

Analysis of Pedestrian Facilities: Case Study of Tarumanagara University Campus I

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Abstract— The result of the Stanford University study [1] state that Indonesia is one of the most lazy countries in Asia in term of walking. Based on this issue, it is necessary to get used to the culture of walking in Indonesia by providing facilities that meet the needs, comfort, and safety of pedestrians. Tarumanagara University is one of the biggest university in Jakarta with land area of 32,051m². Some students, lecturers and workers of Tarumanagara University use public transportation and the access to motorized vehicles in campus area is limited, so it is still necessary to walk in daily activities within the campus environment. This study was examined using seven criteria for ideal pedestrian facilities including: circulation and access, local environmental conditions, facilities, facilities for special needs, signage, security and maintenance. Based on the result of the analysis conducted by researches, pedestrian facilities at Tarumanagara University still meet the criteria for ideal pedestrian facilities. From 25 indicators of measuring instruments used, 12 indicators that have not been achieved. The final results of this study are expected to be taken into consideration by several parties, especially the University Foundation in planning the development of ideal pedestrian in Tarumanagara University.

Keywords: *pedestrian facilities, comfort, Universitas Tarumanagara*

I. INTRODUCTION

Based on the results of a study by a researcher from Stanford University, United States, published in the Journal Nature, stated that Indonesia is one of the Asian countries that is lazy to walk [1]. In the study it was stated that Indonesian citizens only walked 3,513 steps per day, while the global average step was 5,000 steps a day [2]. A Yogyakarta State University sociologist, Grendi Hendrastomo said that environmental factors related to pedestrian safety and comfort are one of the factors causing Indonesians to be lazy to walk [2], therefore pedestrian facilities that can meet the needs, comfort, and safety for the users are needed to realize the culture of walking.

Tarumanagara University Campus I is one of the biggest university in Jakarta with land area of 32,051m² and building

area 115,487m² [3]. Some students, lecturers and workers of Tarumanagara University use public transportation or rent a housing around the campus, so they have to walk inside the campus complex. This study was conducted to analyse pedestrian facilities within Tarumanagara University Campus I by describing the condition of pedestrian facilities in the field and analysing them with theory and standardization that are summarized into one parameter. This research is expected to be a consideration for the university to improve pedestrian facilities in the campus area to achieve a maximum walking culture.

II. LITERATURE REVIEW

A. Study Literature

Pedestrian facilities are services in the form of facilities and infrastructure provided for pedestrians to achieve a smooth, comfortable, secure and safety to run activities [4]. These facilities are divided into two, the main facilities and supporting facilities. The main facilities are in the form of pedestrian paths, such as crossings and sidewalks, while supporting facilities are all supporting facilities, such as waiting areas, lighting, signs, markers, information boards, guardrails, shelter or shade from sun and rain, green lines, seating, trash bin, shelter or station, and public telephone facilities [4].

Based on Indonesia's Ministry of Public Works Regulation No.03 of 2014 [5], the ideal criteria for pedestrian facilities are:

1. Avoiding physical contact with other pedestrians and motorized vehicles;
2. Avoid holes;
3. Having a direct path with the shortest distance;
4. Continues without obstacles;
5. Has supporting facilities such as benches and lights;
6. Protect pedestrians from heat, rain, wind and air and voice pollution; Minimizing the opportunity for people to commit criminal acts;
7. Universal design for pedestrians with special needs;

8. Connecting one place to another with connectivity and continuity;
9. Has a fairly gentle slope and the flat road surface does not rise and fall;
10. Adapt the physical character to the local social and cultural conditions, such as habits and lifestyle, population density, as well as inheritance and values adhered to the environment.

Criteria for good pedestrian pathways also include [6]:

1. The surface conditions of the field are strong and stable, flat and not slippery;
2. The resting place is made at certain distances and adjusted to the pedestrian comfort distance scale, 180m;
3. The ideal ramp has a 3% slope. While the ramp with 4-5% slope must have a short distance of 165cm;
4. Pedestrian width for one direction is at least 122cm, while for two directions is at least 165cm;
5. Lighting at night at least 75W;
6. Controlled and periodic maintenance;
7. Has proper slope drainage so that water does not stagnate;
8. Pedestrian crossing paths must be easily seen by motorists.

According to Rustam Hakim [7], the convenience of a facility is influenced by several aspects such as circulation, natural / climate strength, noise, aroma / smell, shape, security, cleanliness, beauty and lighting. In addition, time is a matter that must be considered. The distance traveled is related to the limits of human fatigue which results in fatigue. The ideal walking time limit is 5 minutes to 30 minutes. Direction and road guidance are needed to facilitate pedestrians so that they can be accessed easily [6].

B. Method

Based on the explanation of the theory above, the researcher summarizes these theories into a parameter for measuring the ideal criteria for pedestrian facilities in table 1

Table 1: Parameters used to review the criteria for ideal pedestrian facilities at Tarumanagara University Campus I.

Table 1. Pedestrian facilities

No.	Category	Indicator
1	Circulation and Access	Has a separate pedestrian path from motorized vehicles.
		Has special needs separate pedestrian paths from motorized vehicles
		Has a fence or divider between pedestrian paths and motorized vehicles
		Connect one place to another without interruption
		Can be accessed easily and quickly
2	Local Environmental Conditions	Protected from heat radiation from the sun, rain and wind
		Avoid the noise of motorized vehicles
		Clean from graffiti and trash
		There is no odor or smell
		Avoid air pollution
3	Facilities	The road surface is strong and stable
		Flat and not slippery road surface
		The road surface is not damaged
		Pedestrian width for one direction is at least 122cm, while for two directions is at least 165cm
		Has supporting facilities such as benches, lights, and trash bins.
4	Special Needs Facilities	There is a resting place every 180m
		The minimum width for pedestrians with special needs is 1.5 meters
		Having handrails for pedestrians with special needs
5	Signage	There are pedestrian directions
		Clear and Focused Pedestrian Instructions
		Roads and road directions are clearly visible at night
6	Safety	Roads and road directions are clear and not glare during the day
		Does not invite crime
7	Maintenance	Controlled and periodic maintenance

Source: Researcher's Summary, 2019

The results of survey data collected are then analysed by comparing field conditions with parameters summarized in table 1. Then conclusions are drawn that explain the condition of pedestrians at Tarumanagara University so that they can produce consideration.

C. Study Case

The research was conducted at Tarumanagara University Campus I located on Jalan Letjen S.Parman No.1, Grogol Petamburan, West Jakarta. This location was chosen because Tarumanagara University has a large land area of 32,051m². Access to motorized vehicles is limited to certain areas and some students and workers use public transportation or rent housing around the campus area, so to move from one building to another, they must walk.

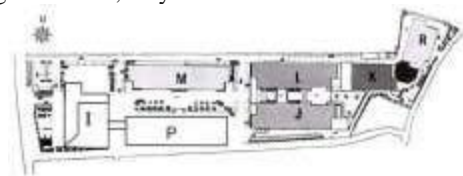


Figure 1: Tarumanagara University Campus I Master Plan.

III. ANALYSIS

A. Circulation And Access

There are 3 main entrances at Tarumanagara University (See Figure 2), namely entrance A, B and C. When viewed from the intensity of pedestrians, entrance A is dominated by pedestrians who use public vehicles such as Trans Jakarta buses and city buses. While entrance B is dominated by pedestrians who use privat and public vehicles such as cars, motorbikes or taxis online. Whereas entrance C is dominated by pedestrians who live around the University.

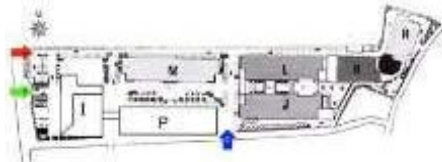


Figure 2: Main Entrance at Tarumanagara University.

Pedestrian paths are separate from motorized vehicles and are separated by road dividers, but for pedestrian with special needs still use ramp belonging to motorized vehicles (See Figure 4).



Figure 3: Pedestrian Paths are Separate.



Figure 4: Pedestrian With Special Needs Have No Separate Paths

The pedestrian path at Tarumanagara University Campus I can be mapped into 2, main pedestrian pathways and pedestrian paths with special needs (See Figure 5 and Figure 6). Areas that are not roofed or open are marked in yellow and a closed area is marked in blue.



Figure 5: Pedestrian Circulation Flow.



Figure 6: Pedestrian With Special Needs Circulation Flow.

Based on the picture above, pedestrian paths can be access between one building to another with the main paths or alternative paths. But for pedestrians with special needs, the paths provided are limited so that access becomes further and detour.

B. Local Environment Conditions

Some pedestrian paths do not have a roof (See Figure 7 and Figure 8), so pedestrians are not perfectly protected from weather. Especially pedestrians with special needs, compared to ordinary pedestrians, more areas are not protected because the access points are limited

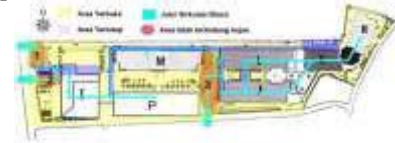


Figure 7: Pedestrian Circulation When It Rains.



Figure 8: Pedestrian With Special Needs Circulation When It Rains.

Based on the circulation flow of motorized vehicles, you can see areas that are still exposed to motorized vehicle emission. In addition there are several areas that produce diesel machine emmission such as the area of mechanical engineering workshops that often conduct engine tests that produce noise and vehicle fumes (See Figure 9).



Figure 9: Vehicle Circulation Flow.

In addition to motorized vehicle emission, there are several areas that have the smell or odor from disposals of restrooms or dining places and alcohol smell from laboratorium (See Figure 10).



Figure 10: Area That have Smell on Pedestrian Paths.

Mostly the pedestrian sidewalk are clean and well maintained, but there are still some areas where construction waste is on the alternative routes (See Figure 11). In addition there are no graffiti around the pedestrian path, but it is necessary to repaint some buildings and facilities available on the pedestrian path.



Figure 11: Construction Waste on Campus.

The current drainage system is quite good, there is no puddle or flood despite heavy rains.

C. *Facilities*

The road surface is strong, stable and not slippery. However, some road surfaces are uneven, there are still a number of terraces and broken roads.



Figure 12: Damaged Pedestrian paths.

Most pedestrian paths have a large enough width. For the track that is passed by 1 person the smallest road width is 100cm, while the path that is passed by 2 people has the smallest road width 150cm.



Figure 13: Pedestrian Minimum Width.

Greeneries in the campus area is very good, almost in every lane there is greening (See Figure 14).



Figure 14: Greening at Campus Area.

Other supporting facilities such as seating, are numerous and put closely together. Within a 180 m radius it is still available (see Figure 15). But unfortunately there are supporting facilities such as seats that have been damaged and have not been updated (see Figure 16).



Figure 15: Seating Facilities.



Figure 16: The Seat is Broken.

Trash bins are provided but not spread evenly on campus. Only main lanes have consistent placement of trash bin.



Figure 17: Location of Trash Bin.

D. *Special Needs Facilities*

Tarumanagara University already has pedestrian paths for the special needs (see Figure 6) with a minimum width of 80cm. Only one area in building R has a tool in the form of a handrail.



Figure 18: Smallest Pedestrian with Special Needs.

E. *Signage*

There is only 1 pedestrian guide signage. The directions for the road and location of the building do not yet exist, so if there are people who are first visiting the campus, it will be difficult to find a way. The material used in signage is iron and does not reflect light too much during the day. However, at night the signage is not very visible because it does not have its own lighting, it only relies on general lights.



Figure 19: Smallest Pedestrian Paths.

F. *Safety*

Security in the campus area is quite maintained. There are security guards in several locations, besides that some areas are equipped with CCTV cameras so that activities in the campus area can be controlled.

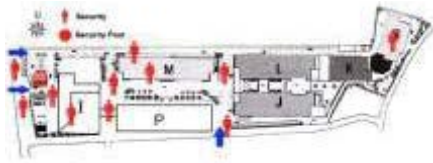


Figure 20: Security spots at Campus Area.

G. Maintenance

Regular maintenance of facilities on campus is regularly carried out. but there are still some areas whose facilities have not been repaired. In addition, cleaners regularly clean the pedestrian street, especially during the rainy season, the road is cleaned so that there is no moss that makes the road slippery.



Figure 21: Cleaning Officers are Cleaning the Road.

Based on the explanation of the data above, pedestrian facilities at Tarumanaga University are analyzed as:

Table 2: Analysis of pedestrian facilities at Tarumanagara University Campus I

No.	Category	Indicator	Info
1	Circulation and Access	Has a separate pedestrian path from motorized vehicles.	√
		Has special needs separate pedestrian paths from motorized vehicles	-
		Has a fence or divider between pedestrian paths and motorized vehicles	√
		Connect one place to another without interruption	√
		Can be accessed easily and quickly	-
2	Local Environmental Conditions	Protected from heat radiation from the sun, rain and wind	-
		Avoid the noise of motorized vehicles	-
		Clean from graffiti and trash	√
		There is no odor or smell	-
		Avoid air pollution	-
3	Facilities	Has proper slope drainage so that water does not stagnate	√
		The road surface is strong and stable	√
		Flat and not slippery road surface	-
		The road surface is not damaged	-
		Pedestrian width for one direction is at least 122cm, while for two directions is at least 165cm	-
4	Special Needs Facilities	Has supporting facilities such as benches, lights, and trash bins.	√
		There is a resting place every 180m	√
5	Signage	The minimum width for pedestrians with special needs is 1.5 meters	√
		Having handrails for pedestrians with special needs	-
		There are pedestrian directions	√
6	Safety	Clear and Focused Pedestrian Instructions	-
		Roads and road directions are clearly visible at night	-
		Roads and road directions are clear and not glare during the day	√
7	Maintenance	Does not invite crime	√
		Controlled and periodic maintenance	√

Source: Author Research Analysis, 2019

Based on the table above, out of the 25 indicators of ideal pedestrian facility criteria, 13 of them have been achieved, while the remaining 12 have not been reached.

IV. CONCLUSIONS

Based on the results of the analysis above, pedestrian facilities at Tarumanagara University are adequate but not quite there. There's still room for improvement. Out of the 25 indicators, 12 indicators have not been achieved, 13 indicators have achieved. The most unachieved category is the category of local environmental conditions, especially climate, pollution and smell. Therefore this category needs to be given more attention to improve the quality of pedestrian facilities. It is hoped that this research can be taken into consideration for the development of ideal pedestrian facilities at Tarumanagara University

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