

Analysis of Sidewalk or Pedestrian Path Satisfaction (Case Study of Casablanca Street, Kasablanka City Mall Area)

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Abstract

Increased mobility in DKI Jakarta area has resulted in the government having to make improvements to facilities or infrastructure especially in the transportation sector, but in the effort to increase this, the government is still siding with motorized vehicles compared to pedestrians. This study aims to determine the level of satisfaction and performance of pedestrian paths on pedestrian paths at Jalan Casablanca, South Jakarta, Kota Kasablanka Mall Area. This research method is carried out by direct survey 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 100 respondents. The population taken in this study are people (sidewalk users) who pass or travel on foot along Jalan Casablanca, Jakarta Selatan, Kota Kasablanka Mall Area. Data processing in this study used Microsoft Excel and SPSS version 24 and the methods used are Importance Performance Analysis (IPA) and Level Of Service. The results of data analysis using Importance Performance Analysis method, it was found that the level of interest and satisfaction of pedestrians in Quadrant I which is given priority is the availability of facilities for the disabled and the elderly, order on pedestrian paths (street vendors, illegal parking, etc.), smooth travel, ease of walking. on the sidewalk, availability of trash cans. In Quadrant II what must be maintained are having lighting, paving conditions (not cracked / perforated, not slippery, etc.), sidewalk cleanliness, having traffic signs, having a barrier between the sidewalk and the road, adequate drainage channels, availability of stops / shelters, availability JPO (Pedestrian Bridge). In Quadrant III, the low priority is the availability of public telephones, availability of seats, neatness and regularity of the sidewalks. And in Quadrant IV, which is categorized as excessive, there is a sidewalk width of at least 3 meters, sidewalk slope (easily accessible), availability of shade trees, and accessibility between modes of public transportation. The results of the analysis of the road level with the LOS method get the LOS A category for the pedestrian space level. Then for the average pedestrian speed get the LOS B level on Monday and LOS C on Friday and Saturday. Then for the flow level get the LOS A category. And finally for the ratio assessment level get LOS A.

Keywords :

Importance Performance Analysis (IPA), Level Of Service (LOS), Pedestrians, Sidewalks.

1. Introduction

DKI Jakarta is the center of business, politics, culture and the center of Indonesian government. As time goes by, it is undeniable that DKI Jakarta is increasingly experiencing development in terms of business, politics, economy and others. This makes DKI Jakarta has relatively high mobility, both permanent and non-permanent, reaching 1.2 million people per day who come to Jakarta according to the commuter survey results (Statistik, 2019).

Along with high mobility in the DKI Jakarta area, the government must also keep pace with these developments by improving facilities both facilities and infrastructure in order to support the quality of life of its people, especially in the field of transportation. However, developments in terms of transportation in the DKI Jakarta area are still only in favor of motorized vehicles compared to pedestrians, so it is hoped that the government will be able to increase and pay more attention to the rights of pedestrians to the sidewalk facilities that it must obtain.

Transportation in general can be defined as an effort to move people or goods from one location, which is called the location of origin, to another location, which is usually called the destination, for certain purposes by using certain tools as well (Miro, 2012).

Pedestrian is a term given in transportation to describe people who are walking on a pedestrian path either on the side of the road, sidewalk, special lane for pedestrians or road crossing (Pratama, 2014).



Figure 1. Sidewalks / Pedestrian Lanes

Sidewalks are pedestrian paths that are located in the benefit area of the road, coated with a surface, given a higher elevation than the surface of the pavement, and generally parallel to vehicle traffic lanes (Marga, 1990). The function of the sidewalk itself is to provide services to pedestrians so that it can improve the smoothness, safety and comfort of these pedestrians.

The comfort level of pedestrians in carrying out walking activities can be achieved if the pedestrian path is smooth and free of obstacles, and the pedestrian lane must be wide so that it can accommodate pedestrian traffic flow from two directions (Weisman, 1981).

The objectives of this study are:

- Can find out the number of users of sidewalks or pedestrian paths on Jalan Casablanca, South Jakarta, DKI Jakarta
- Can know the level of satisfaction of users of sidewalks or pedestrian paths on Jalan Casablanca, South Jakarta, DKI Jakarta
- Can find out the condition of sidewalks or pedestrian paths on Jalan Casablanca, South Jakarta, DKI Jakarta in accordance with the regulations set by the government.

2. Research Methodology

This research requires several stages in the process, namely, primary and secondary data collection. Primary data obtained are from questionnaire answers from respondents and pedestrian data. Then from the questionnaire data processed in order to determine the level of pedestrian satisfaction distributed to 107 respondents online, respondents will provide a Likert scale assessment of the physical condition of the sidewalk on Jl. Casablanca, South Jakarta followed the 20 statements in the questionnaire that the researcher gave, then processed it using the method Importance Performance Analysis and analyzed it with several data tests, namely validity and reliability tests and for pedestrian data it was processed by calculating HCM (High Capacity Manual) to know the level of performance / Level Of Service from the sidewalk. Meanwhile, secondary data is obtained from several data sources such as government regulations, constitution, etc.

2.1 Level Of Service

The pedestrian data that has been obtained are then processed using the calculation method High Capacity Manual (HCM) in order to obtain 4 useful aspects to determine the level of performance / Level Of Service from careful sidewalks. The 4 aspects include pedestrian space, average speed of pedestrians, pedestrian flow and ratio. Which is then categorized into the Level Of Service level which refers to the Regulation of the Minister of Public Works. The following formulas are used:

1. Pedestrian Flow

Pedestrian flow is the number of pedestrians that cross a particular pedestrian path / which is examined at certain time intervals and is measured in units of pedestrians per meter per minute. Pedestrian flow is obtained by the following formula:

$$Q = \frac{N}{T}$$

Explanation :

Q = Pedestrian Flow (ped/m/minutes)

N = Number of pedestrian (ped/m)

T = Time of observation (minutes)

2. Speed Of Pedestrian

Speed of Pedestrian speed is the level of speed obtained by pedestrian lane users passing through the sidewalk. The formula used is:

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

Explanation:

V = Speed of pedestrian (m/minute)

L = Length of segment (meters)

t = Time obtained (minute)

3. Average Velocity Of Space

Average velocity of space can be calculated with the following formula:

$$V_s = \frac{1}{\sum_{i=1}^n \frac{1}{V_i}}$$

Explanation :

V_s = Average velocity of space (m/minutes)

n = Amount of data

V_i = Speed Of Pedestrian (m/minutes)

4. Average Velocity Of Time

Average velocity of time can be calculated with the following formula:

$$V_t = \frac{1}{n} \sum_{i=1}^n V_i$$

Explanation :

V_t = Average velocity of time (m/minutes)

n = Amount of speed data

V_i = Speed of pedestrian (m/minutes)

5. Pedestrian Space

Pedestrian space can be calculated with the following formula:

$$S = \frac{V_s}{Q} = \frac{1}{D}$$

Explanation:

S = Pedestrian Space (m²/Ped)

D = Density (Ped/ m²)

Q = Pedestrian Flow (Ped/min/meter)

V_s = Average velocity of space (m/min)

6. Ratio

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

$$R = \frac{V}{C}$$

Explanation:

R = Current ratio to pedestrian capacity

V = Pedestrian Flow (Ped/min/meters)

C = Pedestrian Capacity (75 ped/min/meters)

The following is a table of service level categories or types of *service levels* which refer to the Regulation of the Minister of Public Works No.3 of 2014, which can be seen in table 1

Tabel 1. Type of Level Of Service

Level Of Service	Pedestrian Space (m ² /Ped)	Average Velocity Of Time (m/min)	Pedestrian Flow (Ped/m/min)	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	Variabel	1,00

2.2 Questionnaire

Questionnaire data that have been collected are then processed using the Important Performance Analysis method by comparing satisfaction with the importance of sidewalk services on Jl. Casablanca, South Jakarta is felt by the sidewalk users. Then the results are presented in the form of the priority level of the statement attributes in the questionnaire which are presented in a Cartesian Diagram.

2.3 Data Analysis

To find out which instrument is properly arranged in measuring the level of service and producing valid data, several tests are carried out as follows:

2.3.1 Validity Test

Validity test is used to measure the validity of a questionnaire. The questionnaire is said to be valid if the questions on the questionnaire are able to reveal something that will be measured on the questionnaire. Question items in the questionnaire are declared valid if $r_{count} > r_{table}$. Testing with the following test criteria:

- If $r_{Calculate} > r_{Tabel}$, then the data is valid.
- If $r_{Calculate} < r_{Tabel}$, then the data is Invalid.

2.3.2 Realibility Test

Realibility is an index that shows the extent to which a measuring device can be trusted or reliable. Reliability also shows the consistency of a measuring instrument in measuring the same factors. The criteria for a research instrument are said to be reliable using the Cronbach Alpha technique when the reliability coefficient r is more than 0.6. Testing with the following test criteria:

- If Cronbach's Alpha > 0.6 , the data is reliable.
- If Cronbach's Alpha < 0.6 , then the data is not reliable.

3. Results and Analysis

3.1 Level Of Service

The following is the hourly highest pedestrian data on the sidewalk of Jl.Casablanca which is obtained after the survey was conducted for 3 days, can be seen in tables 2,3 and 4.

Table 2. Pedestrian Data 7 December 2020

Time	Num. Of Pedestrian		Total
	B-T	T-B	
12.00 - 12.15	56	31	87
15 - 30	43	41	84
30 - 45	47	56	103
45 - 00	49	52	101
Total			375

Table 3. Pedestrian Data 11 Desember 2020

Time	Num. Of Pedestrian		Total
	B-T	T-B	
17.00 - 17.15	54	45	99
15 - 30	50	77	127
30 - 45	58	39	97
45 - 00	43	26	69
Total			392

Table 4. Pedestrian Data 12 Desember 2020

Time	Num. Of Pedestrian		Total
	B-T	T-B	
17.00 - 17.15	31	57	88
15 - 30	52	54	106
30 - 45	49	42	91
45 - 00	48	37	85
Total			370

Then after the pedestrian data is obtained, the calculation is carried out using the HCM method and then averaged so that the average Level Of Service is obtained from the sidewalks for the pedestrian paths, LOS A is obtained, for average speed, LOS C is obtained, for pedestrian flows it is obtained LOS A, and for the ratio obtained LOS A and can be seen in table 6.

Tabel 6. Average Of Level Of Service

Research Time	Pedestrian Space (m ² /Ped)	Average Velocity Of Time (m/min)	Pedestrian Flow (Ped/m/min)	Ratio (V/C)
Monday, 7 December 2020	24,90 m ² /Ped	75,98 m/menit	2,99 ped/meter/menit	0,04
Friday, 11 December 2020	19,97 m ² /Ped	74,53 m/menit	3,68 ped/meter/menit	0,05
Saturday, 12 December 2020	22,76 m ² /Ped	72,23 m/menit	3,07 ped/meter/menit	0,04
Average	22,54 m ² /Ped	74,25 m/menit	3,25 ped/meter/menit	0,04

3.2 Characteristics of Respondents from Sidewalk Users On Jl.Casablanca

Following are the characteristics of respondents who use sidewalks at Jl.Casablanca which consist of 107 respondents can be seen in table 7 to table 10:

Table 7. Gender of Respondents

Gender	Total	Percentage
Male	56	52,3%
Female	51	47,7%
Total	107	100%

Table 8. Age Of Respondents

Age	Total	Percentage
10 – 20 years	22	20,6%
21 – 30 years	66	61,7%
31 – 40 years	13	12,1%
41 – 50 years	3	2,8%
>51 years	3	2,8%
Total	107	100%

Table 9. Job Of Respondents

Job	Total	Percentage
Students	69	64,53%
Civil Servants	0	0%
Private Employees	33	30,8%
Entrepreneur	2	1,9%
Others	3	2,8%
Total	107	100%

Table 10. Walk Interest

Interest	Total	Percentage
Shopping Center	78	72,9%
Work	16	15%
Exercising	7	6,5%
Others	6	5,5%
Total	107	100%

3.3 Validity Test

Validity test is carried out using the SPSS program by entering the value of satisfaction and importance. The question item is declared valid if $r \text{ count} > r \text{ table}$. To determine the $r \text{ table}$, it can be seen in the distribution table of the R value of 5% significance based on the number of respondents, namely $107 - 2 = 105$ so that it can be seen that the value of $r \text{ table}$ to be used is 0.1900. Following are the results of testing performance and service satisfaction, can be seen in table 11 and table 12.

Table 11. Validity Test Of Satisfaction

Statement	R.Count	R.Table	Satisfaction
1	0,723	0,190	Valid
2	0,695	0,190	Valid
3	0,662	0,190	Valid
4	0,758	0,190	Valid
5	0,602	0,190	Valid
6	0,760	0,190	Valid
7	0,689	0,190	Valid
8	0,726	0,190	Valid
9	0,712	0,190	Valid
10	0,723	0,190	Valid
11	0,467	0,190	Valid
12	0,747	0,190	Valid
13	0,748	0,190	Valid
14	0,693	0,190	Valid
15	0,696	0,190	Valid
16	0,716	0,190	Valid
17	0,733	0,190	Valid
18	0,802	0,190	Valid
19	0,733	0,190	Valid
20	0,557	0,190	Valid

Table 12. Validity Test Of Interest

Statement	R.Count	R.Table	Interest
1	0,854	0,190	Valid
2	0,866	0,190	Valid
3	0,825	0,190	Valid
4	0,866	0,190	Valid
5	0,891	0,190	Valid
6	0,889	0,190	Valid
7	0,867	0,190	Valid
8	0,787	0,190	Valid
9	0,761	0,190	Valid
10	0,854	0,190	Valid
11	0,378	0,190	Valid
12	0,894	0,190	Valid
13	0,889	0,190	Valid
14	0,722	0,190	Valid
15	0,817	0,190	Valid
16	0,927	0,190	Valid
17	0,890	0,190	Valid
18	0,920	0,190	Valid
19	0,733	0,190	Valid
20	0,888	0,190	Valid

From the validity test, it can be seen that all r Count > r Table so it can be concluded that all data are declared valid.

3.4 Realibility Test

Reliability test was carried out using the SPSS program by entering the value of satisfaction and importance, the questionnaire data was declared reliable if Cronbach's Alpha > 0.6 and if Cronbach's Alpha < 0.6, then it was not reliable. Following are the results of testing on satisfaction and importance, can be seen in table 13

Table 13. Realibility Test Of Satisfaction and Interest

Variabel	N Item	Cronbach's Alpha	R	Keterangan
Satisfaction	20	0,942	0,6	Reliabel
Interest	20	0,976	0,6	Reliabel

From reliability testing, it can be seen that all Cronbach's Alpha values are > 0.6, so it can be concluded that all data are declared reliable.

3.5 Sidewalk Identification

This sidewalk identification contains a standard conformance form for the sidewalk of Jalan Casablanca, South Jakarta (Kota Kasablanka Mall Area) which refers to the Minister of Public Works Regulation No.

3/2014. This identification is carried out to determine whether it is in accordance with the planning provisions or not. This identification was done by making direct observations to the research location Jalan Casablanca, South Jakarta (Kota Kasablanka Mall Area) can be seen in table 14.

Table 14. Sidewalk Identification

No	DESCRIPTION	Minimum Size	Answer		Size	Description
			Yes	No		
1	Lounge Pedestrian Under Dimensions					
	a. The width of the walkway	1,8 m	√		2,3 m	
	b. Walk in a row 2 people	2,0 m	√		2,3 m	
	c. Walk in a row 3 people	3,0 m		√	2,3 m	
2	Pedestrian Pathways with Special Needs					
				√	-	No special needs paths
3	Free Pedestrian Pathways					
	a. Provides flexibility for pedestrians			√		There is illegal parking, street vendors
	b. High accessibility			√		There is illegal parking, street vendors
	c. Security and safety for pedestrian			√		
	d. Have a free view of the activities around			√		
	e. Free vertical obstruction 2.5 m from the walkway surface	2,5 m		√	>2,5 m	
	f. Has a side width of at least	0,3 m		√	2,9 m	
4	Minimum Pedestrian Distance to Buildings					
	a. Minimum distance from building	0,75 m		√	2,9 m	
	b. Difference in maximum height with motorized vehicle lane is	0,2 m		√	0,25m	
5	Facilities on the Sidewalk					
	a. Green zone			√		There is no green zone
	b. Lighting			√		
	c. Seat			√		There is no place to sit
	d. Safety Fence			√		
	e. Trash Can			√		
	f. Sign			√		
	g. Waiting Place			√		
	h. Pedestrian Bridge			√		
	i. Zebra Cross			√		There is no zebra cross
	j. Bus Stop			√		

3.6 Calculation of the Priority Level

Following is a Cartesian diagram that has been processed using the SPSS program so that it can be seen in Figure 2.

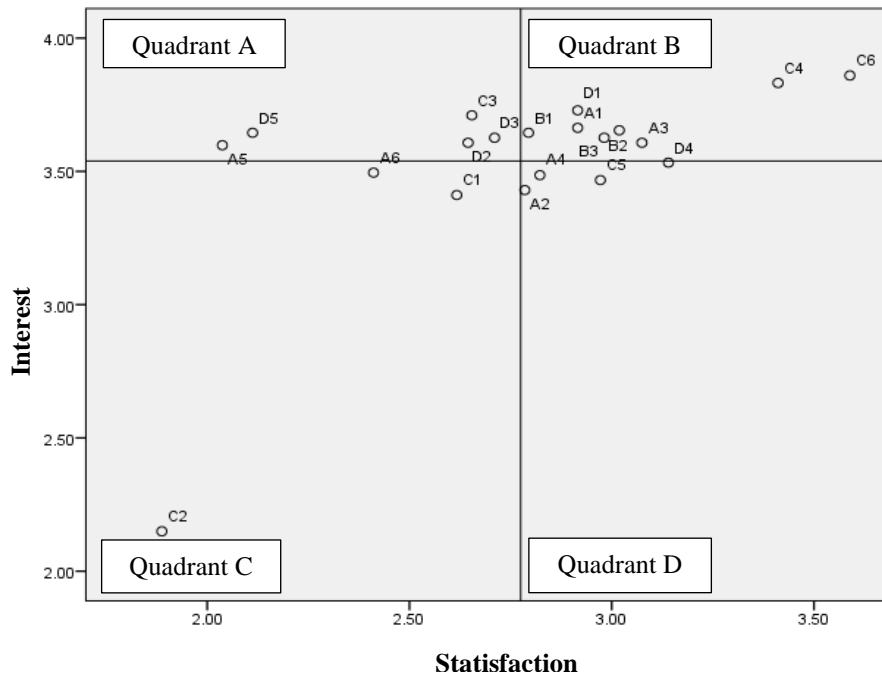


Figure 2. Cartesian Diagram

Following is a description of the various components at the priority level:

1. **Quadrant A:** This quadrant shows the main priority. This quadrant explains that the pavement performance appraisal has low satisfaction results but has a high importance value. Factors that are in this quadrant must be the main priority in handling or repairing in order to create welfare for pedestrians or sidewalk users because they have low satisfaction. Following are the components included in quadrant A:
 - 1) Availability of Facilities for Disabilities and the Elderly (A5)
 - 2) Order on Pedestrian Lines (PKL, Illegal Parking, etc.) (D5)
 - 3) Smoothness On The Way (D2)
 - 4) Easy to walk on sidewalks (D3)
 - 5) Availability of Trash Can (C3)

2. **Quadrant B:** This quadrant shows that the level of importance of a component is considered very important by users and the satisfaction provided is in accordance with user expectations, so that users are satisfied. Thus, the components that are in this quadrant need to be maintained to maintain and increase user satisfaction. The components included in quadrant B are as follows:
 - 1) Has Lighting (B1)
 - 2) Paving Conditions (Not Cracked / Perforated, Not Slippery, etc.) (A1)
 - 3) Sidewalk Cleanliness (D1)
 - 4) Have Traffic Signs (B2)
 - 5) There is a barrier between the sidewalk and the road (B3)
 - 6) Adequate Drainage Drain (A3)
 - 7) Availability of Shelters (C4)
 - 8) Availability of JPO (Pedestrian Bridge (C6)

3. **Quadrant C:** This quadrant is a low priority where these components have unsatisfactory satisfaction and importance. Repair priority of components in this quadrant is low because the effect is insignificant on consumer satisfaction compared to quadrants A and B. Here are the components included in the C quadrant:
 - 1) Availability of Public Phones (C2)
 - 2) Availability of Seats (C1)
 - 3) Tidiness and Regularity of Sidewalks (A6)

4. Quadrant D: This quadrant contains components that are considered by users to be less important, but the resulting satisfaction has met user expectations, so this quadrant is considered excessive and can consider shifting components in this quadrant to components with priority main (quadrant A). Here are the components in the D quadrant:
- 1) Minimum Sidewalk Width 3 meters (A2)
 - 2) Sidewalk Ramps (Easily accessible) (A4)
 - 3) Availability of Shade Trees (C5)
 - 4) Accessibility between modes of public transportation (D4)

4. Conclusion

The results of data analysis using the Importance Performance Analysis method, it is found that the level of importance and satisfaction of pedestrians in Quadrant A, which is given priority is the availability of facilities for the disabled and the elderly, order on the pedestrian route (PKL, Illegal Parking, etc.), Smoothness of Travel, Ease of Walking on Sidewalks, Availability of Trash Can. In Quadrant B what must be maintained are having lighting, paving conditions (not cracked / perforated, not slippery, etc.), sidewalk cleanliness, having traffic signs, having a barrier between the sidewalk and the road, adequate drainage channels, availability of stops / shelters, availability JPO (Pedestrian Bridge). In Quadrant C the low priority is the availability of public telephones, availability of seats, neatness and regularity of the sidewalks. And in Quadrant D, which is in the excessive category, there is a sidewalk width of at least 3 meters, sidewalk slope (easily accessible), availability of shade trees, and accessibility between modes of public transportation.

Then for the results of the analysis of the level of pavement performance with the Level Of Service method, get the LOS A category for the pedestrian space level, then for the average pedestrian speed get the LOS C level, then for the flow level get the LOS A category and finally the ratio rating level get LOS A.

Then from the sidewalk identification form regarding the standardization or provisions of sidewalk planning which refers to the Minister of Public Works Regulation No.3 of 2014 that there are still several aspects that need to be considered, some of which are sidewalk width for walking 3 people with a width of 3.2 meters, free from vertical obstructions 2.5 meters, space for pedestrians with special needs, the existence of a green lane on the sidewalk and adequate seating.

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Biographies

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Muhammad Isradi., was born in Kandangan on August 18, 1972. He is the secretary of the Civil Engineering study program at Mercu Buana University. He earned a Bachelor of Civil Engineering degree from the University of Muhammadiyah Malang in 1998 with his thesis title One Way Flat Plate Planning at Ratu Plaza Madiun. Then obtained a Masters in Civil Engineering Concentration of Transportation from Brawijaya University in 2001 with a thesis title, Analysis of the Model of Family Movement Awakening in the Sawojajar Malang Housing Area. He also teaches several subjects such as Pavement Planning, Road Geometric Planning, Transportation Planning and Environmental Engineering.

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Hanayas Bagaskara., Born in Jakarta, May 5, 1999.. He is pursuing a Bachelor's Degree in Civil Engineering Study Program at Mercu Buana University and will graduate in 2021. Graduated from Yadika 08 Bekasi Timur High School in 2017. He was an intern in the Cibitung - Cilincing toll road construction project section 4 in Jakarta Utara as a field assistant, he was also the chairman of the International Seminar and Workshop: "Sustainability On Industry And Community: Impact Of Research And Publication" in 2019. was involved in several civil engineering seminars as a committee, National Seminar: "Transport Infrastructure Development Model "In 2018, " Modern Transit-Oriented Development Management "in 2019.