Analysis of the Satisfaction Level of Sidewalk Users (Case Study on Jl Jendral Ahmad Yani Bekasi)

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Abstract

The development of sidewalks has not been in alignment with the number of evaluation results related to the level of utilization so far. In this study, the aim is to analyze the level of pedestrian satisfaction and its complementary facilities on the Jl. General Ahmad Yani. Problems that often arise related to pedestrian facilities include: the damage to the physical form of the sidewalk, the sidewalk is used as a place for other activities such as a place for selling street vendors, parking for motorized vehicles, billboards along the sidewalk. This research method is carried out by surveying directly to the research location in order to obtain pedestrian data such as the number of pedestrians, pedestrian speed, etc. Then also by distributing questionnaires to 95 respondents. Based on research conducted using the LOS method to determine the level of service on the sidewalks of Jendral Ahmad Yani's road which was carried out at two observation points, namely Mega Bekasi Hypermall parking lot and Ammarosa Grande Hotel, it was found that the results of the Los A Standard for Pedestrian Space in The two points are LOS A Standard for average speed at Mega Bekasi Parking, and LOS E Standard for Average Speed at Ammarosa Grande Hotel, then LOS A Standard for Flow at Mega Bekasi Parking, and LOS A Standard for Flow at Ammarosa Hotel Grande, finally found LOS B Standard for Ratio in Mega Bekasi Parking, and LOS A Standard for Ratio at Ammarosa Grande Hotel. .96 which is included in VERY GOOD condition.

Keywords
Level Of Service (LOS), Importance Performance Analysis (IPA), Pedestrian, Sidewalk.

1. Introduction

Rapid urban development has an impact on the quality and quantity of urban space. Development in cities are often oriented to the system of transportation with motorized vehicles. Space for pedestrians is neglected to the point that it cannot provide benefits for pedestrians. Both for movement and for everyday activities. Sidewalks are pedestrian paths located in road-use areas, given a surface layer, given an elevation higher than the surface of the pavement, and are generally parallel to the vehicle traffic lane. The function of the sidewalk itself is to provide services to pedestrians to provide safety, and convenience of the pedestrians.

The development of the city of Bekasi is growing rapidly. One of the roads with growing sidewalks is Jl. General Ahmad Yani. However, the development of the sidewalk has not been balanced with the number of evaluation results related to the level of utilization so far. Problems that often arise related to pedestrian facilities include: the damage to the physical form of the sidewalk, the sidewalk is used as a place for other activities such as a place for selling street vendors, parking for motorized vehicles, billboards, etc. Based on these problems, a study was conducted that analyzed the service of pedestrian facilities on the sidewalk on Jl. Jendral Ahmad Yani. The location of this final project research was carried out on the sidewalk on Jalan Jenderal Ahmad Yani, Bekasi City with 2 observation points. The first location of observation is in the parking lot beside Mega Bekasi Hypermall while the second location of observation is in front of the Amarossa Grande Hotel.
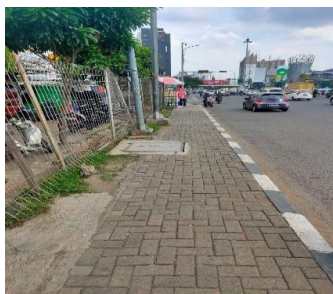

Figure 1. Location of Observatio

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2. Literary Review

Transportation is thr activity of moving or shifting of passengers or goods from one point to another. The emergence of transportation is due to fullfilling the needs of individuals and how those needs are met. According to Janosik, 2005 transportation is the activity of moving goods) and passengers from one place to another. In transportation there are two key elements, namely the transfer / movement and physically changing the place of goods (commodities) and passengers to other places. Sidewalk is a facility for pedestrians which is usually higher and different from the road that is passed by motorized vehicles, the sidewalk is part of the highway but has a height difference to distinguish the sidewalk from the highway being one of the guarantees of security and safety for pedestrians from the danger of friction. with motorized vehicles. Sidewalks in their planning and construction refer to the decision of the Director General of Highways No. 76/KPTS/Db/1999 dated December 20, 1999 (Highways, 1999)

2.1 Level Of Service

Service level analysis is carried out using the HCM (High Capacity Manual) method, 2000. The service level of pedestrian facilities according to the HCM (Highway Capacity Manual) 2000 can be determined in four indicators, namely based on flow, average speed of space, space and ratio. Here are the formulas:a

1. Pedestrian Speed

   Pedestrian speed can be calculated using the following formula:

   $$V = \frac{L}{t}$$

   Information:
   V = pedestrian speed (m/min)
   L = Length of observation (meters)
   t = time taken by pedestrians passing the observation segment (minutes)

2. Mean Speed of Time

$$Vt = \frac{i}{n}\sum_{i=1}^{n} Vi$$

   Information:
   Vt = Average speed of time, (m/min)
   n = Number of observed speed data
   Vi = Speed per pedestrian observed, (m/min)

3. Mean Speed Of Space

$$Vs = \frac{1}{\sum_{i=1}^{n}\frac{1}{Vi}}$$

   Information:
   Vs = Average velocity of space,(m/min)n = Number of data
   Vi = Speed per pedestrian observed, (m/min)

4. Pedestrian Volume

   Pedestrian volume can be calculated using the following formula.

   $$D = \frac{Q}{\overline{Vs}}$$

   Information:

   D = Density (pedestrians/m2)

   Q = Pedestrian flow (pedestrians/m/min)

   Vs = Average speed (m/min)

5. Pedestrian Space

   Pedestrian Space is obtained using the following formula.

   $$S = \frac{Vs}{Q} = \frac{I}{D}$$

Information:
S = Pedestrian space (m2/pedestrian)
 D = Density (pedestrians/m2)
Q = Pedestrian flow (pedestrians/minute/meter)
Vs = Average velocity of space, (m/min)

6. Ratio

The ratio between flow and pedestrian capacity is obtained by the following formula ratio:

$$r = \frac{v}{C}$$

Information;
R = Ratio of flow to pedestrian capacity
V = Pedestrian flow (pedestrians/minute/meter)
C = Pedestrian capacity (50 pedestrians/minute/meter)

The following is Table 1 which is the level of service or type of level of service based on the regulation of theMinister of Public Works in 2014:

Tabel 1. Type of LOS

Level of Service	Pedestrian Path (m²/Ped)	Average speed (m/menit)	Pedestrian Flow Volume (person/meter/minute)	Ratio (V/C)
A	>12	≥78	≤16	≤ 0,08
B	≥3,6	≥75	23	≤ 0,28
C	≥2,2	≥72	33	≤ 0,40
D	≥1,4	≥68	50	≤ 0,60
E	≥0,5	≥45	83	≤ 1,00
F	≥ 0,5	<45	Variable	1,00

2.2 Questionnaire

To determine the level of satisfaction of the pedestrians, the authors use the questionnaire method. Questionnaire method is a data collection technique which is done by giving a list of written statements to respondents either directly or indirectly. This questionnaire method is considered quite efficient because it can quickly and accurately determine the level of respondent satisfaction. The type of questionnaire used in this study is a closed questionnaire. Before distributing the questionnaires, a sampling technique was used using the slovin formula:

$$n = \frac{N}{1 + N(e)^2}$$

Information:
n = Number of samples
N = Total population
e = percent inaccuracy leeway10%

2.3 Test Data

1. Validity Test

Validity test is carried out to show the degree of accuracy between the data that actually occurs on the object of research and the data that has been collected by the researcher. To find the validity of an item, we correlate the item score with the total items utilized. If the coefficient between the item and the total item is equal to or above 0.3 then the item is declared valid, but if the correlation value is below 0.3 then the item declared invalid.

2. Reliability Test

The purpose of the reliability test is to determine whether the questionnaire that has been used in this study shows the level of accuracy, accuracy and consistency. The reliability value is expressed by the Cronbach Alpha coefficient based on the criteria for the lowest limit of reliability is 0.6. If the requirements in the test are met, the questionnaire is declared reliable.

2.4 Importance of Performance Analysis

The pedestrian satisfaction level analysis in this study used the IPA (Importance Performance Analysis) method. IPA analysis is data processing that is used to measure the importance of an indicator by linking the performance perceived by the user, to find that out the, the SPSS application is used to process the statistical data obtained. The level of performance and the level of importance of these indicators will be described and plotted into four parts on the Cartesian diagram, namely quadrants 1, 2, 3, 4.

3. Research Methodology

The data used in this study are primary data and secondary data. Primary data is data obtained based on direct observations based on field conditions, the data obtained are pedestrian volume, pedestrian speed, pedestrian characteristics and pedestrian satisfaction data. Secondary data is data obtained from data sources in the form of existing literature such as books, records, and existing evidence, or archives, both published and unpublished in general. For this research, the data used are location map data, reports or documentation from related agencies, and journals.

4. Results & Analysis

4.1 Calculation of Number of Pedestrians

Pedestrian data obtained based on a survey conducted for 3 days below is one of the results of these observations on Wednesday, July 21, 2021. The following is Table 2 which is an example of the number of pedestrians at one of the observation points located in front of Mega Bekasi Hypermall parking lot with a segment length of 57.6 meters and an effective width of 1.3 meters.

Table 2. Number of Pedestrians

Time	Number of Pedestrians								Total
	South (Mall)				North (JPO)				
	L	P	A	TOTAL	L	P	A	TOTAL	
11.00-11.15	5	9	0	14	5	4	0	5	19
11.15-11.30	10	5	0	15	3	8	0	11	26
11.30-11.45	5	14	0	19	4	6	0	10	29
11.45-12.00	5	7	0	12	2	7	0	9	21
12.00-12.15	7	9	0	16	10	8	0	18	34
12.15-12.30	15	12	0	27	7	9	0	16	43
12.30-12.45	13	8	0	21	7	6	0	13	34
12.45-13.00	12	7	0	19	9	10	0	19	38
	TOTAL								244

4.2 Level Of service

The value of the service level / pavement performance is used as a parameter for the performance of the pedestrian path, which then the performance of the pedestrian path on Jalan Jendral Ahmad Yani can be known based on the results of the level of service analysis conducted at 2 points, namely the Parking Area of Mega Bekasi Hypermall and Hotel Ammarosa Grande. The results obtained at Mega Bekasi Hypermall parking lot is based on pedestrian space, the results obtained from LOS A Standard, Average Speed LOS A Standard, Pedestrian Flow Volume LOS A Standard, LOS B Standard Pedestrian Ratio. While the results obtained at the Ammarosa Grande Hotel point for pedestrian space obtained LOS A standard, the average speed was found tobe LOS E standard, the volume of pedestrian flow was found to be LOS A standard, pedestrian ratio was found to be LOS A standard.

Tabel 3. Level Of Service

SEGMENT	PEDESTRIAN SPACE (m²/Ped)	AVERAGE SPEED (m/menit)	PEDESTRIAN FLOW VOLUME (person/meter/minute)	RATIO (V/C)
OBSERVATION POINT 1	29,7	137,4	4,51	0,08
OBSERVATION POINT 2	20,4	53,1	2,73	0,05

4.3 Questionnaire Processing

The first step is to determine the number of samples using the Slovin formula. Based on the data obtained, the number of pedestrians on Jalan Jendral Ahmad Yani during the observation was 1171 people. Then the number of samples obtained is 95 samples/respondents. The next step is to test the instrument which will be described as follows. Validity test and reliability test were processed using SPSS.

1. Validity Test

is a test carried out to determine the validity of each item of the respondent's statement with the provisions R Count > R Table. Below are the results of the validity of the satisfaction and importance of data using SPSS

Tabel 4. Satisfaction and Interest Validity Test

VARIABLE	R COUNT	R TABLE	DESCRIPTION
1	1	0,202	VALID
2	,711**	0,203	VALID
3	,463**	0,204	VALID
4	,687**	0,205	VALID
5	,424**	0,206	VALID
6	,332**	0,207	VALID
7	,524**	0,208	VALID
8	,422**	0,209	VALID
9	,538**	0,210	VALID
10	,711**	0,211	VALID
11	,524**	0,212	VALID
12	,687**	0,213	VALID
13	,711**	0,214	VALID
14	,491**	0,215	VALID
15	,225*	0,216	VALID
16	,397**	0,217	VALID
17	,472**	0,218	VALID
18	,223*	0,219	VALID

VARIABLE	R COUNT	R TABLE	DESCRIPTION
1	,314**	0,202	VALID
2	,253*	0,203	VALID
3	,248*	0,204	VALID
4	,263*	0,205	VALID
5	,207*	0,206	VALID
6	,524**	0,207	VALID
7	,208*	0,208	VALID
8	,687**	0,209	VALID
9	,314**	0,210	VALID
10	,206*	0,211	VALID
11	,253*	0,212	VALID
12	,687**	0,213	VALID
13	,205*	0,214	VALID
14	,524**	0,215	VALID
15	,538**	0,216	VALID
16	,253*	0,217	VALID
17	,687**	0,218	VALID
18	,221*	0,219	VALID

2. Reliability Test

Reliability tests were conducted on each smoothing item that was included in the valid category. Reliability test serves to determine the level of consistency of the questionnaire used. The data analyzed used the Alpha Cronbach method. The reliability test is said to be reliable if the Cronbach Alpha obtained from the reliability test is greater than 0.60 (r > 0.6).

Tabel 5. Satisfaction and Interest Reliability Test

VARIABEL	N Item	Cronbach's Alpha	R	DESCRIPTION
SATISFACTION	18	0.952	0.6	VALID
INTEREST	18	0.958	0.6	VALID

3. Characteristics of Respondents

The characteristics of the respondents were obtained based on the distribution of questionnaires through the google form and the data can be seen in the table below

Tabel 6. Characteristics of Respondents

No	Characteristics	Category
1	Gender	Male : 51 people Female : 44 people
2	Respondent Age	10 – 20 years : 5 people 21 – 30 years : 69 people 31 – 40 years :21 people
3	Occupation	Student : 33 people Civil Servant : 14 people Private Employee : 38 peopleStreet Vendors : 10 people
4	Purpose of Utilization of Sidewalk	Work : 28 people Shopping : 48 people Exercise : 12 people Others : 7 people

4.4 Pedestrian Satisfaction Level Testing Using the IPA (Importance Performance Analysis) Method

The stages in distributing the level of satisfaction and importance into the Cartesian diagram are to determine the level of conformity between interests and satisfaction using the Importance Performance Analysis method by analyzing the comparison between the satisfaction score and the interest score after analyzing the level of conformity, namely determining the average rating for satisfaction and interest. For each item after that a Cartesian diagram was made.

1. Conformity Level

The stages in distributing the level of satisfaction and importance into the Cartesian diagram are to determine the level of conformity between interests and satisfaction using the Importance Performance Analysis method by analyzing the comparison between the satisfaction score and the interest score. The following is an explanation of the level of conformity. Based on the analysis of the level of conformity in table 4.22 above, it is concluded that the overall average obtained is 82.96%, including in VERY GOOD conditions.

Table 7 . Conformity Level

VARIABEL	SATISFACTION X	INTEREST Y	Suitability Leve; (5)	DESCRIPTION
1	320	371	86,25	VERY GOOD
2	304	362	83,98	VERY GOOD
3	310	368	84,24	VERY GOOD
4	304	368	82,61	VERY GOOD
5	304	371	81,94	VERY GOOD
6	218	316	68,99	GOOD
7	314	375	83,73	VERY GOOD
8	310	308	100,65	VERY GOOD
9	321	371	86,52	VERY GOOD
10	210	345	60,87	PRETTY GOOD
11	195	362	53,87	PRETTY GOOD
12	304	308	98,70	VERY GOOD
13	188	348	54,02	PRETTY GOOD
14	308	318	96,86	VERY GOOD
15	314	316	99,87	VERY GOOD
16	315	365	86,30	VERY GOOD
17	330	357	92,44	VERY GOOD
18	346	376	90,02	VERY GOOD
	AVARANGE		82,96	VERY GOOD

2. Cartesian Charts

The next step in using the IPA method is to make a Cartesian diagram from the average data of needs and average interests that have been analyzed and the following is a picture of a Cartesian diagram
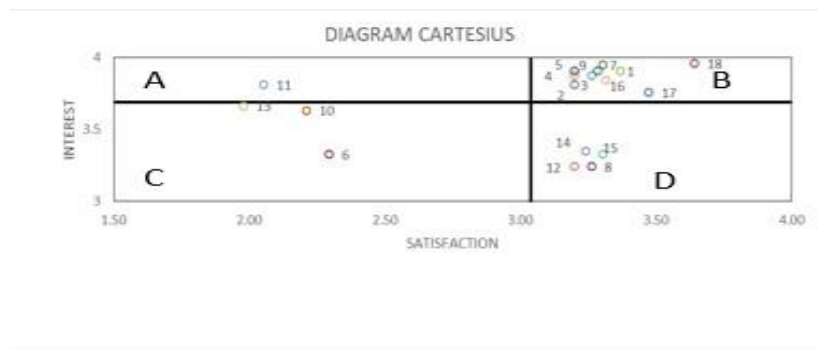
Figure 2. Cartesius Charts

The Cartesian diagram above is divided into 4 quadrants, each of which has different factors. The following isan explanation of the components in the Cartesian diagram contained in the following table.

Quadrant A

Factors that are in quadrant A are the main priority factors. In this quadrant the research factors have a high level of importance but have a low performance appraisal. Therefore, the factors in this quadrant have the main priority that really needs to be considered. In this quadrant, more emphasis is placed on the direction of improvement, because satisfaction is considered low. In this study, quadrant A are as follows:

1. Availability of Trash Cans (11)

Quadrant B

Quadrant B consists of factors that are considered important and are expected to be supporting factors for pedestrian satisfaction. So that the policy makers or the government are obliged to ensure that the performance they manage can continue to maintain the achievements they have achieved. In this study, quadrant B are as follows:

1) Adequate drainage (1)
2) Pavement width of at least 2 meters (2)
3) Paving Conditions (3)
4) Pavement Slope (easy to access) (4)
5) Pavement Tidiness (5)
6) Has Illumination (7)
7) There is a barrier between the sidewalk and the road (9)
8) Ease of walking on the Sidewalk (16)
9) Order on pedestrian paths (PKL, Parking, ETC) (17)
10) Affordable accessibility between public transportation modes (18)

Quadrant C

Quadrant C consists of factors with a low priority level. In this quadrant, the factors that are considered to havea level of importance and performance are quite low. Therefore, the factors that are here are not so important compared to the factors that are in quadrant A and quadrant B. In this study, those included in quadrant C are as follows:

1) Availability of trees used for shade (13)
2) Availability of seats (10)
3) Availability of facilities for the disabled and elderly (6)

Quadrant D

Quadrant D is a factor that is considered not very important, so the authorities need to allocate factors that are considered related to this quadrant to other factors that require a higher priority for handling. In this study, quadrant D as follows:

1) Have Traffic signs (8)
2) Availability of shelters (12)
3) Availability of JPO (People Crossing Bridge) (14)
4) Sidewalk Cleaning (15)

5. Conclusion

Based on the results of the research that has been done, it is concluded that in analyzing the satisfaction level ofJalan Jendral Ahmad Yani Sidewalk Users, it is as follows:

From the research and observations carried out to determine the condition of the sidewalks and supporting facilities on Jalan Jendral Ahmad Yani, of the 21 sections identified on the sidewalk in accordance with the provisions of the guidelines from the SE Minister of Public Works NO2/SE/M/2018, 12 sections were found in accordance with the provisions and 9 parts that do not comply with the provisions.

Based on research conducted using the LOS method to determine the level of service on the sidewalks of Jendral Ahmad Yani's road which was carried out at two observation points, namely the Mega Bekasi Hypermall parking lot and the Ammarosa Grande Hotel, and the results found were the LOS A standard for the pedestrian space at both points, as well the LOS A standard for the average speed at Mega Bekasi Parking Lot, and LOS E Standard for the Average Speed at Hotel Ammarosa Grande, then the LOS A Standard for Flow at Mega Bekasi Parking, and LOS A Standard for Flow at Hotel Ammarosa Grande, Finally, the LOS B Standard for Ratio was found at Mega Bekasi Parking, and the LOS A Standard for Ratio was found at Ammarosa Grande Hotel. Based on research conducted using the IPA method to determine the satisfaction level of the sidewalk users on Jalan Jendral Ahmad Yani, was found at the percentage of satisfaction level which was 82.96and determined as a VERY GOOD condition.

Based on the Importance Performance Analysis method, it shows that the main priorities that must be considered are the availability of trash bins, adequate drainage channels, slope of sidewalks (easy to access),neatness of sidewalks, affordability of accessibility between modes of public transportation.

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Biographies

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