

## Analysis Level of Comfort, Safety and Safety Level on Pathways in the Kebayoran Baru Area, South Jakarta

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### ABSTRACT

As the population increases, resulting in high human mobility. However, high mobility is not matched by services for transportation facilities and infrastructure, especially sidewalks. One of the areas with existing sidewalk problems is the Kebayoran Baru area of South Jakarta. The problem that occurs is that the sidewalk is used as a place to street vendors, and is used as an illegal parking lot. The methodology of this research was carried out by conducting a geometric survey, measuring the volume and travel time of pedestrians to determine the level of service and distributing questionnaires as 80 respondents to pedestrians in search of the level of performance and importance of sidewalk facilities. This data processing uses Microsoft Excel and Statistical Product and Service Solutions (SPSS). The results of the analysis carried out that the sidewalks do not meet the minimum standards according to regulations. From the measurement of the results of the volume and travel time of pedestrians, the level of service with category A is obtained, as well as the results of the questionnaire related to the level of comfort, security, and safety of pedestrians influenced by the presence of street vendors and illegal parking on sidewalks.

Keywords: sidewalks; pedestrians; comfort; security; safety.

### INTRODUCTION

Sidewalk is a part of a highway specifically provided for pedestrians located in a road benefit area, which is given a surface layer with an elevation higher than the road pavement surface, and is generally parallel to the vehicle traffic lane. (Decree of the Director General of Highways Number: 76/KPTS/Db/1999 concerning Guidelines for Planning Pedestrian Paths on Public Roads, 1999).

One of the strategic work programs of the DKI Jakarta Provincial Highways Office in order to carry out the strategy and in accordance with the main tasks and functions of the organization is the arrangement (rightsizing) of roads and sidewalks, and the creation of public spaces in road corridors. The Kebayoran Baru area has residential functions, shopping centers, culinary delights, a business district, and is supported by other public facilities. It has been developed into a Transit Oriented Development (TOD) area with easy pedestrian accessibility to and from various modes of transportation (MRT, BRT, non BRT, and terminal) as well as destinations in the area.

The sidewalks available in the Kebayoran Baru area are not only used for walking, but also for other activities such as parking, street vendors, loading and unloading of goods, and as a place to place traffic signs and electricity poles. Utilization of these other activities causes a lack of effective sidewalk width for pedestrian paths. Pedestrians must avoid objects that are in the pedestrian space or take to the road to obtain more free space, this causes pedestrians to feel uncomfortable and unsafe.

By looking at the problems above, research is needed to identify the development of sidewalks as pedestrian paths in the Kebayoran Baru area so that pedestrians can feel safe and comfortable walking on the sidewalks. The main function of the sidewalk is to provide services to pedestrians so as to increase the comfort, safety and security of the pedestrians.

The purpose of this study is to identify and identify the existing condition of pedestrian facilities in the Kebayoran Baru area, South Jakarta, referring to the Regulation of the Minister of Public Works Number: 03/PRT/M/2014 concerning Guidelines for Planning, Provision, and Utilization of

Pedestrian Network Infrastructure and Facilities in Urban Areas, knowing the characteristics and getting the performance value of pedestrian path services in the Kebayoran Baru area of South Jakarta, and providing solutions and alternatives related to the concept of structuring pedestrian paths in the Kebayoran Baru area of South Jakarta.

## RESEARCH METHODS

This study specifically discusses the arrangement of pedestrian paths for the comfort, safety, and security of pedestrians in the Kebayoran Baru area, which is located on Jl. Senopati, Jl. Suryo, and Jl. Wolter Monginsidi. The flow chart can be seen in Figure 1.

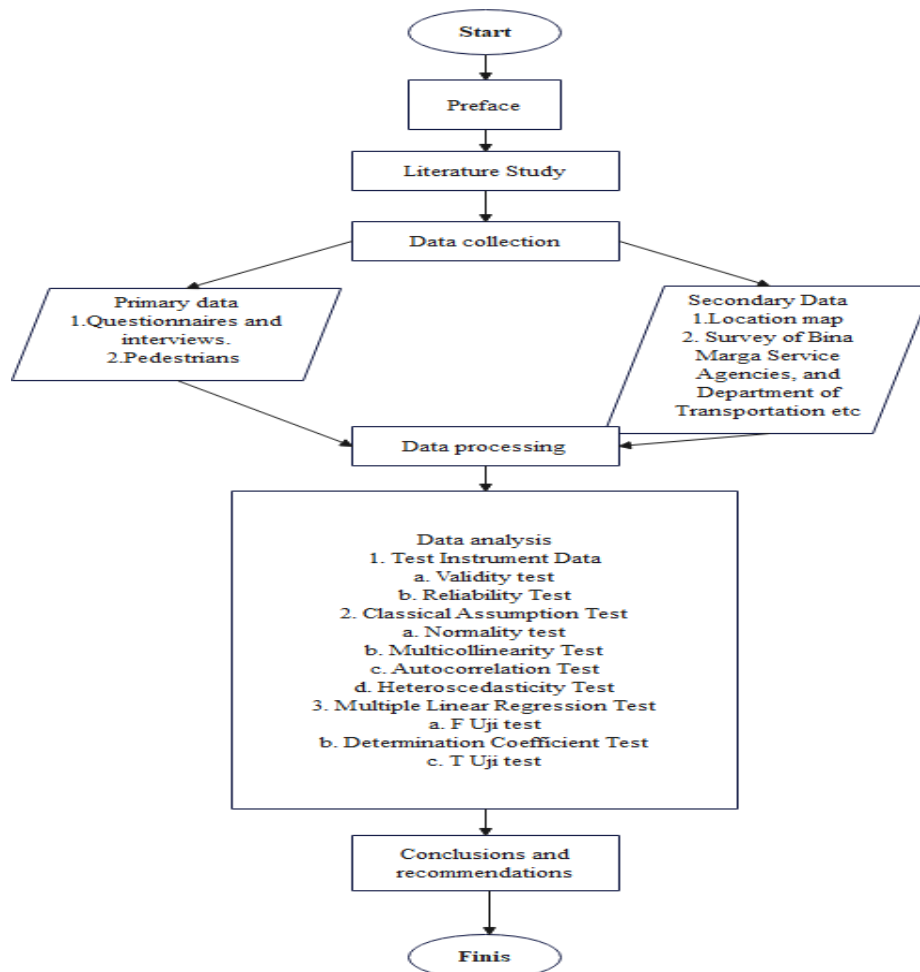


Figure 1. The flow chart can be seen in

## RESULT AND DISCUSSION

### A. Geometric Conditions

The geometric condition survey was conducted to determine the existing physical condition of the sidewalk with the service standards of sidewalk facilities as stipulated in the Regulation of the Minister of Public Works (Guidelines for Planning, Provision, and Utilization of Pedestrian Network Infrastructure and Facilities in Urban Areas, 2014). The results of the survey of geometric conditions in the Kebayoran Baru area, South Jakarta can be shown in table 1

**Table 1.** Observation Results of Pavement Geometric

No	Sidewalk	the Kebayoran Baru Area	
		Existing Condition	Description
1	Pedestrian Path		
A	Minimum sidewalk width (2 meter)	Sidewalk width > 2 meter	Meets standard
B	Pedestrian elevation with motorized vehicle lanes (0,2 meter)	Pedestrian elevation with motorized vehicle lanes 0,15 meter	Does not meet the standard
C	Pedestrian elevation with green lane (0,15 meter)	Pedestrian elevation with green lane 0,01-0,05 meter	Does not meet the standard
D	Minimum distance between pedestrian paths and buildings (0,75 meter)	Distance between pedestrian paths and buildings > 0,75 meter	Meets standard
E	Longitudinal curb slope (8%)	Longitudinal curb slope 8%	Meets standard
F	Pavement slope (2-4%)	Pavement slope 2-4%	Meets standard
2	Disabled Walking Paths		
A	Minimum lane width (1,5 meter)	Sidewalk width > 2 meter	Meets standard
B	Minimum sidewalk area (2,25 meter <sup>2</sup> )	Minimum sidewalk area > 2,25 meter <sup>2</sup>	Meets standard
C	Avoiding various hazards that have the potential to threaten safety, such as bars and potholes	the condition of the sidewalks, no holes	Meets standard
D	The height of the sidewalk should make it easier to cross the road	The height of the sidewalk should make it easier to cross the road	Meets standard
E	Equipped with guide paths and guiding devices to indicate changes in pavement texture	There are guiding tiles along the sidewalk	Meets standard
F	The road surface is not slippery	The pavement surface is made of stamp concrete	Meets standard
G	Ramps are placed at every intersection, pedestrian space infrastructure entering the entrance and exit of buildings or plots, and crossing points	There is a ramp at every intersection and entrance to the building	Meets standard
H	Disabled paths are placed along the pedestrian network infrastructure	There are guide tiles along the sidewalks	Meets standard
3	Path Furniture Street		
A	The minimum width of this street furniture lane is at least 0,6 meter	Width of the street furniture lane > 0,6 meter	Meets standard
B	If the road furniture lane is used as a green lane that functions as a buffer planted with trees and ornamental plants, the minimum width is 1.50 meters. This path is	The width of the green line is 0,8 – 1 meter	Does not meet the standard

No	Sidewalk	the Kebayoran Baru Area	
		Existing Condition	Description
	called the green line because the dominant landscape elements are plants which are generally green.		
C	The walkway has a height difference from the pedestrian path. The maximum height difference between the street furniture lane and the pedestrian path is 15 centimeter.	The height difference between the walkway and the pedestrian path is 1-5 centimeter.	Does not meet the standard

From the results of observing the geometric conditions of the sidewalks in the Kebayoran Baru area, South Jakarta, there are several sidewalk conditions that do not meet service standards with the level of problems that occur, namely the height of the pedestrian path with the vehicle lane, the height of the pedestrian path with the green lane. In general, the condition of the sidewalks in the Kebayoran Baru area has met the standards set out in the Regulation of the Minister of Public Works (Guidelines for Planning, Provision, and Utilization of Infrastructure and Facilities for Pedestrian Networks in Urban Areas, 2014).

#### B. Level of Service (LOS)

Calculation of Level of Service (LOS) is carried out by calculating the area of pedestrian paths and pedestrian flows in the Kebayoran Baru area of South Jakarta on 27 May, 6 June, and 14 June 2022 in the afternoon (16.00-17.00). The results of the LOS calculation can be seen in the table 2 below:

**Table 2.** Calculation of Sidewalk LOS

Total width of sidewalks	Width of barriers	Effective width of sidewalks	Highest number of pedestrians in an interval of 15 minutes	Pedestrian Flow Rate	Length of sidewalks under consideration	Time travel	Pedestrian speed	Pedestrian density	Pedestrian space
WT	WO	WE = WT - WO	Nm	$Q_{15} = \frac{Nm}{(15 \times WE)}$	L	t	$V = \frac{L}{t}$	$D = \frac{Q_{15}}{V}$	$S = 1/D$
meter	meter	meter	org/15 menit	org/menit/meter	meter	menit	meter/menit	org/m2	m2/org
3,61	1,48	2,13	56	1,75	376	5,25	71,62	0,02	40,86

**Table 3.** Calculation Results of Pedestrian Service Level

	Kebayoran Baru area	Standar A	Standar B	Standar C	Standar D	Standar E	Standar F
<b>Pedestrian area (m2/person)</b>	40,86	≥ 12	≥ 3,6	≥ 2,2	≥ 1,4	≥ 0,5	< 0,5

<b>Pedestrian flow (person/minute /m)</b>	1,75	≤ 6,7	≤ 23	≤ 33	≤ 50	≤ 83	Var
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From the results of the calculation of the level of service for the pedestrian path, the pedestrian path area is 40.86 m<sup>2</sup>/person, then the pedestrian flow is obtained by

1.75 people/minute/meter, so that it is known that the level of pedestrian service in the Kebayoran Baru area of South Jakarta is "A" in accordance with the Regulation of the Minister of Public Works (Guidelines for Planning, Provision, and Utilization of Infrastructure and Facilities for Pedestrian Networks in Urban Areas, 2014).

### C. Pedestrian Characteristics

The use of sidewalks in the Kebayoran Baru area of South Jakarta consists of various activities, including pedestrians as the main users of the sidewalks and non-pedestrian activities who also use the sidewalks to carry out other activities including as a place to sell street vendors and illegal parking. Pedestrian users have different characteristics that are divided based on gender, age, occupation, pedestrian activity, and how often pedestrians move on the sidewalk. These characteristics can be seen in the following table 4.

**Table 4.** Characteristics of Respondents

No	Characteristics of Respondents Category	Kategori
1	Gender	Male: 54 people Female: 26 people
2	Age	< 20 years: 20 people 21 – 30 years: 34 people 31 – 40 years: 18 people 41 – 54 years: 6 people > 55 years: 2 people
3	Jobs	Government employee: 12 people Student: 27 people Others (Entrepreneu): 41 people
4	Pedestrian activity	Working: 25 people School: 15 people Others (Shopping, Sport, dll): 40 people
5	How often pedestrians are on the sidewalk	< 2 times: 4 people 2 – 3 times: 1 people 3 – 4 times: 16 people > 4 times: 59 people

### D. Questionnaire Data Analysis

1. The results of testing the validity of the validity correlation coefficient or the calculated R value listed in the table above can be seen that the calculation results with the help of statistical calculation software, obtained R Count most of the research questionnaire items submitted to the respondents who became the research sample met the valid criteria, i.e. the

result of the calculated R measurement is greater than the test number in the R table of 0.185. For variables that have valid values, it means that research variables can be used as effective data collectors to explore problems that are used as research objects, and can then be processed to measure study dimensions and research indicators for each study dimension.

2. The results of testing the reliability coefficient or the calculated Cronbach's Alpha value listed in the table above can be seen that the results of calculations with the help of statistical calculation software, obtained all research questionnaire items submitted to the respondents who became the research sample met the reliable or consistent criteria, namely the results measurement of Cronbach's Alpha Count greater than the test score on Cronbach's Alpha table of 0.7.
3. The results of the normality test can be concluded that: The significance value of Asymp.Sig (2-tailed) is 0.75. With the terms of significance  $> 0.05$ . So according to the basis of decision making in the Kolmogorov-Smirnov normality test, it can be concluded that the data are normally distributed.
4. The results of the multicollinearity test show that the value of tolerance for the predisposing factor to the reinforcing factor ranges from 0.532 to 0.876 and the variance inflation factor (VIF) ranges from 1.142 to 1.879. This shows that there is no independent variable that has a tolerance value (T) less than 0.10 and no independent variable has a variance inflation factor (VIF) value of more than 10. Based on the results of the multicollinearity test, it can be concluded that in the regression equation model In this study, there was no multicollinearity problem and the regression equation model could be used in this study.
5. The results of the heteroscedasticity test show that the significance value obtained for all variables shows a value greater than  $= 0.05$  (Sig.  $> 0.05$ ). So it can be concluded that there is no heteroscedasticity in the regression model so that it meets the requirements of multiple linear regression testing.
6. The results of the autocorrelation test using the Durbin-Watson test, the Durbin Watson test value is 1.736. The value of the Durbin Watson test obtained lies between the values of -2 to 2. It can be interpreted that in the regression model formed no autocorrelation is detected.
7. The results of the F test can be seen that the F-count value is 14.754 with a significance value of 0.001. Because the significance value is smaller than  $= 0.05$  ( $0.000 < 0.05$ ), it can be said that the independent variables simultaneously have a significant effect on pedestrian comfort, security, and safety.
8. The results of the coefficient of determination test ( $R^2$ ), it can be seen that the magnitude of the R-square value is 0.660. This means that 66.0% of the variables of comfort, safety, and pedestrian safety factors are influenced by independent variables. While the remaining 34.0% is influenced by other variables that are not explained in this study.
9. Based on the results of the Hypothesis Testing, there are 3 factors that significantly affect the Comfort, Security, and Safety of pedestrians, namely X.1.2, X.1.3, X.2.2. with the result Sig  $< 0.05$ . For other influencing factors, sig  $> 0.05$ , then  $H_0$  is accepted that there is no significant influence from the dominant factors of Comfort, Security, and Pedestrian Safety.

It can be concluded that the variable how often pedestrians move on the sidewalk (Y) is influenced by the comfort, security, and safety factors of pedestrians (X) with a mathematical equation, while the multiple linear regression equation model obtained is as follows:

$$Y = 0.465 + 0.163 X.1.2 + 0.059 X.1.3 + 0.069 X.2.1 + e$$

With:

Y : How often do pedestrians move on the sidewalk?

X.1.2 : Pedestrian comfort factor, namely the condition of the sidewalk there are street vendors (PKL)

X.1.3 : The pedestrian comfort factor is the condition of the sidewalk where there is illegal parking on the sidewalk

X.2.1 : Pedestrian safety factor, namely the condition of the sidewalk seen from the height of the sidewalk (20 cm)

1. The constant value of 0.465 can be interpreted that if the variable is X.1.2, X.1.3, X.2.1 then the magnitude of the Y variable (how often pedestrians are on the sidewalk) is 1.465.
2. The pedestrian comfort factor variable, namely the condition of the sidewalk there are street vendors (PKL) (X.1.2) has a regression coefficient of 0.019. It can be seen that this variable has a positive influence that causes pedestrian comfort. This means that if the variable X.1.2 increases by one unit, the factor that causes pedestrian comfort will increase by 0.019 with the assumption that other variables are constant. With the influence/relationship between these variables, it shows a unidirectional effect, if X.1.2 increases then pedestrian comfort will increase and vice versa.
3. Variable pedestrian comfort factor, namely the condition of the sidewalk there is illegal parking on the sidewalk (X.1.3) has a regression coefficient of 0.003. It can be seen that this variable has a positive influence that causes pedestrian comfort. This means that if the variable X.1.3 increases by one unit, the pedestrian comfort factor will increase by 0.003 assuming other variables are constant. With the influence/relationship between these variables, it shows a unidirectional effect, if X.1.3 increases then pedestrian comfort will increase and vice versa.
4. Variable Factors Pedestrian safety factors, namely the condition of the sidewalk seen from the height of the sidewalk (20 cm) (X.2.1) has a regression coefficient of 0.044. It can be seen that this variable has a positive influence on pedestrian safety. This means that if the X.2.1 variable increases by one unit, the factor that causes pedestrian safety will increase by 0.044 with the assumption that other variables are constant. With the influence/relationship between these variables, it shows a unidirectional effect, if X.2.1 increases then pedestrian safety will increase and vice versa.

## CONCLUSION

From the results of observations of the geometric conditions of the sidewalks in the Kebayoran Baru area, South Jakarta, there are several pavement conditions that do not meet the standard planning guidelines, namely the elevation of the pedestrian path with the required vehicle path is 0.2 meters while the pavement conditions in the field are 0.15 meters, the height of the pedestrian path with the required green lane is 0.15 meters while the pavement conditions in the field are as high as 0.05 meters, and the required green lane width is at least 1.5 meters while the width of the green lane in the field is between 0.8-1, 0 meters. In addition to the pavement conditions that have been mentioned, the rest of the pavement conditions in the Kebayoran Baru area have met the standards set out in the Regulation of the Minister of Public Works (Guidelines for Planning, Provision, and Utilization of Pedestrian Network Infrastructure and Facilities in Urban Areas, 2014). Characteristics of pedestrians on average are male with a percentage of 67.5%; aged 21 – 30 years with a percentage of 42.5%; have other jobs (Entrepreneur/Entrepreneur) with a percentage of 51.3%; have other activities (shopping, sports, etc.) with a percentage of 50.0%; how often pedestrians move on the sidewalk on average > 4 times with a percentage of 73.8%. From the results of the calculation of the service level of the pedestrian path, the pedestrian path area is 40.86 m<sup>2</sup>/person 12 m<sup>2</sup>/person then for the pedestrian flow, it is obtained by 1.75 people/minute/meter 6.7 people/minute/meter, so that it is known that the level of pedestrian service in the Kebayoran Baru area, South Jakarta is "A" in accordance with the Regulation of the Minister of Public Works (Guidelines for Planning, Provision, and Utilization of Infrastructure and Facilities for Pedestrian Networks in Urban Areas, 2014). Based on the results of the research that has been done, from statistical calculations it is proven that there are dominant factors that can affect the comfort, security, and safety of pedestrians, namely: 1) Pedestrian comfort factor, namely the condition of the sidewalk there are street vendors (PKL), 2) The pedestrian comfort factor is the condition of the

sidewalk, there is illegal parking on the sidewalk, 3) Pedestrian safety factor is the condition of the sidewalk seen from the height of the sidewalk (20 cm).

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