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Analysis of Pedestrian Satisfaction Level for Sidewalk Revitalization on Jalan Puri Kencana, West Jakarta

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ABSTRACT: This study aims to determine the level of satisfaction of the method used in collecting data in this study through questionnaires, documentation, and direct observation in the field. Meanwhile, for data processing using SPSS version 29.0.2.0, the importance performance analysis (IPA), customer satisfaction index (CSI), and level of service (LOS) methods. From the results of data analysis using the Importance Performance Analysis (IPA) method, it shows that the factors that influence the level of satisfaction and importance in Quadrant I are cleanliness of pedestrian paths, orderliness on pedestrian paths, safety for pedestrians, waste disposal sites, park arrangement, and lighting of pedestrian paths. Quadrant II is the availability of paths for people with disabilities. While in quadrant IV, the influencing factors are the view around the pedestrian path, width of the pedestrian path, and benches on the pedestrian path. And for the result of the analysis of the level of pedestrian satisfaction, the CSI value is 85.45%, where pedestrians are satisfied with the facilities available on pedestrian. The result of the analysis of the pavement using the LOS method shows that getting category A means that the trotoar segment is in line with pedestrian expectations.

KEYWORDS: Importance Perfomance Analysis, Customer Satisfaction Index, Level of Service, Pedestrian Revitalizatin, Sidewalk

INTRODUCTION

Jakarta, the capital of Indonesia, is experiencing rapid development in various sectors and fields. The development of this city is influenced by many factors, such as office centers, trade, government, business, and housing, so that many people are looking for a life in Jakarta every year. The population growth of the city of Jakarta has increased by 1.66% from 2023 (BPS JAkarta, 2020). The DKI Jakarta government has built city infrastructure to create a spatial layout that supports urban life and advances the economic axis in Indonesia (Dermawan, Isradi, et al., 2021). Currently, the city of Jakarta is improving pedestrian infrastructure, such as road conditions, sidewalks, and pedestrian facilities, to improve the quality of urban open space and provide comfort for residents and tourists who come (Movahed et al., 2012). This effort is expected to improve the quality of the city area and attract tourists to come to Jakarta, especially in the West Jakarta area. The West Jakarta area is part of the DKI Jakarta Region, which is the capital of the Republic of Indonesia (DGH, 1999).

According to (Alawadi et al., 2021), walking indirectly becomes the simplest means of transportation. Walking is also a means of connecting transportation between the functions of an area with other areas such as trade areas, residential areas, and cultural areas so that walking activities can make a city more humane (Kakar & Prasad, 2020). Therefore, pedestrian paths are an important means of transportation that connects various functional areas in the city. The main function of the existence of pedestrian paths is as a container or place for pedestrians to be able to move and move from one point to another by paying attention to aspects of comfort and safety and without fear of other pedestrians, as well as against motorized vehicles passing on the road (Shan et al., 2016). Pedestrian paths, or pedestrians, are also one of the parts of the road that have a function for circulation space for pedestrians and must ensure the safety of pedestrians (Rifai et al., 2021). Pedestrians and must ensure pedestrian safety, so that the pedestrian path must be separated from the road body as a vehicle circulation path(Pongprasert & Kubota, 2019). Pedestrian planning should be an important part of good urban planning to improve the quality of life of urban communities and support the sustainability of the urban environment (Dermawan, Bagaskara, et al., 2021).

The Puri Kencana road area in West Jakarta has low pedestrian activity. However, a significant issue arises when numerous street vendors (PKL) utilize the sidewalk for their sales, occupying nearly half of the pedestrian path. Furthermore, congestion in this area often occurs during peak hours when people go to and from work. Many road users, particularly motorcycles, utilize the road body or pedestrian path to bypass congestion and overtake the vehicle in front of them. This results in reduced space for pedestrians, forcing some of them to use the road as a means of walking (Ha et al., 2019; Ibrahim et al., 2020).

RESEARCH METHOD

Data analysis and processing of questionnaire results that have received responses from respondents in the field by filling out questionnaires and observing the composition of traffic in vehicles on the Puri Kencana road, West Jakarta. The results of the respondent's questionnaire will be tested using SPSS software version 29.0.2.0 (Chikkabagewadi et al., 2022; Kinasih & Permata, 2022). Presented using the Importane Performance Analysis (IPA) method because it will produce data in the form of indicators that need to be improved or reduced to maintain service user satisfaction, the results are relatively easy to interpret, the scale is easy to understand, and it requires low costs (Firdaus et al., 2022). In addition, the questionnaire material was examined with the Customer Satisfaction Index (CSI) to determine the level of customer satisfaction (Isradi, Dermawan, et al., 2020). Level of service (LOS) testing on roads that have been observed (Isradi, Fauziah, et al., 2020).

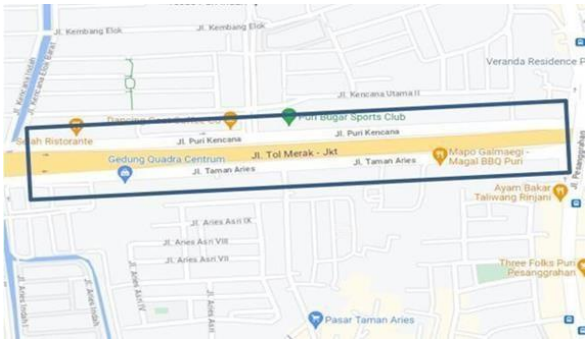

Figure 1: Research location

The collection of data needed, data from traffic volume surveys and the results of pedestrian characteristics in the form of indicators in the pedestrian path that are a reference in making questionnaires, can be taken during a field survey, which lasts for two days on Monday and Thursday in July 2024 (Isradi et al., 2021; Isradi & Pratama, 2020). The data collection is divided into three sessions: morning, afternoon, and evening, where the survey time is determined at 07.00–08.00, 12.00–13.00, and 16.00–18.00. The purpose of this data collection is to be able to know the volume of pedestrians crossing Jalan Puri Kencana and also to know the characteristics of Jalan Puri Kencana, then get the results of the performance of the Pedestrian Road section on Jalan Puri Kencana West Jakarta (Firdaus et al., 2021).

The data needed in this study are primary data and secondary data. The following data is the data needed :

A. Primary Data
1. Operational Performance
2. Respondent Demographic
3. The Respondent's Perception

B. Secondary Data
1. Situation Map

RESULT AND DISCUSSION

Research Questionnaire

This research questionnaire is addressed to respondents who use the facilities in the research room and the result is a follows.

Validity Test

To analyze Importance Performance Analysis (IPA) and Customer Satisfaction Index (CSI), a validity test will be carried out where there are 100 respondents obtained. In this study using the Corrected Item-Total Correlation technique to test the validity of satisfaction and importance. The output issued will be said to be valid if the Corrected Item-Total Correlation value is greater than the R table (Pearson Correlation).

Table 1. Importance Validity Test Result

Indicator of Validity	*Scale Mean if Item Deleted*	Scale Varience if Item Deleted	Corrected Item – Total Correlation	R tabel	Information
View	80,59	69,807	.323	.197	Valid
Widenig	80,66	69,154	.433	.197	Valid
Cleanliness	79,31	69,924	.463	.197	Valid
Bench	80,12	70,469	.339	.197	Valid
Orderliness	79,36	71,360	.343	.197	Valid
Disability	78,95	72,243	.553	.197	Valid
Security	79,12	69,923	.643	.197	Valid
Trash	79,37	68,744	.599	.197	Valid
Park	79,33	67,224	.688	.197	Valid
Lighting	79,14	69,100	.654	.197	Valid

Table 2. Satisfaction Validity Test Result

Indicator of Validity	*Scale Mean if Item Deleted*	Scale Varience if Item Deleted	Corrected Item – Total Correlation	R tabel	Information
View	59,15	79,276	.465	.197	Valid
Widenig	58,78	78,607	.482	.197	Valid
Cleanliness	59,77	75,854	.626	.197	Valid
Bench	59,40	80,569	.391	.197	Valid
Orderliness	59,68	76,127	.625	.197	Valid
Disability	58,47	82,524	.269	.197	Valid
Security	60,60	78,478	.497	.197	Valid
Trash	59,66	79,336	.477	.197	Valid
Park	59,74	77,449	.616	.197	Valid
Lighting	59,74	73,754	.610	.197	Valid

Analyse With Method Importance Performance Analysis (IPA)

This study will be conducted to measure the level of satisfaction and the level of importance of facilities on the performance of pedestrian paths on Jalan Puri Kencana West Jakarta as perceived by pedestrians.

Table 3. Pedestrian Assessment of Importance to Pedestrian Path Performance

No	Indicator of Importance	Responden Opinion					Total Score	Avarage
		TP	KP	CP	P	SP		
1	View of Pedestrian	8	18	42	29	14	318	3.18
2	Pedestrian Width	1	28	46	27	10	312	3.12
3	Pedestrian Hygiene	0	1	18	19	73	447	4.47
4	Pedestrian Bench	2	7	39	38	25	366	3.66
5	Pedestrian Order	0	1	21	19	71	442	4.42
6	Disability Path	0	0	4	11	96	482	4.82
7	Pedestrian Security	0	1	6	28	81	466	4.62
8	Landfill	0	1	16	32	62	441	4.41
9	Garden Arrangement	0	2	14	27	68	445	4.45
10	Pedestrian Lightning	0	0	12	15	84	464	4.64

Table 4. Pedestrian Assessment of Satisfaction with Pedestrian Path Performance

No	Indicator of Satisfaction	Responden Opinion					Total Score	Avarage
		TB	KB	CB	B	SB		
1	View of Pedestrian	1	14	42	49	10	347	3.47
2	Pedestrian Width	0	7	46	36	35	384	3.84
3	Pedestrian Hygiene	7	35	18	30	2	286	2.86
4	Pedestrian Bench	1	22	39	42	4	323	3.23
5	Pedestrian Order	3	36	21	32	4	294	2.94
6	Disability Path	0	36	4	42	45	416	4.16
7	Pedestrian Security	30	61	6	8	2	202	2.02
8	Landfill	3	27	16	24	4	297	2.97
9	Garden Arrangement	1	37	14	19	3	289	2.89
10	Pedestrian Lightning	13	40	12	25	13	289	2.89

Table 5. Avarage Calculation of The Level of Satisfaction and The Level of Importance of Pedestrians

No	Indicator	Satisfaction Assessment	Satisfaction Importance	X	Y
1	View of Pedestrian	347	319	3.47	3.19
2	Pedestrian Width	384	313	3.84	3.13
3	Pedestrian Hygiene	286	448	2.86	4.48
4	Pedestrian Bench	323	367	3.23	3.67
5	Pedestrian Order	294	442	2.94	4.42
6	Disability Path	416	483	4.16	4.83

No	Indicator	Satisfaction Assessment	Satisfaction Importance	X	Y
7	Pedestrian Security	202	467	2.02	4.67
8	Landfill	297	441	2.97	4.41
9	Garden Arrangement	289	445	2.89	4.45
10	Pedestrian Lightning	289	465	2.89	4.65
Avarage				3.13	4.19

Cartesian Diagrams

After obtaining the calculation of the average value of the level of satisfaction and importance and the overall average value, it will be plotted in a Cartesian diagram which will be assisted by ms.excel, so it can be described as follows

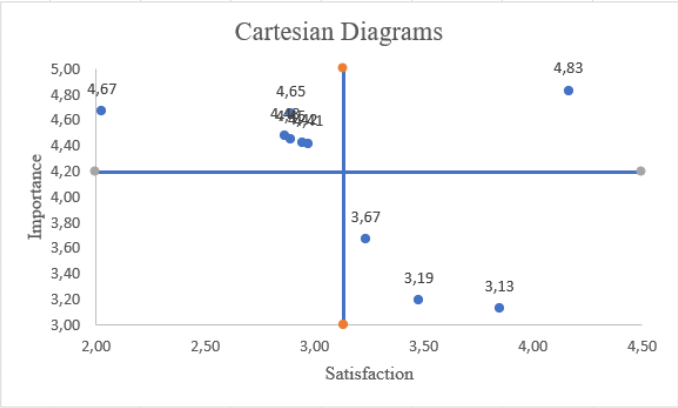

Figure 2: Cartesian Diagram

Sidewalk facilities that should be prioritized in quadrant I of the cartesian diagram "Importance Performance Analysis", are as follows:

a. The 3rd indicator is the Cleanliness of the Pedestrian Path
b. The 5th indicator is Order on the pedestrian path
c. The 7th indicator is Safety for pedestrians
d. The 8th indicator is the Waste Disposal Site
e. The 9th indicator is Park Arrangement
f. The 10th indicator is Pedestrian Path Lighting

Sidewalk facilities that must maintain the achievements that are in quadrant II of the "Importance Performance Anlysis" cartesian diagram, are as follows:

a. The 6th indicator, namely the availability of a path for people with disabilities Sidewalk facilities that are categorized as excessive are in quadrant IV of the "Importance Perfomance Anlysis" cartesian diagram, as follows: indicator 1, namely the view around the pedestrian path, indicator 2, namely the width of the pedestrian path
b. The 4th indicator is garden chairs in the pedestrian lane

Analyse With Method Customer Satisfaction Index (CSI)

At this stage, it is carried out to determine the overall level of pedestrian satisfaction by paying attention to the level of importance of the observed indicators. The following is the calculation of the weight factor value.

WF = 3,18/41,83 WF = 7,61

and the following is the calculation of the Weight Score value

WS = 7,61/41,83

WS = 24,27

Table 6. Calculation Results of CSI Method

Satisfaction Score			Importance Score				
Indicators	Total Value (Xi)	MIS score	Total Value (Yi)	MSS Score	Weight Factor	Weight Score	CSI score
View of Pedestrian	347	3.47	318	3.18	7.61	24.27	85,45%
Pedestrian Width	384	3.84	312	3.12	7.46	23.32	
Pedestrian Hygiene	286	2.86	447	4.47	10.68	47.85	
Pedestrian Bench	323	3.23	366	3.66	8.75	32.09	
Pedestrian Order	294	2.94	442	4.22	10.55	46.70	
Disability Path	416	4.16	482	.4.82	11.52	55.66	
Pedestrian Security	202	2.02	466	4.66	11.13	51.98	
Landfill	297	2.97	441	4.41	10.53	46.51	

Satisfaction Score			Importance Score				
Indicators	Total Value (Xi)	MIS score	Total Value (Yi)	MSS Score	Weight Factor	Weight Score	CSI score
Garden Arrangement	289	2.89	445	4.45	10.62	47.28	
Pedestrian Lightning	289	2.89	464	4.64	11.09	51.58	
Total			31.27		41.83		

Pedestrian Volume on Puri Kencana Road Monday

The results of the survey conducted on Thursday 07.00 – 18.00 occurred the total volume of footing of 510 pedestrians.

The following is the calculation of the 15-minute average volume V15 = 32 Person/15 minute

The following is the calculation of the average volume of 1 minute V = Volume Avarage/15

V = 32/15

V = 2 Person/minute

Table 7. Recap of Pedestrian Count Data on Jalan Puri Kencana West Jakarta on Monday

Time	Volume Pedestrian	Volume (Person/minute)
07.00-07.15	32	2
07.15-07.30	27	2
07.30-07.45	25	2
07.45-08.00	27	2
12.00-12.15	38	2
12.15-12.30	34	2
12.30-12.45	41	2
12.45-13.00	27	2
16.00-16.15	23	2
16.15-16.30	27	2
16.30-16.45	33	2
16.45-17.00	38	2
17.00-17.15	29	2
17.15-17.30	36	2
17.30-17.45	39	2
17.45-18.00	34	2
Total	510	33

Pedestrian Volume on Puri Kencana Road Thursday

The results of the survey conducted on Thursday 07.00 – 18.00 occurred the total volume of footing of 455 pedestrians.

The following is the calculation of the 15-minute average volume V15 = 27 Person/15 minute

The following is the calculation of the average volume of 1 minute V = Volume Avarage/15 minute

V = 27/15

V = 2 Person/minute

Table 8. Recap of Pedestrian Count Data on Jalan Puri Kencana West Jakarta on Thursday

Time	Volume Pedestrian	Volume (Person/minute)
07.00-07.15	27	2
07.15-07.30	36	2
07.30-07.45	28	2
07.45-08.00	15	1
12.00-12.15	28	2
12.15-12.30	33	2
12.30-12.45	29	2
12.45-13.00	26	2
16.00-16.15	24	2
16.15-16.30	35	2
16.30-16.45	28	2
16.45-17.00	36	2
17.00-17.15	25	2

Time	Volume Pedestrian	Volume (Person/minute)
17.15-17.30	37	2
17.30-17.45	36	2
17.45-18.00	27	2
Total	510	33

Pedestrian Speeds

In calculating pedestrian speed, 5 people were taken as samples at every 15-minute interval with a distance from the start to finish point of 20 m.

the calculation of the 15 minute average speed : S = L/T
S = 20/0,20
S = 4,15 meter/Second

Table 9. Pedestrian Speed at Puri Kencana Road

Time	Distance (meter)	Pedestrian Travel Time (second)	Avarage Time (minute)	Avarage Speed (20m/second)
07.00-07.15	20	12,45	0,29	4,15
07.15-07.30	20	11,47	0,19	3,82
07.30-07.45	20	10,77	0,17	3,59
07.45-08.00	20	11.55	0,19	3,85
12.00-12.15	20	9,9	0,16	3,3
12.15-12.30	20	10,49	0,17	3,49
12.30-12.45	20	10,6	0,17	3,53
12.45-13.00	20	11,06	0,18	3,68
16.00-16.15	20	12,47	0,20	4,15
16.15-16.30	20	12,48	0,20	4,16
16.30-16.45	20	11,83	0.19	3,9
16.45-17.00	20	12,8	0,21	4,2
17.00-17.15	20	11,24	0,18	3,7
17.15-17.30	20	12,39	0,20	4,13
17.30-17.45	20	12	0,2	4
17.45-18.00	20	12,28	0,2	4,09
Total		185,78		61,92

Pedestrian Density

Pedestrian density can be calculated by dividing the pedestrian volume by the variable average speed.

Here's the density calculation D = V/S
D = 4/12,45
D = 0,321 orang/m^2

Table 10. Pedestrian Crowding on Puri Kencana Road

Time	Speed (m/minute)	Volumes (person/minute)	Density (person/minute)
07.00-07.15	12,45	4	0,321
07.15-07.30	11,47	4	0,348
07.30-07.45	10,77	4	0,278
07.45-08.00	11,55	4	0,346
12.00-12.15	9,9	3	0,404
12.15-12.30	10,49	4	0,381
12.30-12.45	10,6	4	0,377
12.45-13.00	11,06	4	0,361
16.00-16.15	12,47	4	0,320
16.15-16.30	12,48	4	0,320
16.30-16.45	11,83	4	0.338
16.45-17.00	12,8	4	0,312
17.00-17.15	11,24	4	0,355
17.15-17.30	12,39	4	0,322
17.30-17.45	12	4	0,333
17.45-18.00	12,28	4	0,325
Total	185,78	63	5,488

Pedestrian Flows

Pedestrian flow was conducted to determine the number of pedestrians in one minute for a one-meter area.

Current Calculation Formula : V = S x D
V = 12,45 x 0,321
V = 4 orang/m/menit

Table 11. Pedestrian Flow on Puri Kencana Street

Time	Speed (m/minute)	Density (person/minute)	Current (person/m/minute)
07.00-07.15	12,45	0,321	4
07.15-07.30	11,47	0,348	4
07.30-07.45	10,77	0,278	4
07.45-08.00	11,55	0,346	4
12.00-12.15	9,9	0,404	3
12.15-12.30	10,49	0,381	4
12.30-12.45	10,6	0,377	4
12.45-13.00	11,06	0,361	4
16.00-16.15	12,47	0,320	4
16.15-16.30	12,48	0,320	4
16.30-16.45	11,83	0.338	4
16.45-17.00	12,8	0,312	4
17.00-17.15	11,24	0,355	4
17.15-17.30	12,39	0,322	4
17.30-17.45	12	0,333	4
17.45-18.00	12,28	0,325	4
Total	185,78	5,488	63

Level Of Service Pedestrian

One of the objectives of this study was to determine the level of pedestrian service (sidewalks) in the Jalan Puri Kencana area. Determination of the level of service is done by processing primary data, especially pedestrian volume data and the size of the sidewalk width. In this study to determine the level of service of sidewalks (level of service in walkways) can be seen in the regulation of the minister of public works (2014).

Table 12. Level of Service Standard for Pedestrian Walkways

Servive Level	**Pedestrian Walkway (m^2/person)**	**Speed Avarage (meter/minute)**	**Volume of Pedestrian flow (person/menit/me nit)**	**Volume / Capacity Ratio**
A	≥ 12	≥ 78	≤ 7	≤ 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
F	≤ 0.5	< 45	Variabel	Variabel

(**Source:** Minister of Public Works Regulation No.03/PRT/M/2014)

Table 13. Pedestrian Service Level on Puri Kencana Road

Time	Speed (m/minute)	Density (person/minute)	Current (person/m/minute)	Level of Service
07.00-07.15	3,22	0,321	1	A
07.15-07.30	4,78	0,348	1	A
07.30-07.45	4,62	0,278	1	A
07.45-08.00	3,85	0,346	1	A
12.00-12.15	3,34	0,404	1	A
12.15-12.30	3,52	0,381	1	A
12.30-12.45	3,47	0,377	2	A
12.45-13.00	4,56	0,361	1	A

16.00-16.15	3,08	0,320	1	A
16.15-16.30	4,12	0,320	1	A
16.30-16.45	3,98	0.338	1	A
16.45-17.00	3,83	0,312	1	A
17.00-17.15	4,09	0,355	1	A
17.15-17.30	4,11	0,322	1	A
17.30-17.45	3,82	0,333	1	A
17.45-18.00	4,03	0,325	1	A
Total	62,42	5,44	21	

Based on table 4.36 and table 4.37 above, the Level of Service of the observation area which is a shopping and office area is at level A on the sidewalk on Jalan Puri Kencana West Jakarta. During four hours of observation from 07.00-17.0

CONCLUSION

Based Based on the results of the study, the conclusions in the analysis of the level of satisfaction of the pedestrian path towards sidewalk revitalization on Jalan Puri Kencana West Jakarta, as follows :

1. From the results of data analysis with the Importance Performance Analysis (IPA) method shows, the factors that affect the level of satisfaction and importance in Quadrant I are Cleanliness of pedestrian paths, Order on pedestrian paths, Security for pedestrians, Garbage Disposal, Park Arrangements, Lighting pedestrian paths. Quadrant II is the availability of paths for people with disabilities. While quadrant IV influencing factors are the scenery around the pedestrian path, the width of the pedestrian path, benches on the pedestrian path.
2. By using the Customer Satisfaction Index (CSI) method to get the level of pedestrian satisfaction, it is known that the pedestrian satisfaction index value obtained is 85.45%, which indicates that all pedestrians are satisfied with the existing facilities on the pedestrian walkway at Jalan Puri Kencana, West Jakarta.
3. The Level of Service (LOS) of the pedestrian path on Jalan Puri Kencana West Jakarta is A, this shows that the West Jakarta city government has provided good service for pedestrians or people who use sidewalk facilities. And for the condition of the sidewalk road section after the revitalization of the widening of the road sidewalks reviewed has covered and in accordance with the interests of the respondents.

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