.53	3.84	84.7%
12	Point of sale / Ticket balance filling machine	4.49	3.87	86.2%
13	Parking lot in the Jatimulya - Bekasi LRT Station area	4.44	3.78	85.2%
14	Pedestrian path design that does not interfere with smooth traffic	4.53	3.71	81.9%
15	Connecting lines between the shortest modes in the station area	4.35	3.76	86.6%
16	Direct access to advanced modes without any obstacles	4.38	3.91	89.2%
17	Facilities for the disabled including elevator and Guiding Block	4.69	3.80	81.0%
18	Gender separation	4.07	3.62	88.8%

19	Special Space/Lane for boarding and lowering passengers	4.45	3.78	84.9%
20	Officers who supervise the order of public transportation / online motorcycle taxis / taxis / private transportation	4.42	3.71	84.0%
21	Clean and tidy environment in the Jatimulya - Bekasi LRT Station area	4.58	3.78	82.5%
22	An environment that has aesthetic value in the Jatimulya - Bekasi LRT Station area	4.49	3.89	86.6%
23	An environment that reflects the cultural character of the Jatimulya - Bekasi LRT Station area	4.35	3.80	87.4%
24	An environment that has a landscape of decorative vegetation (Green Space/Garden Decoration) in the Jatimulya - Bekasi LRT Station area	4.44	3.75	84.4%
Average		**4.48**	**3.78**	**84.4%**

Source: 2023 analysis results

Based on Table 4, the average percentage (%) level of conformity of Pedestrian Facility Service Attributes at the Jatimulya Bekasi LRT Station was obtained with a value of 84.4%. This can show the overall picture that the performance of pedestrian facility services has not been able to meet the expectations of the community because the value of the level of conformity is still below 100% and still not optimal.

1. Cartesius diagram in the *Importance-Performance Analysis* (IPA) Method

Performance values and interest values were generated from 55 respondents. The performance value will be the value of X and the value of importance will be the value of Y which will be entered into the cartesian diagram, and the result can be seen in figure 3.

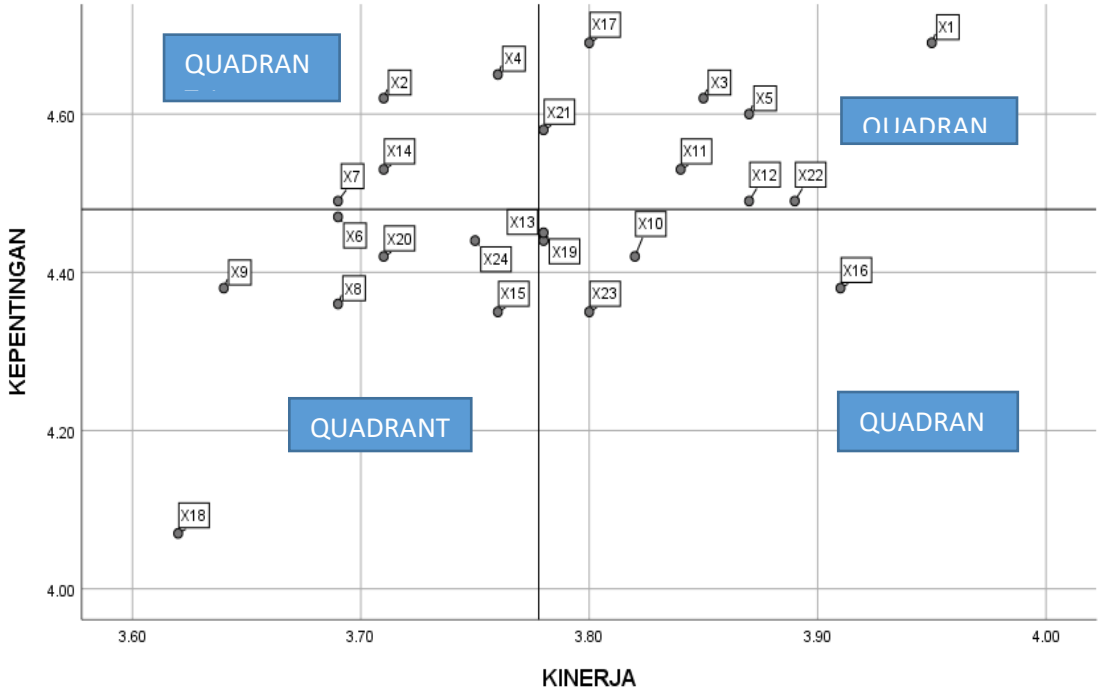


Figure 4: Cartesian Diagram

The position of each attribute in the four quadrants is used as a strategy to improve the service of pedestrian facilities at the Jatimulya - Bekasi LRT Station because each of these attributes affects pedestrian satisfaction with its facilities. In the picture above, it can be seen that:

a. Quadrant I which has the main priority in improving pedestrian facilities is the condition and availability of crossing facilities (x2), the availability of security systems or CCTV (x4), waiting places for advanced transportation in the form of areas with sitting or standing facilities (x7), the design of pedestrian paths that do not interfere with the smooth flow of traffic (x14),
b. Quadrant II that needs to be maintained is Pedestrian Paths that avoid vehicle conflicts (x1), Safety support facilities such as signs, Markings, Lighting, Safety Fences and Apparatus (x3), Security Officers (x5), Information Boards containing location maps, maps of schedule transfer points and advanced transportation fares (x11), Ticket sales places / ticket balance filling machines (x12), facilities for diffable that include elevators and guiding blocks (x17), A clean and tidy environment (x21), and an environment that has aesthetic value (x22).
c. Quadrant III is a quadrant that shows indicators that are less important in terms of influence according to user perception and their implementation by mediocre management, namely Complaint Facilities (x6), Facilities that can protect pedestrians from heat, rain, wind and air and noise pollution (x8), Ramp facilities (x9), Connecting Paths between modes with the shortest distance (x15), Gender Separation (x18), Officers who supervise public transport order (x20), and decorative vegetation/garden landscapes (x24).
d. Quadrant IV is a quadrant that according to the respondents' perception is less important, but its implementation / performance is excessive which includes signs and directions for the location of modal shifts (x10), parking spaces (x13), direct access to advanced modes without obstacles, special spaces/lanes to get on and off passengers (x16), and reflect cultural character (x23).

CONCLUSION

Based on the assessment of pedestrian facility performance at the *Jatimulya Bekasi LRT Station*, 84.4% of the 24 service quality attributes have met user expectations, while 15.6% require improvement, particularly regarding crossing facilities, security systems (*CCTV*), waiting areas for advanced transportation, and pedestrian path design that does not disrupt traffic flow. Key recommendations include enhancing crossing facilities, ensuring adequate *CCTV* and lighting, providing comfortable and sheltered waiting areas, clear onward transport information, and designing pedestrian lanes that safely separate vehicles and pedestrians. For future research, it is suggested to conduct a longitudinal study to evaluate the effectiveness of implemented improvements over time and to explore user satisfaction across different demographic groups to further refine pedestrian facility planning and policy.

REFERENCES

Anciaes, P. R., & Jones, P. (2018). Estimating preferences for different types of pedestrian crossing facilities. *Transportation Research Part F: Traffic Psychology and Behaviour*, *52*. https://doi.org/10.1016/j.trf.2017.11.025

Bhuiyan, M. A., Matsuyuki, M., & Tanaka, S. (2024). Comparative analysis of various pedestrian-crossing facilities on highways and the selection of a cost-effective facility by maximizing the benefit-cost ratio. *Asian Transport Studies*, *10*. https://doi.org/10.1016/j.eastsj.2024.100123

Galkin, A., Nazarov, O., Shapoval, G., Kolosok, V., Khodova, Y., & Kuznetsov, A. (2022). Assessment Of The Urban Freight Regulations Impact On The Transportation Cost. *Acta Logistica*, *9*(2). https://doi.org/10.22306/al.v9i2.279

Hermawan, S., & Kusuma, F. I. S. (2023). Discourse on online transportation regulation under Posner's theory: A comparative analysis in Indonesia and Brazil. *Brazilian Journal of International Law*, *20*(1). https://doi.org/10.5102/rdi.v20i1.8753

Kadi, S., Abdullah, A., & Bachok, S. (2021). The Evaluation Of Pedestrian Facilities On Hajj Crowd Between Arafat And Muzdalifah Pedestrian Street. *Planning Malaysia*, *19*(5). https://doi.org/10.21837/pm.v19i19.1069

Kim, E. J., Won, J., & Kim, J. (2019). Is Seoul walkable? Assessing A walkability score and examining its relationship with pedestrian satisfaction in Seoul, Korea. *Sustainability (Switzerland)*, *11*(24). https://doi.org/10.3390/SU11246915

Kim, S., Park, S., & Lee, J. S. (2014). Meso- or micro-scale? Environmental factors influencing pedestrian satisfaction. *Transportation Research Part D: Transport and Environment*, *30*. https://doi.org/10.1016/j.trd.2014.05.005

Leather, J., Fabian, H., Gota, S., & Mejia, A. (2011). Walkability and Pedestrian Facilities in Asian Cities State and Issues. *Asian Development Bank Sustainable Development Working Paper Series*, *17*.

Lee, J., Kim, D., & Park, J. (2022). A Machine Learning and Computer Vision Study of the Environmental Characteristics of Streetscapes That Affect Pedestrian Satisfaction. *Sustainability (Switzerland)*, *14*(9). https://doi.org/10.3390/su14095730

Lee, S., Han, M., Rhee, K., & Bae, B. (2021). Identification of factors affecting pedestrian satisfaction toward land use and street type. *Sustainability (Switzerland)*, *13*(19). https://doi.org/10.3390/su131910725

Muhammad Mulyadi, A., Verani Rouly Sihombing, A., Hendrawan, H., Vitriana, A., & Nugroho, A. (2022). Walkability and importance assessment of pedestrian facilities on central business district in capital city of Indonesia. *Transportation Research Interdisciplinary Perspectives*, *16*. https://doi.org/10.1016/j.trip.2022.100695

Rankavat, S., & Tiwari, G. (2016). Pedestrians perceptions for utilization of pedestrian facilities – Delhi, India. *Transportation Research Part F: Traffic Psychology and Behaviour*, *42*. https://doi.org/10.1016/j.trf.2016.02.005

Sangeeth, K., & Lokre, A. (2019). Factors influencing Pedestrian Speed in Level of Service (LOS) of pedestrian facilities. *Transportation Research Interdisciplinary Perspectives*, *3*. https://doi.org/10.1016/j.trip.2019.100066

Suhana, I., Bogar, W., & Mandagi, M. (2023). The Role of Civil Servant Investigators (PPNS) in Implementing Regulation of the Director General of Sea Transportation No: Kp.

222/Djpl/2019 in Supporting the Main Duties and Functions of Class II Bitung Sea and Coast Guard Bases for Enforcement of Law N. *Technium Soc. Sci. J.*, *44*, 53.

Sun, L., Zhang, T., Liu, S., Wang, K., Rogers, T., Yao, L., & Zhao, P. (2021). Reducing energy consumption and pollution in the urban transportation sector: A review of policies and regulations in Beijing. In *Journal of Cleaner Production* (Vol. 285). https://doi.org/10.1016/j.jclepro.2020.125339

Tolegen, Z., Konbr, U., Karzhaubayeva, S., Sadvokasova, G., Nauryzbayeva, A., & Amandykova, D. (2023). Assessment of Safe Access to Pedestrian Infrastructure Facilities in the City of Almaty, Kazakhstan. *Civil Engineering and Architecture*, *11*(1). https://doi.org/10.13189/cea.2023.110128

Zhang, J., Jin, W., Philbin, S. P., Lu, Q. C., Ballesteros-Pérez, P., Skitmore, M., & Li, H. (2021). Impact of environmental regulations on carbon emissions of transportation infrastructure: China's evidence. *Cleaner and Responsible Consumption*, *2*. https://doi.org/10.1016/j.clrc.2021.100010