

# Analysis of Pedestrian Facility Services on Shopping Mall Area in Satellite City During Pandemic COVID-19

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## Abstrak

The condition of the Covid-19 pandemic that is increasing in the middle year of 2021 requires better attention. Sidewalks with a pedestrian facility function must provide smoothness, security, comfort, and safety for pedestrians. This paper aims to analyze the minimum service standards, level of services, and the interests of pedestrian users. The research method used in this paper is by distributing digital questionnaires and then processing them with importance-performance analysis (IPA). The study results show that pedestrians in the area have implemented a minimum service standard with the Corona Virus Disease (COVID-19) protocol. Based on the results of the level of service assessment, this area has an A level. At the same time, the IPA results show that the pavement condition is the attribute with the best conditions. Meanwhile, the availability of disabled facilities is a variable that requires attention to be improved.

## Keywords

Importance Performance Analysis, Level of Service, Pedestrian, Shopping Mall Area,

## 1. Introduction

Pedestrians are an integral part of the development of global transportation today. A well-structured transportation system will encourage new settlements and industrial areas with a global perspective Kustysheva and Konyukhova (2021). Pedestrians must also be able to respond and adapt to the needs of users following the current conditions. Today, pedestrians and public transportation infrastructure need facilities that support their activities during the Corona Virus Disease (COVID-19) pandemic Rifai and Arifin (2020). In addition, humans as pedestrian actors need to carry out health protocols while using pedestrians because it is possible that pedestrians while on pedestrian or public transportation can be exposed to COVID-19 (Anwari et al., 2021).

Pedestrian facilities in Indonesia are currently still very minimal. This condition causes urban communities to prefer vehicles to reach destinations over short distances (300 meters or less). Although there are many initiatives and efforts to improve pedestrian paths, these programs are not comparable to the construction or widening of roads, which often consume pedestrian space. This inequality impacts the low use of public transportation, where half of the urban population prefers to use private vehicles as their daily mode of transportation Jang, S. Y., Han, S. Y., & Kim (2010). On the other hand, an excellent public transport service level can increase the number of passengers (Rifai & Arifin, 2020).

Public services in the new-normal era by implementing established policies will impact service access to the community. This protocol will reduce the intensity of meetings between service providers and service recipients. Of course, this transition must also be followed by a change in the community's mindset by providing socialization or socialization. The decrease in direct activity will undoubtedly reduce the number of pedestrians. Conditions like this must be used as positive momentum in optimizing public services by conducting comprehensive evaluations and improvements Isradi, M., & Abdika (2021). At the same time, conduct education so that awareness and understanding can arise to produce effective and efficient outputs.

The city of Bekasi, one of the supporting cities for the state capital Jakarta, has a relatively rapid level of development. Good public service facilities must support this development. One of the characteristics of a city with good service is the availability of pedestrians that meet standards and meet user service needs. However, the development of pedestrians to date has not been matched by the certainty of standards and service levels. Conditions like this will reduce the space for movement and the level of service for pedestrian facilities so that pedestrians feel less safe and comfortable in carrying out their activities Jones, M. G., Ryan, S., Donlon, J., Ledbetter, L., Ragland, D. R., & Arnold (2010). Based on the various conditions mentioned above, it is necessary

to evaluate the fulfillment of minimum standards and the level of pedestrian services. This paper aims to analyze the level of pedestrian service and its complementary facilities at the shopping mall satellite city area.

## 2. Literature Review

Transportation facilities and infrastructure are mutually supportive factors. In the transportation system, both are the primary needs. Facilities and infrastructure need to be detailed and their characteristics recorded, including the level of service and distribution in urban areas Nag et al. (2020) Transportation facilities are made to support the movement of people from one place to another using the available public transportation modes; transportation facilities are also intended to serve the community in their activities to achieve the movement's goals. Transportation facilities related to traffic are terminals, traffic signs and markings, pedestrian facilities, parking facilities, and rest areas (Osama & Sayed, 2017).

### 2.1. Pedestrian Facility

Transportation infrastructure is significant support for transportation facilities Bhaduri, Eeshan, ManojBs, JoySen (2019) One of these infrastructures is facilities for pedestrians. Pedestrian itself is an activity to move from one place to another and is expected to enjoy the atmosphere and the facility. Pedestrians are activities of pedestrian paths either on the side of the road, sidewalks, particular paths for pedestrians, or road crossings. In a city layout, one critical element is all complete buildings provided for pedestrians to provide smoothness, security, and comfort, as well as safety for pedestrians (Sun et al., 2021).

Transportation infrastructure has the main characteristic of serving users, not as goods or commodities. Therefore, transportation infrastructure must be utilized at any time so as not to lose its function. Furthermore, as one of the infrastructures, Pedestrians are usually parallel to the road and higher than the pavement surface to ensure safety for pedestrians. Therefore, streets in urban areas should be equipped with safe and comfortable pedestrian facilities (Mukherjee & Mitra, 2019).

The main problem for pedestrians in developing countries is the conflict between pedestrians and vehicles. The existing condition is the assumption that pedestrians are treated as second-class residents compared to vehicle owners. Therefore, the priority is to see if the facilities are available and can be appropriately maintained Sulaksono Wibowo and Nurhalima (2018). Furthermore, good maintenance of pedestrian facilities is expected to increase public awareness in getting used to walking.

### 2.2. New Normal

The World Health Organization officially declared Corona Virus Disease (COVID-19) as a pandemic on March 9, 2020. This condition means that the coronavirus has spread widely in the world. The term pandemic seems scary, but actually, it has nothing to do with the disease's malignancy but its widespread spread. Remember, most coronaviruses cause mild or moderate symptoms, such as fever and cough, and most get better within a few weeks. Especially now that so many variants of COVID-19 are spreading in various countries around the world Kustysheva and Konyukhova (2021). The current development of the virus includes the delta variant that is attacking Indonesia.

Indonesia is one with a relatively high spread of the virus. These conditions resulted in significant changes in human life. All sectors, including the economic sector, business, transportation, and many others, have been affected. The impact of COVID-19 has reduced people's activities outside the home for fear of being exposed to this virus. Community activities are mainly carried out at home, such as working from home, school children studying at home, or online. One of the massive impacts is in the field of transportation Monmousseau et al. (2020) The COVID-19 pandemic has encouraged transportation system stakeholders to prepare various solutions. The current pandemic requires that essential services be maintained. For example, when the demand for public transportation declines significantly, it is still necessary to take action to maintain the service. However, of course, a new protocol is needed for public transport operators and other parties. In addition, it is necessary to design various new-normal conditions so that the stakeholders of the transportation system remain healthy Bian, Z., Zuo, F., Gao, J., Chen, Y., Venkata, S. S. C. P., Bernardes, S. D., & Wang (2021) All transportation support facilities must be ensured to have strictly implemented the Health protocol.

### 2.3. Level of Service

Level of Service (LOS) is one of the methods used to assess the performance of a pedestrian facility which is an indicator of the level of service Nag et al. (2020). A pedestrian facility has the densest performance if the Los calculation results produce a VC ratio value close to 1. In calculating Los at a pedestrian facility, it must first know its capacity (C), which can be calculated by knowing the primary conditions in space, speed, and flow rate Campisi et al. (2019) LoS calculation for pedestrian capacity is straightforward. The most popular calculation method is issued by the US Highway Capacity Manual (HCM).

The HCM method is commonly used to analyze the loss of pedestrian facilities based on space, speed, and flow rate Raad and Burke( 2018). Indonesia adjusted the Los HCM by issuing a standard which can be seen in table 1. The level of service for pedestrians can be classified into service level A to service level F.

Table 1. Level of service standard

Level	Space (m2/Person)	Speed (m/ menit)	Flow Rate (person/min/m)	VC Ratio
A	$\geq 12$	$\geq 78$	$\leq 16$	$\leq 0,08$
B	$\geq 3,6$	$\geq 75$	$\leq 23$	$\leq 0,28$
C	$\geq 2,2$	$\geq 72$	$\leq 33$	$\leq 0,40$
D	$\geq 1,4$	$\geq 68$	$\leq 50$	$\leq 0,60$
E	$\geq 0,5$	$\geq 45$	$\leq 83$	$\leq 1,00$
F	$\geq 0,5$	$< 45$	Variabel	variable

## 2.4. Importance Performance Analysis

The application IPA begins with the identification of attributes that are relevant to the observed choice situation. Attribute lists can be developed using mean, median, or ranking measures Cao and Cao (2017). First, the aggregated importance scores and performance attributes are classified into high or low categories; each attribute is assigned to one of the four predefined performance interest quadrants by pairing the two rank sets. IPA has been widely applied to evaluate importance and performance value in the market, identify opportunities for improvement, and guide strategic planning efforts. In IPA, service attributes are plotted in a two-dimensional matrix based on each attribute's importance and performance. All attributes' average or median importance and performance divide the matrix into four quadrants Chang et al. (2017). The priority for improvement is then summarized based on the location of the matrix points, as shown in Figure 1.

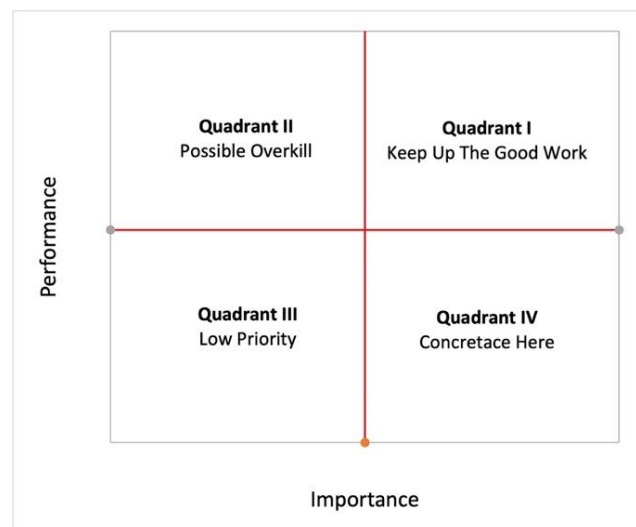


Figure1. Importance Performance Analysis

Quadrant 1 (high importance and high performance) has the management scheme for this quadrant is continuing to work well. On the other hand, quadrant 2 (low importance and high performance) have a management scheme for this quadrant that is likely to overdo. Quadrant 3 (low importance and low performance): A management scheme for this quadrant is a low priority. Whereas Quadrant 4 (high importance and low performance) has a management scheme for this quadrant is concentrated here.

## 2.4. Metode Penelitian

The research method used in this research is descriptive research. This research is used to answer questions about what or how an event or phenomenon. Therefore, intensive field observation of the phenomenon under study is required. This research was conducted on the pedestrian in cyber park mall Bekasi Indonesia. Respondents in the survey were 100 respondents. Untuk mengetahui LoS pedestrian facility dilakukan survey lapangan berupa pengukuran dan pemeriksaan kondisi lokasi. Lokasi survey yang dipilih dapat dilihat pada figure 2.

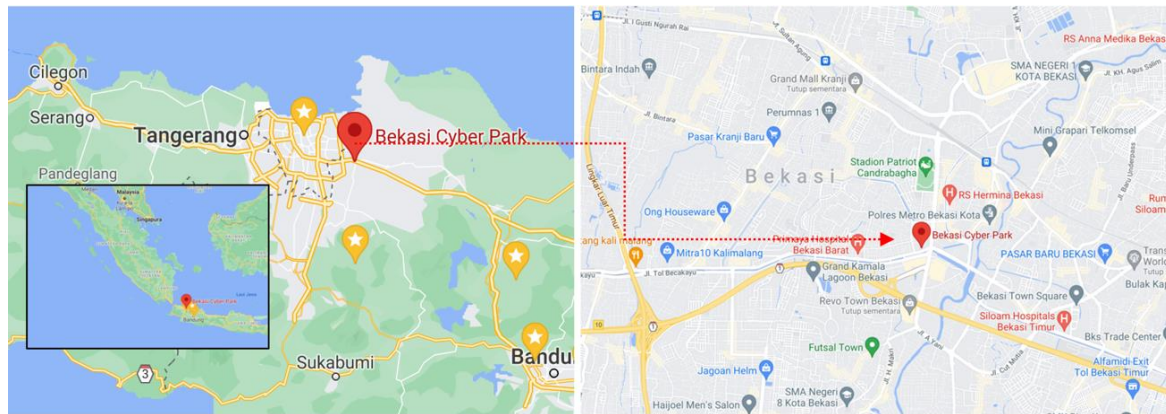


Figure 2. Location of Study

The questionnaire consists of two parts. In the first part, respondents are asked to provide information about the respondent's characteristics and information. The second part contains questions about the level of importance and respondent satisfaction with each attribute of the pedestrian activity. The assessment for the satisfaction level on the guideline using the Likert Scale method can be seen in table 2.

Table 2. Community satisfaction level

Code	Level	Weight
VD	Very Dissatisfied	1
NS	Not Satisfied	2
QS	Quite Satisfied	3
S	Satisfied	4
VS	Very Satisfied	5

The survey results were then carried out with statistical analysis to determine the normality and validity of the data. Finally, the measurement results are compared with the existing minimum standards to obtain LoS. Meanwhile, the performance of the pedestrian facility will be processed with IPA.

### 3. Result and Discussion

In recent years, the pedestrian facilities in Bekasi City are still not optimal. The facility is still a contested space by many parties, such as pedestrians, motorized vehicle users, and street vendors. As a result, pedestrian rights have not been fulfilled. Not only that but the facilities also built by the government are considered not right on target. However, currently, the government continues to make improvements and improvements to the function of the facility. In this paper, the condition of the pedestrian facility in the Bekasi Cyber Park Mall area can be seen. A location that is a densely populated area because the area is an office area, shopping center, and the scope of residence that can be reached from one place to another on foot. The condition of the pedestrian facility, which is the location of the study, can be seen in figure 3.



Figure 3. Pedestrian facility condition



### 3.1. Level of Service

Los evaluation was carried out by surveying for three days, namely Monday, Friday, and Saturday. The survey begins by measuring the dimensions of the pedestrian facility in the field. Then proceed with calculating the number of pedestrians. From the calculation results, it can be seen in figure 3. The number of pedestrians in the morning has a difference between workdays and weekends, on the weekend used for sports and family trips. At the same time, the number of pedestrians in the afternoon has similarities between workdays and weekends.

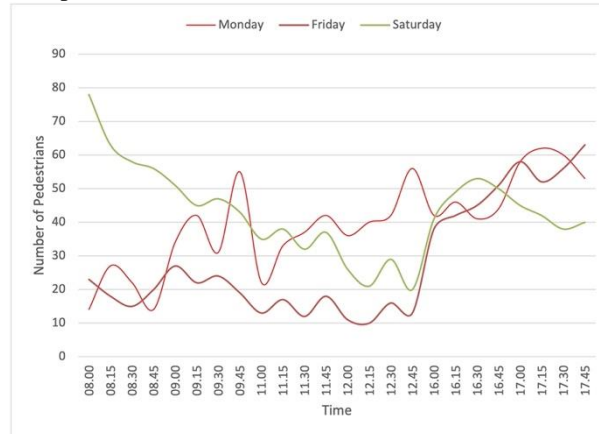


Figure 4. Number of pedestrians

Los sidewalk in the study location can be analyzed with survey data. Space is the average daily availability of sidewalk land. Furthermore, speed is obtained from the results of sampling ten selected pedestrians. At the same time, the flowrate and VC ratio using calculations from 15 minutes of data. The results of the complete analysis can be seen in table 3. Based on the analysis results, it can be seen that the level of service for the pedestrian facility at the study site is A.

Table 3. Level of services

Days of Survey	Space (m <sup>2</sup> /Person)	Speed (m/minit)	Flow Rate (person/min/m)	VC Ratio	Level
Monday	88,7	82,73	1,25	0,02	A
Friday	69,6	84,00	1,27	0,02	A
Saturday	61,3	86,00	1,58	0,02	A

### 4.2. Importance Performance Analysis

Based on the results of the questionnaire, the respondent's profile can be seen in table 4. Among the respondents, 43 % were men, and 57 % were women. Meanwhile, based on age, the respondents were dominated by the 21–30-year-old group. Furthermore, based on the type of work, students have the most positions.

Table 4. Sample Profile

Measure	Items	Frequency	Percentage (%)
Gender	Male	43	43,00%
	Female	57	57,00%
Age	10 – 20	26	26,00%
	21 – 30	37	37,00%
	31 – 40	24	24,00%
	>41	13	13,00%
Profession	Government Employees	28	28,00%
	Private Employees	23	23,00%
	Entrepreneur	19	19,00%
	Student	30	30,00%

The questionnaire data obtained from 100 respondents have been tested for instrument reliability using Cronbach's alpha value. The value of the reliability test results can be used if it exceeds the alpha value of 0,600.

Based on the reliability test results, the value of Cronbach's alpha for reliability importance statistics is 0,884 and for reliability performance statistics is 0,906.

A total of 20 indicators are used to measure the performance of the pedestrian facility. Indicators are taken from the minimum standards in Indonesia. IPA is carried out to determine the importance of each service quality attribute based on user perceptions of the importance of pedestrian facility quality. Based on the questionnaire results regarding the importance level and performance attributes of the pedestrian facility services, descriptive statistics are obtained from all respondents in the study area, which can be seen in table 5. The I is importance, P is performance, and G is the gap between importance and performance.

Table 5. The average level of pedestrian satisfaction

Code	Indicator	I	P	G
P1	Paving condition	3,58	3,47	-0,11
P2	Width of sidewalk	3,36	3,59	+0,23
P3	Drainage condition	3,49	3,45	-0,04
P4	Accessibility	3,43	3,49	0,06
P5	Diffable facility	3,55	2,74	-0,81
P6	Neatness of sidewalk	3,45	3,34	-0,11
P7	Sidewalk lighting	3,75	3,45	-0,30
P8	Sidewalk sign and direction	3,39	3,09	-0,30
P9	Separator	3,60	3,54	-0,06
P10	Public seating	3,24	3,53	0,29
P11	Public phone	2,87	2,16	-0,71
P12	Rubbish bin	3,74	3,07	-0,67
P13	Shelter of public transport	3,33	2,72	-0,61
P14	Shade trees	3,33	3,44	+0,11
P15	Crossing bridge	3,39	2,74	-0,65
P16	Cleanliness of sidewalk	3,70	3,29	-0,41
P17	Flow of pedestrians	3,46	3,39	-0,07
P18	Convenience	3,62	3,57	-0,05
P19	Accessibility to public transport	3,55	3,40	-0,15
P20	Orderliness of sidewalk	3,46	2,68	-0,78
	Mean	3,46	3,21	-0,26

Paying attention to the questionnaire results, most of the indicators are not following the importance of pedestrians. Only accessibility (P4) and public seating (P10) get a positive gap value. At the same time, the other 18 indicators received a rating of less than pedestrians. The indicator with the highest information value is sidewalk lighting (P7), with the lowest being a public phone (P11). For performance value, pedestrians assess the width of the sidewalk (P2) as the highest and public phone (P11) as the lowest.

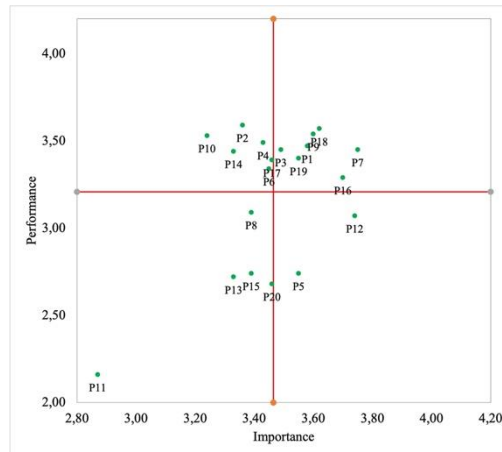


Figure 5. Importance performance analysis graph

Based on figure 5, it can be seen that the indicators P1, P3, P7, P9, P16, P18 are in quadrant I. This result shows that these indicators have good performance and are following importance. So that all indicators in the quadrant must be maintained. Meanwhile, the diffable facility (P5) and Rubbish bin (P12) indicators in quadrant IV require serious attention to improve their performance.

The diffable facility indicator becomes very interesting to discuss because it has the most significant gap value (-0.81). Diffable facility describes the extent to which the conditions of the services are provided so that people with disabilities feel safe and comfortable when they are on the sidewalk. The results of field observations of disability-friendly lane facilities on the sidewalk provided by the government seem to be far from expectations. The construction of disability-friendly lanes is only a form of decoration. In addition, people do not understand the disability facilities due to a lack of socialization. This condition impacts the conversion of sidewalk functions to street vendors, piles of garbage, motorbike parking, and hawkers. Therefore, the diffable facilities available on the sidewalk are still far from the standard of accessibility that is friendly for people with disabilities, especially for people with blind conditions.

### 3.3. COVID-19 Protocol

Government policies on controlling COVID-19 need to be studied more deeply. So it is hoped that pedestrian facility stakeholders must be able to implement regulations by preparing facilities and infrastructure (wearing masks, washing hands, maintaining distance, and avoiding crowds) for pedestrians. However, problems that arise when implementing regulations are related to applying discipline and law enforcement of health protocols in virus prevention and control. Therefore, the government and the community must increase their synergy to carry out health protocols in a disciplined manner to anticipate COVID-19 transmission.

Based on the data collected from the study location, there is a decrease in pedestrians. This condition can be seen on weekdays, and this is allegedly due to the work-from-home policy. Some of the pedestrians who usually use the sidewalk are currently doing activities in their respective homes. However, on weekends, many pedestrians use the sidewalk to do family and sports activities. These conditions can create a crowd that has the potential to transmit the virus. Especially for anticipating crowds outside the building, such as the sidewalk, cooperation with community organizations and the local government is needed.

People who work simultaneously on the sidewalk will create crowds and increase the potential for COVID-19 transmission. The availability of a comfortable sidewalk is a sports facility that is safe from the spread of the virus, provided that health protocols are observed. Sports in the open will be safer if all people wear masks, not create crowds, and keep their distance. In addition to implementing health protocols, Pandu also hopes that the government can motivate and educate people to understand better how to implement health protocols. Based on the monitoring results, the local government has advised residents who will be active on the sidewalk to wear masks, bring spare masks, dry and wet tissues, non-cash payment instruments, hand sanitizers, drinking bottles, and plastic bags.

## 4. Conclusion

The results of research that have been carried out show that pedestrians in the study location have different characteristics between weekdays and weekends. More pedestrians are in the afternoon during weekdays, while they are mainly in the morning on weekends. On weekends, it is suspected that pedestrians do family and sports activities using the sidewalk. The results of the Los evaluation obtained from data and calculations show that the sidewalk is at level A. Furthermore, based on the importance-performance analysis, seven indicators are

considered to meet user importance, with the Convenience indicator having the highest performance value. Meanwhile, the diffable facility and Rubbish bin indicators are in quadrant IV, which must be improved immediately.

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