

STUDY ANALYSIS IN THE TERMINAL FACILITIES PEDESTRIANS JOYOBOYO SURABAYA

Diky Efendi

Faculty of Engineering
Civil Engineering Program
Narotama University, Surabaya
Dikyefendijaya@gmail.com

Atik Wahyuni

Faculty of Engineering
Civil Engineering Program
Narotama University, Surabaya
atik.wahyuni@narotama.ac.id

ABSTRACT

Pedestrian is a term that describes the transport of people walking in a special place pedestrian. Surabaya is a metropolitan city and one of the cities that serve the community for a vacation like to Surabaya Zoo (KBS) is located not far from the terminal Joyoboyo. The present study was to determine the characteristics of the pedestrian (flow, speed, density), determine the condition of the geometry of pedestrian facilities, pedestrian facilities as well as performance analysis method used is the ratio. This research method includes several stages of site survey, then the data collection that uses a number of pedestrian walkways, noting the results of a survey conducted during the second day on Sunday and Tuesday at 06:00 to 09:00, measurement speed, geometry condition surveys and questionnaires about the identity, purpose and the purpose, time and distance pedestrian. The analysis showed that the dominant Pedestrian use the sidewalk at 8:45 a.m. to 9:00, the variable max on Sunday ie max speed of 64.78 m / min, max density pedestrian 43.47 /m², While the variable ratio 0.03 max max on Tuesday that max speed 61.15 m / min, max density 37.51 pedestrian/m², Max ratio of 0.032. While the performance of pedestrian facilities in category "A", this means that the performance of pedestrian facilities in Surabaya Joyoboyo terminal region is still in either category and still be able to accommodate the number of existing pedestrian.

Keywords : Questionnaire, Performance Ratio.

INTRODUCTION

Background

Pedestrian is a term that describes the transport of people walking in a special place pedestrian. Surabaya is a metropolitan city and one of the cities that serve the community for a vacation like to Surabaya Zoo (KBS) is located not far from the terminal Joyoboyo. The present study was to determine the characteristics of the pedestrian (flow, speed, density), determine the condition of the geometry of pedestrian facilities, pedestrian facilities as well as performance analysis method used is the ratio.

Formulation of the problem

1. How characteristic pedestrian Joyoboyo terminal region Surabaya?
 2. How is the condition of the geometry of pedestrian facilities Joyoboyo terminal region Surabaya?
 3. What was the performance of pedestrian facilities Joyoboyo terminal region Surabaya?
- Research purposes
1. Knowing the characteristics of the pedestrian area of the terminal Joyoboyo.
 2. Knowing the geometry of pedestrian facilities Joyoboyo terminal region.
 3. Knowing performance Joyoboyo terminal region of pedestrian facilities.

LITERATURE

characteristics of Pedestrian

- identity of pedestrian
 To find out the identity of the pedestrian is required questionnaire containing personal data pedestrian as follows:
- Current
 To find the current value of the formula used as follows:

$$Q = \frac{N}{T} \dots\dots\dots (1)$$
 Information :
 Q = flow of pedestrian (person / m / min)
 N = the number of pedestrian (person / m)
 T = observation time (minutes)
- Speed
 To find the value of the speed of the formula used as follows:

$$V = \frac{L}{t} \dots\dots\dots (2)$$
 Information :
 V = pedestrian speed (m / min)
 L = length of the observation segment (meters)
 t = pedestrian travel time (minutes)
- Average speed (the mean velocity)

$$Vt = \frac{1}{n} \sum_{i=1}^n v^i \dots\dots\dots (3)$$
 explanation of:
 Vt = average speed of time (km / h)
 N = number of observed speed data
 Vi = velocity of every pedestrian who observed (km / h)
- Average speed (average room rate)

$$Vs = \frac{1}{\frac{1}{n} \sum_{i=1}^n \frac{1}{vt}} \dots\dots\dots (4)$$
 Information :
 Vs = average speed of the room (m / min)
 n = number of observed speed data
 vi = the speed of each vehicle was observed (m / min)
- Density
 To get the value of density can using the following formula:

$$D = \frac{Q}{Vs} \dots\dots\dots (5)$$
 Information :
 D = density (pedestrian / m²)
 Q = flow of pedestrian (pedestrian / m / min)
 Vs = average speed of the room (m / min)
- Room
 To find the value of the formula used space as follows:

$$S = \frac{Vs}{Q} = \frac{1}{D} \dots\dots\dots (6)$$
 Information :
 S = pedestrian space (Pedestrian / m²)
 D = density (pedestrian / m²)
 Q = flow (pedestrian / m / min)
 Vs = average speed (m / min)

Geometry condition Pedestrian Facilities

The sidewalks have a main function for the pedestrian to get safety and comfort during their activities, to get the condition of the geometry of pedestrian facilities in the terminal

Joyoboyo done by the survey directly to the place of research and set up a table to record what will be studied such as wide sidewalks, type of flooring, the conditions , cleanliness, beauty and obstacles found on the pedestrian path.

Performance Pedestrian Facility

Performance pedestrian facilities in the region Joyoboyo terminal is determined based on the ratio. To get the value of the ratio can use the following formula:

$$R = \frac{Q}{SCVD} \dots\dots\dots (7)$$

R = Ratio

Q = Volume of pedestrian



SCVD = Service Volume LOS between C and D (Ardono 2005)





The service levels can be expressed in the level of service A sampai with service level F which describes the current state of certain services by using the Regulation of the Minister of Public Works No. 3 of 2014. The classification of service level can be determined using Table 1 and illustrated in Table 2.

table 1, Performance Pedestrian Facility

LOS	Room	Speed	Current	ratios
	(m ² / Org)	(M / min)	(Org / m / min)	
A	≥ 12:08	≥ 79.27	≤ 7:00	≤ 0:08
B	≥ 3.72	≥ 76.22	≤ 23.00	≤ 0:28
C	≥ 2:23	≥ 73.17	≤ 33.00	≤ 0:40
D	≥ 1:39	≥ 68.60	≤ 49.00	≤ 0.60
E	≥ 0:56	≥ 45.73	≤ 82.00	≤ 1:00
F	≥ 0:56	≥ 45.73	Variation	Variation

Table 2. Illustration performance Pedestrian Facilities

<p>LOS A LOS At present, there is a free flow, the running speed can choose, convenience to pass another pedestrian, pedestrian conflicts do not occur.</p>	
<p>LOS B In LOS B, pedestrian feel the presence of another pedestrian, but there are still wide enough for pedestrian areas in determining the pace of walking, to pass another pedestrian, and to avoid conflicts intersect with another pedestrian</p>	
<p>LOS C</p>	

<p>At LOS C, there is ample space makes it possible to choose a normal walking pace, and avoid another pedestrian. The movement of another pedestrian will result in the volume and speed will be lower.</p>	
<p>LOS D LOS D at this election walking speed and to avoid other pedestrians will be limited. It is caused by the opposite movement and crossing from another pedestrian.</p>	
<p>LOS E At LOS E is, normal walking speed is limited, and adjust gait. Walk with dragging feet movement is likely to occur and the available space is not sufficient to preempt another pedestrian.</p>	
<p>LOS F At LOS F, speed is limited to walking, pedestrian flow movements done with the legs dragged. The resulting current unstable and more pedestrian space as the queue.</p>	

RESEARCH METHODOLOGY

In preparing this thesis using survey methods and analysis methods. Survey method using techniques of observation and pedestrian data collection using questionnaires, whereas the method of analysis is to enter observations into tables and diagrams to facilitate the reading of the information.

RESULTS AND DISCUSSION

This research was conducted in the area of Surabaya Joyoboyo terminal for 2 days, Sunday and Tuesday at 6:00 to 9:00 pm (western Indonesian time) and the time interval of 15 minutes. by spreading the questionnaire to get a pedestrian characteristics and make observations and analysis to obtain the geometry and performance conditions of pedestrian facilities.

- **characteristics of Pedestrian**

table 3, Characteristics pedestrian Joyoboyo terminal region on Sunday

Time	Density (pedestrian / m ²)	Space (m / min)	Flow (pedestrian / min / m)
6:00 to 06:15	0,012	83.33	0.76
6:15 to 06:30	0,018	55.55	1.1
6:30 to 6:45	0,016	62.5	1.03
6:45 a.m. to 7:00	0,017	58.82	1.04
07:00 to 7:15	0,013	76.92	0.80
7:15 a.m. to 7:30	0,014	71.42	0.80
07:30 to 07:45	0,014	52.63	1.17
07:45 to 8:00	0,018	58.82	1.06

8:00 a.m. to 8:15	0,019	52.63	1.17
8:15 to 8:30	0,023	43.47	1.17
8:30 to 8:45	0,021	47.61	1.50
8:45 to 09:00	0,023	43.47	1.53

table 4, Characteristics of the pedestrian area of the terminal Joyoboyo on Tuesday

Time	Density (pedestrian / m2)	Space (m / min)	Flow (pedestrian / min / m)
6:00 to 06:15	0,021	47.38	1.30
6:15 to 06:30	0,020	49.72	1.23
6:30 to 6:45	0,019	52.51	1.13
6:45 a.m. to 7:00	0,014	68.53	0.93
07:00 to 7:15	0,016	61.01	1.00
7:15 a.m. to 7:30	0,011	86.60	0.73
07:30 to 07:45	0,012	79.61	0.77
07:45 to 8:00	0,012	78.80	0.80
8:00 a.m. to 8:15	0,011	90.01	0.70
8:15 to 8:30	0,017	56.31	1.07
8:30 to 8:45	0,020	47.84	1.27
8:45 to 09:00	0,026	37.51	1.63

- **Geometry condition Pedestrian Facilities**

table 5, Geometry conditions of pedestrian facilities terminal region Joyoboyo

wide sidewalks	floor coverings				Resistance
	type	condition	cleanliness	beauty	
2m	paving	paving still no escape, no place to sit and help lines for people with disabilities	Less clean because a lot of garbage is not disposed in place and smell less pleasant	Less because many vehicles are not parked neatly	1. PKL (3) 2. Vehicles parked haphazardly

table 6, Performance pedestrian facilities Joyoboyo terminal region Sunday

time	interval	N peds	SV CD	ratios (Current / scvd)	LOS	Current	LOS	Speed	LOS	Room	LOS
6:00 to 06:15	15	23	50	.0152	A	0.76	A	60.367	E	83.33	A

6:15 to 06:30	15	33	50	.0220	A	1.1	A	59.45 9	E	55.5 5	A
6:30 to 6:45	15	31	50	.0206	A	1.0 3	A	61.02 3	E	62.5	A
6:45 a.m. to 7:00	15	28	50	.0208	A	1.0 4	A	58.49 0	E	58.8 2	A
07:00 to 7:15	15	24	50	.0160	A	0.8 0	A	59.25 9	E	76.9 2	A
7:15 a.m. to 7:30	15	24	50	.0160	A	0.8 0	A	57.14 2	E	71.4 2	A
07:30 to 07:45	15	35	50	.0234	A	1.1 7	A	59.23 3	E	52.6 3	A
07:45 to 8:00	15	32	50	.0212	A	1.0 6	A	59.04 0	E	58.8 2	A
8:00 a.m. to 8:15	15	35	50	.0234	A	1.1 7	A	60.24 0	E	52.6 3	A
8:15 to 8:30	15	35	50	.0234	A	1.1 7	A	50.21 5	E	43.4 7	A
8:30 to 8:45	15	45	50	.0300	A	1.5 0	A	70.86 6	D	47.6 1	A
8:45 to 09:00	15	46	50	.0306	A	1.5 3	A	64.78 8	E	43.4 7	A

table 7, Performance pedestrian facilities Joyoboyo terminal region Tuesday

time	int erv al	N ped s	SV CD	ratios (Current / scvd)	LO S	Cu rre nt	LO S	Spee d	LOS	Ro o m	LOS
6:00 to 06:15	15	39	50	.0260	A	1.3 0	A	61.59 5	E	47.3 8	A
6:15 to 06:30	15	37	50	.0246	A	1.2 3	A	61.16 0	E	49.7 2	A
6:30 to 6:45	15	34	50	.0226	A	1.1 3	A	59.33 8	E	52.5 1	A
6:45 a.m. to 7:00	15	28	50	.0186	A	0.9 3	A	63.74 2	E	68.5 3	A
07:00 to 7:15	15	30	50	0.0200	A	1.0 0	A	61.01 2	E	61.0 1	A

7:15 a.m. to 7:30	15	22	50	.0146	A	0.73	A	63.224	E	86.60	A
07:30 to 07:45	15	23	50	.0154	A	0.77	A	61.306	E	79.61	A
07:45 to 8:00	15	24	50	.0160	A	0.80	A	63.045	E	78.80	A
8:00 a.m. to 8:15	15	21	50	.0140	A	0.70	A	63.008	E	90.01	A
8:15 to 8:30	15	32	50	.0214	A	1.07	A	60.256	E	56.31	A
8:30 to 8:45	15	38	50	.0254	A	1.27	A	60.766	D	47.84	A
8:45 to 09:00	15	49	50	.0326	A	1.63	A	61.150	E	37.51	A

Performance pedestrian facilities in the region Joyoboyo terminal is determined based on the ratio, the survey conducted by the authors that the performance of the lowest pedestrian facilities on Sundays is at 6:00 a.m. to 06:15 have a flow of pedestrian 0.76 / min / m, space 83.33 m^2 / Pedestrian and ratio of 0.0152. Pedestrian speeds result 60.36 m / min, so that the performance of pedestrian facilities in category A. On Sunday highest, at 8:45 to 9:00 a.m. with 1.53 pedestrian flow / min / m, space 43.47 m^2 / Pedestrian and ratio of 0.0306. Pedestrian speeds result 64.78 m / min, in order to obtain the performance category A pedestrian facilities for the ratio, the space and the current A while for speed E.

Performance pedestrian facilities The terminal region Tuesday Joyoboyo lowest at 8 a.m. to 8:15 o'clock to have current 0.70 pedestrian / min / m, space 90.01 m^2 / Pedestrian and ratios .0140, Pedestrian speeds result 60.24 m / min, so that the performance of pedestrian facilities in category A. On Tuesday at 08:45 to 09:00 with a high of 1.63 pedestrian flow / min / m, space 37.51 m^2 / Pedestrian and ratios .0326, Pedestrian speeds result 61.15 m / min, In order to obtain the performance category A pedestrian facilities for the ratio, the space and the current A while for speed E.

CONCLUSIONS

1. Characteristics pedestrian on Sunday dominated by women aged 21-40 years with the most work as private employees. Pedestrian use most sidewalks at 8:45 a.m. to 09:00 because they will be exploring, shopping or hours to come to work. The average pedestrian flow on the day of the week is 1,094 pedestrian / min / m and Tuesdays 1,046 pedestrian / min / m. Average speed pedestrian on Sunday Joyoboyo terminal region is 60.01 m / min and Tuesday 61.63 m / min. Average density on Sunday that pedestrian 0.0176 / 0.0165 Tuesday and pedestrian / as well as the average pedestrian space on Sunday dalah 58.93 / pedestrian and Tuesday 62.98. $m^2m^2m^2$
2. The results of the study of geometry conditions of pedestrian facilities in the terminal area Joyoboyo known that the wide sidewalks are sufficient conditions namely 2m. Type cover the pavements used are paving, visually kind of cover paving more powerful and easy to perawatannya, unfortunately still lacking in the field of beauty, cleanliness and obstacles along the pedestrian path, the number of vehicles parked

unmapped, garbage is still a lot of scattered, odor and pkl above the pedestrian sidewalks create comfort reduced.

3. Performance pedestrian facilities in the terminal area Joyoboyo on Sunday and Tuesday by the flow, speed, density, and the space has a ratio of the average service level A. In accordance with the planning of sidewalks, pedestrian facilities minimum service levels as low as C, so that the pedestrian path The terminal Joyoboyo already meet the minimum standards of service level pedestrian facilities.

Suggestion

1. The authorities need a routine to control the parking of vehicles that do not detract from the beauty of pedestrian paths in the region Joyoboyo terminal.
2. Necessary to attempt to control and sanction by the relevant agencies especially the problem of street vendors who sell above the pedestrian path that interfere with pedestrians in the move.
3. The level of cleanliness must be scaled back as provide guidance to the people so concerned with environmental hygiene and cleanliness put employees on the ground.
4. The service levels of pedestrian facilities should be maintained so that the service has not decreased.
5. The need for further research to examine the performance of pedestrian facilities by building function as a terminal.
6. Further studies should be done by using other methods.
7. The results of this study should be used as a material for making standard pedestrian lay elsewhere.

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