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Comfort Level and Priority Needs of Pedestrians on the Pedestrian Path of Jalan Jenderal Ahmad Yani Makassar

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ABSTRACT

The feasibility of a pedestrian path (sidewalk) can be measured from the level of fulfillment of pedestrians who cross the pedestrian path. This can be measured based on several criteria such as accessibility, beauty, circulation, shade, safety, security, noise, cleanliness and connectivity. Jalan Jenderal Ahmad Yani is an area with various types of land functions, namely offices, education, trade and services. With various land functions (mix use), a proper pedestrian path is needed so that pedestrians can carry out their activities comfortably. Interconnected pedestrian paths are needed so that they can reach all existing facilities in the area on foot without having to move between vehicles. The final objective of this study is to measure the level of comfort of the pedestrian path and determine the priority of pedestrian needs on the pedestrian path along Jalan Jenderal Ahmad Yani in order to obtain the development of a pedestrian path that is comfortable and can accommodate all the needs of pedestrians in the area. This research is a quantitative descriptive study using a Likert scale to obtain a level of comfort based on the criteria / sub criteria for pedestrian needs and the Analytical Hierarchy Process (AHP) to obtain priority pedestrian needs. The results showed that the pedestrian path along Jalan Jenderal Ahmad Yani was categorized as uncomfortable with a comfort level of 2,

Keywords: Priority needs; level of comfort; pedestrian paths; pedestrians

1. INTRODUCTION

Pedestrians can be defined as everyone who walks in the road traffic space, while the pedestrian network is a pedestrian segment, either integrated or separate from the road, which is designated for pedestrian infrastructure and facilities and connects activity centers and / or facilities. change of mode (Minister of Public Works, 2014). A pedestrian path is a part of a city, where people move on foot, usually along the side of a planned or self-created road that connects one place to another [1].

To reduce dependence on vehicles, pedestrian accessibility must be a priority in the development of urban structures. One way to achieve sustainable mobility is the planning of walking paths using an environmental scale by considering the affordability of daily life facilities. [2] Provision of infrastructure in the form of pedestrian facilities can contribute to pedestrian mobility, safety, interest and comfort. The provision of these factors can increase the attractiveness of walking [3]

The pedestrian path is a public space, in which there is also social interaction between communities [4]. In its development, the pedestrian function is not only for walking paths but also for recreational activities, such as sitting around enjoying the city atmosphere, socializing, and communicating between its residents [5]. The main function of the pedestrian path is to provide services to pedestrians so that it can improve pedestrian smoothness, safety and comfort [6].

A. Pedestrian Needs

The concept of pedestrian needs was put forward by Alfonso (2005) which states that walking activities are based on 5 (five) factors, namely the feasibility factor, the accessibility factor, the safety factor, the comfort factor and the pleasurability factor. The five basic needs of pedestrians by Gatoet Windarto (2017) are described more specifically into 8 (eight) operational criteria for pedestrian needs. which is measured based on mobility, accessibility, continuity, connectivity, safety, comfort, security and beauty [7]. The pedestrian requirement-based sidewalk eligibility criteria must be met optimally in accordance with the existing environmental conditions where a sidewalk is located and consider the types and conditions of pedestrians. A well-designed built environment without the presence of pedestrians is not an active social place with a high level of community. This will cause loss of vitality and livability in the area [8]

B. Pedestrian Track Convenience

Comfort is related to the level of convenience and satisfaction that a person gets with something pleasant, both physiologically, psychologically and physically, the harmony between the human body and the environment. Environmental quality will affect a person's comfort level when walking. Planning on a human scale, good design, materials, walking space and a good walking surface are determinants of pedestrian comfort [9]. If the pedestrian lane is dirty, too narrow, the pavement is not up to standard, irregular maintenance, the quality of the sidewalk surface is uneven, the weather phenomenon is unstable, the existence of city facilities that interfere with circulation will affect pedestrians because it is considered uncomfortable and unattractive [10].

The following will describe some of the pedestrian need factors that will affect the comfort of walking based on the opinions of several experts and researchers as mentioned above.

B.1) Mobility, is the need for pedestrians to be able to walk smoothly without obstacles (space). Pedestrian mobility is determined by the following factors: the track surface, the track width and the absence of obstructions along the sidewalk. Dimensions (width) of pedestrian paths that are not optimal become a barrier to mobility, especially for parents who feel unsafe. Uneven surfaces are also a barrier especially for road sidewalk users. The existence of obstacles (permanently or temporarily blocked, minimum lane width, surface conditions that can affect someone to access the pedestrian path. [7,11]

B.2) Accessibility, is the need for pedestrians to access / reach desired destination points by removing obstacles and obstructions. Pedestrian accessibility is an important factor in making an area walkable or pedestrian friendly. Ease of access applies to all people including people with special needs, such as wheelchair users, blind people or the elderly [8,9]

B.3) Continuity, is the need for pedestrians so that they can carry out their activities on foot in a sustainable manner, not cut into pieces or stop. The available sidewalk network must be able to guarantee the continuity of movement for pedestrians in a certain way, if the sidewalk is cut off by an alley, entrance to buildings, intersections, and so on [7]

B.4) Connectivity, is the complete integration of the pedestrian path. The unavailability of access to public transportation and the lack of connection of pedestrians and pedestrians is an obstacle to pedestrian mobility The main reasons a person makes the decision to

walk are distance and the availability and connectivity of urban transportation [3].

B.5) Safety, is the need for pedestrians to avoid traffic accidents. The creation of a safe zone between cars and pedestrians will reduce the risk of conflict and accidents so that traffic control signals or pedestrian traffic signals are required. The age factor of pedestrians also needs attention, those who are elderly (seniors) must be guaranteed safety on pedestrian paths, especially in the area of the crossing and at crossroads. The existence of information signs is very useful for pedestrians because it provides a good picture of the availability / direction of facilities [3]

B.6) Security, is the need for pedestrians to avoid fear of crimes related to physical or emotional hazards that can occur at any time on the sidewalk which will threaten the safety of their lives. The CPTED (Crime Prevention Through Environmental Design) concept is a concept that was built in a certain way to reduce or prevent crime or crime. Sufficient lighting for pedestrian paths is a means to improve road safety and security against criminal threats and for general pedestrian comfort. The location of the lighting on the pedestrian path is placed every 10 meters with a maximum height of 4 meters, and the materials used are materials with high durability such as metal & printed concrete [12].

B.7) Beauty, is the need of pedestrians to get a pleasant physical atmosphere or environment (inner satisfaction and five senses) when doing their activities on foot on the pedestrian path. The role of architects and urban designers plays a big role in designing streetscapes that are able to refresh and rejuvenate physically weary pedestrians from noisy traffic and air pollution including landscaping and pedestrian complementary facilities.

B.8) Circulation, namely rotation or circulation. This is related to the dimensions of the pedestrian path. Pedestrian circulation is closely related to the dimensions of roads and pedestrian paths, the place of origin of circulation and the exact destination of pedestrian circulation, the purpose of travel, the time of day and the volume of pedestrians. The minimum requirement for pedestrian paths in urban areas refers to the Circular of the Minister of PUPR Number: 02 / SE / M / 2018 concerning Technical Planning of Pedestrian Facilities

B.9) Nature or Climate Style, is a natural condition and climate that occurs at one time. Weather conditions such as rain, wind and temperature have a significant impact on pedestrian behavior as this reduces the number of trips. The existence of vegetation in addition to having aesthetic qualities also plays an important role in urban sustainability, because it has a positive influence on climate and pollution prevention. Among all the weather characteristics, temperature is the only variable that has a statistically significant effect on pedestrian volume so that it is a consideration in modifying city infrastructure, in this case pedestrian paths.

B.10) Noise, noise is unwanted noise in a certain level and time that can cause disturbance to human health and environmental comfort. The permissible noise level for urban areas, especially for trade and service areasand recreation in the range of 65 - 70 dB. High The noise level of passing motor vehicles can be minimized by the arrangement of plants on the sidewalk (on the side of the road) is adjusted to the width of the land, starting from the shoulder

of the road to the channel threshold or the Rumija limit. [13].

B.11) Shape, the shape of the pedestrian path design must be adjusted to human standards in order to create a sense of comfort. Sidewalks should be wide, free from obstacles, free of steps, with good quality layers, green and leafy to provide safety and comfort to users. Research results from R. Projadi, Sangkertadi and RC Tarore revealed that there are 4 (four) physical characteristics of the pesedrian route that will affect pedestrian comfort, namely shape, dimensions, color and texture. The requirements related to pedestrian paths are regulated in the Guidelines for Planning Pedestrian Paths on Public Roads based on the Decree of the Director General of Highways Number: 032 / T / BM / 1999), Regulation of the Minister of Public Works Number 03 / PRT / M / 2014 to accommodate pedestrian needs. with special needs and Circular Minister of PUPR Number: 02 / SE / M / 2018 concerning Technical Planning of Pedestrian Facilities.

B.12) Cleanliness, is a state free from dirt. Apart from adding to the attractiveness of the location, it also adds to the feeling of comfort because it is free from garbage and eliminates the unpleasant odors it causes. This unpleasant odor will be smelled by pedestrian path users so that it will reduce pedestrian comfort. Hygiene and maintenance factors are related to the presence of garbage, or maybe the pungent odor it causes will affect a person walking [11]. Placement, the number of bins placed on the pedestrian path, the quantity and materials are adjusted to the predetermined standards [12]

B.13) Supporting Elements, to create comfort for pedestrians, complementary elements of the pedestrian path are needed, including paving, lights, signs, sculptures (vocal points), bollards (barrier), benches, shade plants, telephones, kiosks, shelters and canopies. clocks, bins, stops and utilities.

2. METODOLOGY

The research location is in Ujung Pandang District, namely the pedestrian route along Jalan Jenderal Ahmad Yani Makassar City. The reason for choosing the location was based on the consideration that the area was in a strategic position with various land uses, such as offices, trade and service centers and education, so that it was quite crowded with pedestrian activities. Pedestrian activities that occur on the pedestrian path are functional, routinely carried out every day. To obtain more valid data, the pedestrian lane along Jalan Jenderal Ahmad Yani is divided into 6 (six) pedestrian lane segments. This type of research is a quantitative descriptive study with the Analytical Hierarchy Process (AHP) analysis technique. Primary data collection techniques are carried out through direct observation in the field, structured interviews using a questionnaire and documentation in the form of written archives, recorded images or photographs related to the research location. The variables used will be assessed based on a Likert scale (0 - 5) to obtain a level of comfort. Meanwhile, for priority determination, these variables will be assessed by expert respondents and the data will be processed using the Analytical Hierarchy Process (AHP) method. The results will be tested for the level of consistency with the maximum Consistency Ratio value ≤ 0.1 or 10%.

Respondents or informants used to assess priority needs were as many as 7 (seven) expert respondents in their fields. The sampling technique is using purposive sampling technique, which is only for people who have special competences who can become respondents.

3. RESULT AND DISCUSSION

The comfort level of the pedestrian path along Jalan Jenderal Ahmad Yani is measured using a variable that

is measured / assessed as referred to from several applicable regulations (Ministerial Regulations, Ministerial Circular, Decree, Guidebook, etc.). The variable is measured using a Likert scale with a score of 1 to 5, where a score of 1 indicates a very bad / very uncomfortable condition, a score of 2 indicates a bad / uncomfortable condition, a score of 3 indicates a condition is quite good / comfortable enough, a score of 4 indicates a good / comfortable condition and a score of 5 indicates very good / very comfortable conditions.

Table 1. Average score of pedestrian comfort level assessment

No	Variabel	Skor Rata-Rata (Nilai 1 - 5)
1	Sirkulasi	2.08
2	Aksesibilitas	1.58
3	Keteduhan	2.50
4	Kebisingan	4.33
5	Keamanan	2.83
6	Keselamatan	3.23
7	Kebersihan	2.75
8	Keindahan	2.61
9	Konektivitas	3.17
Rata-rata		**2.79**
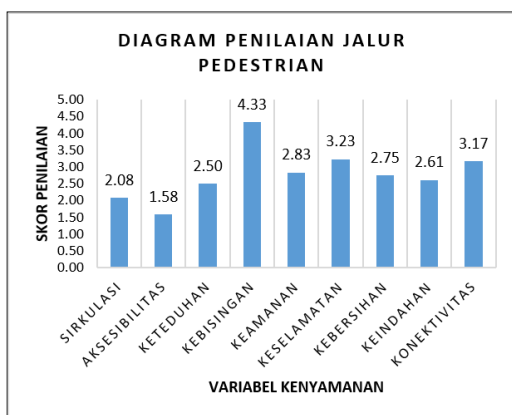
The tables and diagrams above illustrate the average score obtained from the assessment of pedestrian comfort levels from all location segments (1 to 6). The average value of pedestrian paths on pedestrian paths along Jalan Ahmad Yani is 2.79 and is included in the bad / uncomfortable category. The assessment of the lowest level of comfort on the pedestrian path on Jalan Jenderal Ahmad Yani is seen in the accessibility variable: 1.58 (very bad / very uncomfortable). normal or for those with special needs. Unavailability of facilities for pedestrians with special needs, such as guide lanes,

Source: Author's documentation, 2020
Figure 1. The pedestrian path used as a parking lot

Apart from accessibility, there are still many variables that fall into the bad / uncomfortable category, such as circulation (2.08), shade (2.50), beauty (2.61), cleanliness (2.75) and security (2.83). Circulation irregularities in almost all segments at this location are caused by the narrow size of the pedestrian path (<1.50 meters) and the presence of obstructive objects such as shade plants, aesthetic ornaments such as flower pots that are located in the pedestrian area so that they interfere with pedestrian circulation. This can be clearly seen on the pedestrian lane segment B-2. Another case happened in segments B-5 and B-6, partially available pedestrian paths are used as parking spaces for motor vehicles. The existence of a portal that is permanently installed on the pedestrian path also affects pedestrian comfort.

Figure 2. The pedestrian path used as a parking lot
The shade factor also needs to be considered at this location, especially in segment B-3. The shade plants at this location are in the Karebosi Link shopping area so they do not reach the pedestrian area in front of it. In addition, providing shelter facilities such as shelters and pedestrians can also be used to change modes of transportation needs to be a priority in providing comfort for pedestrians. In terms of beauty, the arrangement of aesthetic ornaments in the form of flower pots or small gardens on the pedestrian paths at this location needs to be reorganized and maintained so that the conditions are always in a good condition. The current condition is that many of the flower pots available are not filled with plants and some of them have been damaged. In terms of cleanliness, It is necessary to provide trash bins on the pedestrian path to ensure the cleanliness of the pedestrian path. The

current condition shows that the level of cleanliness in this location is not well maintained, it can be seen that trash in several places originating from the Ketida building owner, the availability of trash cans makes pedestrians because of the difficulty of getting trash bins around the location.

Figure 3. Unavailability of trash cans

Likewise, the safety factor is also an important thing in the development of pedestrian paths at this location. Provision of security facilities such as CCTV, security guards or lighting capable of reaching the pedestrian path area is a very necessary variable in ensuring the security and safety of pedestrians crossing this pedestrian path.

The safety and connectivity factors fall into the quite comfortable category. It is necessary to repair the pedestrian path physically related to the surface condition of the pedestrian path, especially in segment B-2 which is in a badly damaged condition (perforated). In addition, the pedestrian path in this location does not provide special lanes for pedestrians with special needs, the arrangement of the ramp according to standards, the lack of special pedestrian signs will affect pedestrian comfort from safety factors. Connectivity between pedestrians and pedestrians needs special attention in developing pedestrian paths in this location.

Figure 4. Unavailability of trash cans

Prioritizing Pedestrian Needs

Determining the priority needs of pedestrians can be done by compiling an AHP questionnaire which will be filled in by experts, that is, people do not have to be experts in the field of pedestrian paths, but understand the problems to be studied. Resource persons or informants who become expertists come from elements of the government, academics, city observers, and people using pedestrian paths (pedestrians).

Table 2. List of Expert Respondents

No.	Interviewees	Competence	amount
1	Government / Bureaucracy	Involved in the planning and development of pedestrian paths	3 people
2	Academics	Having experience researching or being involved in the development of pedestrian paths	2 persons
3	City Watcher	City observers and contribute to the development of the city	1 person
4	Public	User	1 person

Source: Author's analysis, 2020

The number of respondents who filled out the questionnaire and met the requirements of the constitutional test were 7 (seven) respondents and would assess 9 comfort variables. To obtain an assessment matrix from several respondents, the mean measurement of the results was carried out using the Geometric Mean formula.

The formula for the Geometric Mean is as follows:

$$ GM = \sqrt[n]{X1 \text{ x } X2 \text{ x } X3 \text{ x} \ldots \text{x} Xn} \ . $$

Where : GM   = *Geometric Mean*
X1, X2, X3,…, Xn   = Weight of the assessment of variables 1, 2, 3,…, n
n   = Number n (order)

Based on the geometric mean formula, the average measurement results are obtained and then the

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eigenvalues are calculated for each location to obtain the Priority Vector as in table 3

Table 3. Eigenvalues and Priority Vector

Variabel	Nilei Eigen									Jumlah	Priority Vektor
	V1	V2	V3	V4	V5	V6	V7	V8	V9		
V1 (sirkulasi)	0.0645	0.0762	0.0585	0.0809	0.0698	0.0603	0.0429	0.0758	0.0528	0.5818	0.0646
V2 (aksesibilitas	0.0712	0.0841	0.0937	0.1125	0.0960	0.0762	0.0976	0.0877	0.0583	0.7773	0.0864
V3 (keteduhan)	0.0668	0.0544	0.0519	0.0961	0.0549	0.0492	0.0358	0.0515	0.0409	0.5015	0.0557
V4 (kebisingan)	0.0374	0.0351	0.0222	0.0373	0.0422	0.0401	0.0195	0.0311	0.0351	0.3002	0.0334
V5 (keamanan)	0.2447	0.2157	0.2501	0.2002	0.2649	0.3370	0.2867	0.2456	0.3011	2.3460	0.2607
V6 (keselamatan)	0.2447	0.2526	0.2413	0.1932	0.2265	0.2289	0.2930	0.2634	0.3056	2.2493	0.2499
V7 (kebersihan)	0.0860	0.0621	0.0830	0.1019	0.0666	0.0563	0.0573	0.0628	0.0542	0.6301	0.0700
V8 (keindahan)	0.0512	0.0621	0.0607	0.0617	0.0666	0.0563	0.0519	0.0515	0.0430	0.5050	0.0561
V9 (konektivitas)	0.1334	0.1576	0.1385	0.1162	0.1124	0.0956	0.1154	0.1306	0.1091	1.1089	0.1232
Jumlah	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	9.0000	1.0000

Source: Author's Analysis, 2020

The results of the Priority Vector for each location will be tested again for the validity of the data (consistency) using the Consistency Ratio (CR) formula as follows:
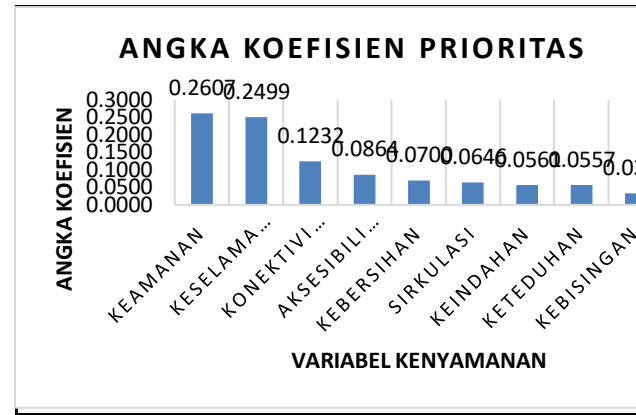
$$CR = CI / IR$$

Where : CR = Consistency Ratio (requirement CR ≤ 0.1)

CI = Consistency Index ((λ max-n) / (n-1))

IR = Index Random Consistency

Based on the formula above, the calculation of the Consistency Ratio (CR) is 0.044 (consistent, CR ≤ 0.1)

Based on the data in table 3, the priority order of the pedestrian path comfort factors is obtained as in the following figure:

Source: Author's analysis, 2020

Figure 5. Priority sequence diagram based on AHP

From the diagram above, it can be seen that security, safety and connectivity are the main priorities in the development of pedestrian paths on Jalan Jenderal Ahmad Yani. The land functions at this location are quite diverse, such as offices, trade and service centers as well as education so that it is quite dense with pedestrian activities. If the pedestrian paths available at this location are comfortable, then it is possible for the public to use more pedestrian paths to reach existing facilities at this location without having to always change modes of transportation.

4. CONCLUSIONS

There are 9 factors that affect the comfort of pedestrians using the pedestrian lane on Jalan Jenderal Ahmad Yani Makassar City, namely: circulation, accessibility, shade, noise, security, safety, cleanliness, beauty and connectivity. The results of the study indicate that the pedestrian path at that locationfall into the bad / uncomfortable category (score 2.79). Improvement is needed, starting from the provision of several facilities to physical development in order to obtain a pedestrian path that is comfortable and even very comfortable for pedestrians. 2. The priority of pedestrian needs on the pedestrian path on Jalan Jenderal Ahmad Yani, Makassar City, places security, safety and

connectivity as the main priority in the development of pedestrian paths in Makassar City. The improvement and development of these three factors need serious handling in order to create a pedestrian path that is comfortable for everyone without exception.

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