

SPATIAL COMFORT LEVEL OF THE KH. MUSTAIN CORRIDOR PEDESTRIAN PATH

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Abstract

The KH. Mustain Road Corridor in Tuban Regency is a strategic route for accessing religious and cultural tourist sites. However, the pedestrian path faces several issues, including pavement damage, a lack of supporting facilities, and the repurposing of pedestrian spaces. The purpose of this research is to calculate the spatial comfort level of pedestrian paths based on pedestrian path factors, pedestrian-friendliness, and public space. The method used was field observations analyzed using the Thurstone scale and questionnaires given to 269 respondents aged between 18 and 45 years. The research was conducted on three segments of the pedestrian path, each measuring 880 meters in length on the east and west sides of the corridor. The results show that segment 1 has a comfortable spatial comfort level (average 5.078), while segments 2 and 3 have a somewhat comfortable level (average 4.622 and 4.498). While the vegetation factor contributes the most to comfort, the availability and placement of street furniture as well as the repurposing of space are the main issues. These results indicate that pedestrian paths need to be reorganized to meet national standards and have inclusive and pedestrian-friendly supporting facilities.

Keywords : *Pedestrian Path, Spatial Comfort, Road Corridor*

INTRODUCTION

KH. Mustain Street is road primary local with long about 500 meters long and wide about 9 meters. This road type One track with two lanes and two directions not divided (2/2 UD). Tourists usually use KH Mustain Road corridor for go to the Tomb of Sunan Bonang. The KH. Mustain Street Corridor has track pedestrian path that is 430 meters long on the west side and 450 meters on the east side east , with wide 1 meter wide and high 20 cm kereb . Usage land in the corridor This For objective housing , education , health , government , trade and services by 32%, and tourism by 2%.

Condition pavement pedestrian walkway This damaged and perforated in several places point , no There is facility lighting , no There is seat For relax , less friendly to people disabled , and not There is place trash . Besides , he complain existence craftsman frequent rickshaws stop at almost throughout road For wait customer . Position parking that takes part The size of the road and pedestrian path is definitely very disturbing Good users road and pedestrians because pedestrian paths are not fulfil its function in accordance with SNI 03-2443-1999. Function main pedestrian path is give safety and comfort best to pedestrians . Therefore that , research This must done about problem This (Mamujaja et al., 2018). Research This aim For count level comfort spatial KH. Mustain Road Corridor with consider factors like track pedestrians , space public , and friendly pedestrian .

LITERATURE REVIEW

Pedestrian Path

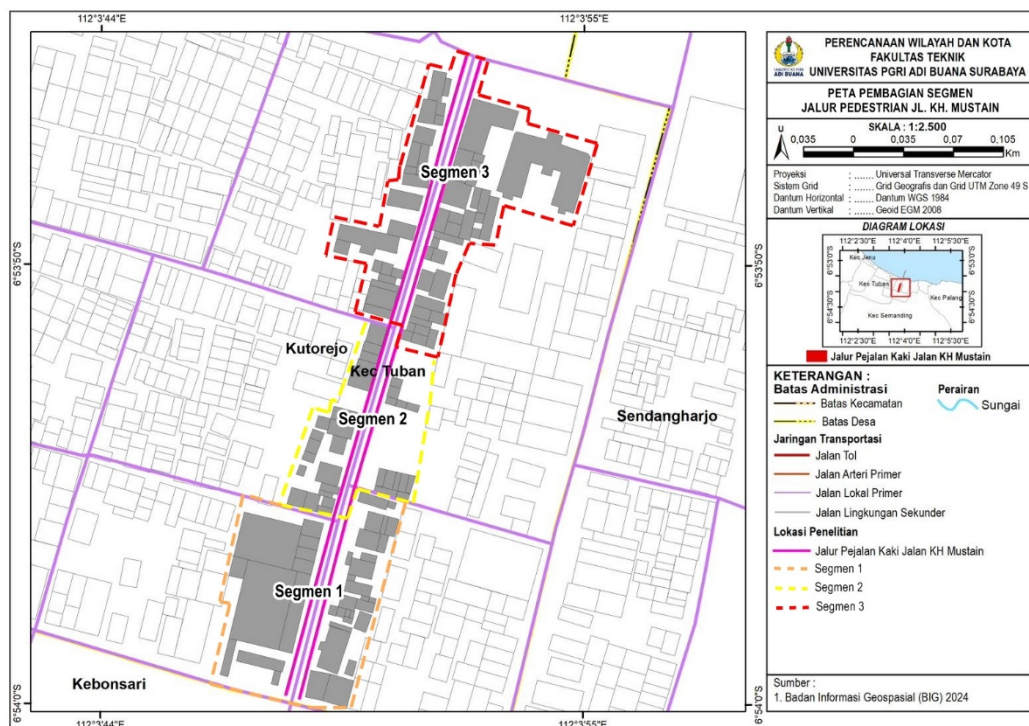
According to Regulation of the Minister of Public Works No. 03 of 2014 concerning Guidelines Planning , Provision , and Utilization of Facilities and Infrastructure Network Pedestrians in Urban Areas , paths pedestrians are section pedestrians , both integrated and separated with the road , which is intended For provide facilities and infrastructure For pedestrian and connecting center activities and/ or facility change mode . Condition physique track pedestrians consist of from length , width , and height track pedestrians . Conditions physique track pedestrians are very important For increase people's interest in walking. Pedestrian paths are not only functioning as place its

movement human and accommodate part activity circulation man For fulfil need his life , but also a place man activities , such as interaction social , buying and selling , and following guidelines or characteristics environment . Complete , adequate , and popular facilities support walking (Rengkung et al., 2023).

Spatial Comfort

Comfort spatial is aspect related comfort with scope activities or receptacle place activities happened . In the study this , movement circulation and activities carried out by pedestrians are component comfort spatial . Variable comfort spatial includes : (Napitupulu & Santosa, 2018)

- The function of a pedestrian corridor is to be located at the edge of the road or street, and is a public right-of-way. There are four sidewalk zones: the curb, the pedestrian zone, the pedestrian-free zone, and the frontage area.
- Regulation of the Minister of Public Works Number 03 of 2014 concerning Pedestrian Guidelines, pedestrian paths are the space required for pedestrians to stand and walk, calculated based on the dimensions of the human body when walking together with other pedestrians, both in stationary and moving conditions. Local roads and collector roads have pedestrian paths of 1.2 meters, while arterial roads have 1.8 meters. There is an additional space of 1.5 meters x 2.4 meters for stops and bus stops.
- Building Setback based on Tuban Regency Regional Regulation No. 5 of 2015 concerning Buildings regulates the location of the outermost building boundary lines for roads, railways and high-voltage networks, in accordance with regulations stipulated by the authorized agency.
- Law No. 22 of 2009 concerning Traffic and Roads, pedestrians have rights in traffic, including the right to obtain the availability of supporting facilities for walking, the right to get priority when crossing in the crossing area, and, if the facilities in question are not yet available, pedestrians have the right to choose the crossing location by



paying attention to their own safety.

- Vegetation with wide canopies is attached to the 0.6 meter wide buffer area to shade pedestrians from sunlight and serve as a barrier to reduce air and noise pollution.

METHODOLOGY

Study done on the track pedestrian corridor of Jalan KH. Mustain Regency Tuban along 430 meters on the West side and 450 meters on the East side with wide 1 meter wide and high kereb 20 cm. For make things easier survey and discussion so shared into 3 segments as in Figure 1. Segment 1 is 160 meters long (Jalan Basuki Rachmad until to Jalan Pemuda Kutorejo Gang 1 and Jalan Veteran Gang X), Segment 2 is 145 meters long (Jalan Pemuda Kutorejo Gang 1 to to Jalan Pemuda Kutorejo Gang 2), and Segment 3 is 195 meters long (Jalan Pemuda Kutorejo Gang 2 to to Jalan RA Kartini).

Figure 1. Distribution Map Segmen

Data collection methods used in study This is technique questionnaire and documentation . Documentation and questionnaire used For search for related data function space , path pedestrians , setbacks building (*setback*), furniture roads and vegetation . The samples used as many as 269 people with range age 18-45 years .

Analysis level comfort spatial track pedestrians on the KH. Mustain Street corridor are carried out from results questionnaires and measurements use scale with Thurstone method as in Table 1.

Pedestrian Path Comfort Scale Table

No.	Scale	Category
1	1 – 1,857	Very Uncomfortable
2	1,857 – 2,714	Uncomfortable
3	2,715 – 3,571	A bit uncomfortable
4	3,572 – 4,428	Neutral
5	4,429 – 5,285	Comfortable
6	5,286 – 6,142	Somewhat Comfortable
7	6.142 – 7	Very comfortable

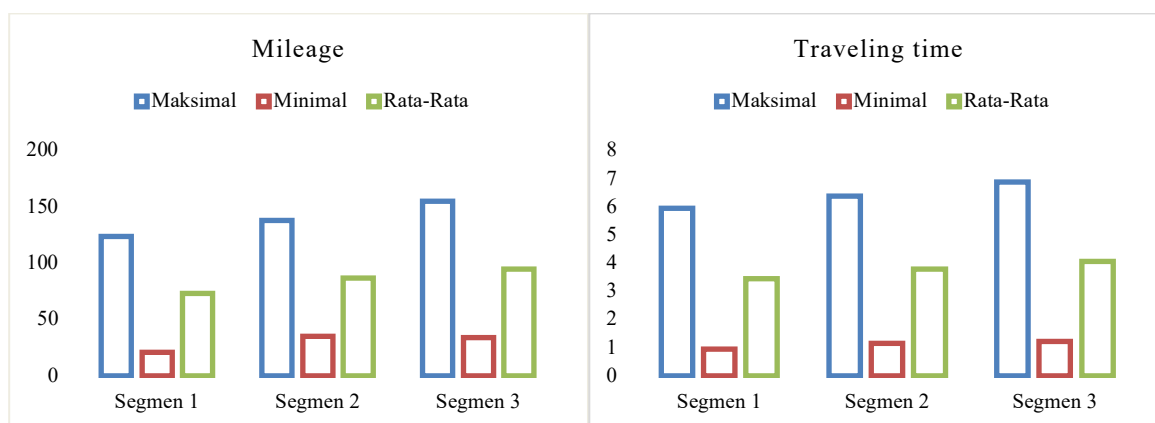
Source : (Napitupulu & Santosa, 2018)

ANALYSIS AND DISCUSSION

Characteristics track pedestrians on the KH. Mustain Street corridor are divided into the aspect track pedestrians , aspects friendly pedestrians and aspects room public .

a. Pedestrian path aspects

Factors that influence pedestrian paths in the KH. Mustain Street corridor are travel time and distance traveled by pedestrians. Travel distance and travel time are obtained from direct observations in the field as shown in Figure 2. The maximum distance traveled by pedestrians in segment 1 in the KH. Mustain Street Corridor is 124 and the minimum distance is 21 meters with an average of 73. The maximum travel distance in segment 2 is 138 and the minimum distance is 35 meters with an average of 87 meters. The maximum travel distance in segment 3 is 155 meters and the minimum distance is 34 meters with an average of 95 meters. The maximum travel time used by pedestrians in segment 1 in the KH. Mustain Street Corridor is 5.96 minutes and the minimum travel time is 0.94 minutes with an average of 3.45 minutes. The maximum travel time in segment 2 is 6.39 minutes and the minimum travel time is 1.16 minutes with an average of 3.78 minutes. Travel time in segment 3 is 6.88 minutes and the minimum travel time is 1.23 minutes with an average of 4.06 minutes. Based on the standard physical characteristics of pedestrians in the Regulation of the Minister of Public Works Number 03 of 2014 concerning Guidelines for Planning, Provision, and Utilization of Pedestrian Network Infrastructure and Facilities in Urban Areas, it states that the maximum comfortable distance for pedestrians is 400 meters, while for carrying goods the distance is no more than 300 meters with a travel time of 10-15 minutes. The average distance traveled by pedestrians in the KH. Mustain Street Corridor is 85 meters and the average travel time is 3.76. It can be concluded that the distance and travel time of pedestrians in the KH. Mustain Street Corridor can be said to be comfortable because the average value of the distance traveled and the travel time is still below the maximum limit of the established standard.

**Figure 2. Distance and Travel Time Diagram Pedestrian**

b. Pedestrian friendly aspects

Safety , comfort and convenience is a number of aspect friendly pedestrians in the KH. Mustain Street Corridor . Aspects security covers room separated pedestrians from track Then cross vehicle and have different heights so that pedestrians can move with easy . Aspect comfort covers track with comfortable and easy width traversed (minimum 1.5 meters), surface material the path that is not slippery , 39 vegetation shade pedestrians for lower climate micro , and furniture roads and facilities room pedestrian . Figure 3-5 illustrates condition security , comfort and convenience from segments 1 to 3.



Figure 3. Condition of Pedestrian Path Segment 1



Figure 4. Condition of Pedestrian Path Segment 2



Figure 5. Condition of Pedestrian Path Segment 3

c. Aspects of public space

Point beginning or point end pedestrians , who were found through observation or field observations , are part from room public . Most of pedestrians start activity they with walk 43 feet from Bravo Supermarket and Jalan Basuki Rachmad , which is point beginning or point beginning of segment 1. Figure 6 shows that point end the journey in segment 1 consists of from 6 points , with point mainly located in Gang Kutorejo , Gang X Kutorejo , and Jalan Basuki Rachmad . This is due to the fact that part big pedestrians end journey they are in place the .



Figure 6. Starting and Ending Points of Pedestrian Segment 1

In segment 2 in Figure 7, the origin point or point beginning consists of from 4 points with point main movement pedestrians are in Gang Kutorejo and Gang X Kutorejo , because part big pedestrians start activity walk from place said . Point end of segment 2 consists of from 8 points with point main located on Jalan Pemuda Kutorejo Gang II, Gang Kutorejo and Gang X Kutorejo , because part big pedestrians end activity walking in place the .



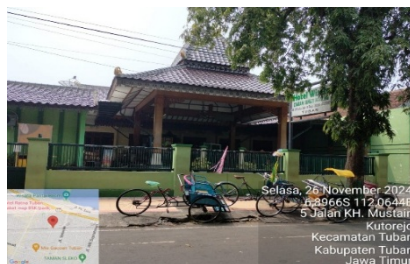
Kutorejo X Alley



Kutorejo Youth Street Gang II

Figure 7. Starting and Ending Points of Pedestrian Segment 2

Origin point or point the beginning of segment 3 (Figure 8) consists of from 5 points with point mainly located on Jalan Pemuda Kutorejo Gang II, Hotel Wisata Ziarah Sunan Bonang and Hotel Indonesia Tuban , because part big pedestrians start activity walk from place said . Point end journey pedestrians consist of out of 10 points with point mainly located in the museum White Floating Bridge and RA. Kartini Street, because part big pedestrians end activity walking in place the .



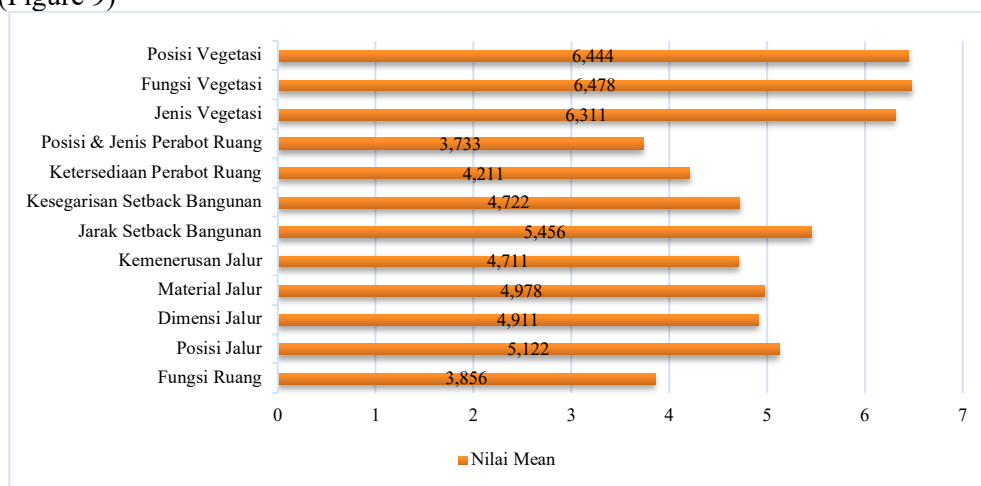
Sunan Bonang Tourist Hotel



White Floating Museum

Figure 8. Starting and Ending Points of Pedestrian Segment 3

Comfort level spatial segment 1 entry category comfortable with the average value of the means is 5.078 because influenced by: (Figure 9)


Figure 9. Segment 1 Assessment Results

- The condition of the pedestrian space has changed into a parking area and a street vendor trading area, with a mean value of 3.856 and a neutral category.
- The pedestrian path position is categorized as somewhat comfortable, with a mean comfort score of 5.122. There are no broken pedestrian paths, but in some places, there are still different heights for entering or exiting alleys, houses, and other buildings.
- Although the impact on pedestrians was not significant, the mean pedestrian comfort score was 4.911, placing it in the somewhat comfortable category. In segment 1, the average pedestrian path was 1 meter wide. This condition

- does not comply with the Minister of Public Works Regulation Number 03 of 2014 concerning Pedestrian Guidelines, which states that pedestrian paths on primary local roads must be 1.2 meters wide.
- Pedestrian path materials received an average score of 4.978, placing them in the somewhat comfortable category. Segment 1 has many damaged pedestrian paths, so the materials used vary in some areas.
 - The pedestrian comfort level regarding the continuity of the pedestrian path was rated as somewhat comfortable, with an average score of 4.771. The pedestrian path is constricted by several street vendors (PKL), parked vehicles, and dense vegetation. Furthermore, the vehicle access area, also known as the "vehicle access road," is in very poor condition and disrupts the pedestrian path. It is crucial for pedestrians to continue their movement without being disturbed by other things.
 - The comfort level of the building's setback distance from the pedestrian path was categorized as comfortable at 5.456. Respondents' assessments are inconsistent with the current situation. In this segment, the building's setback is typically 3-5 meters wide, but sometimes as low as 0-1.5 meters.
 - Comfort level to building setback alignment own mean value of 4.722 with category rather comfortable . This is not enough in accordance with condition existing in segment 1, because there is difference significant setback between one building with others.
 - The availability of furniture in pedestrian spaces received a mean score of 4.211, which places it in the somewhat uncomfortable category. Since there is no street furniture in this segment, this aligns with the current situation at the study site.
 - There are only streetlights. Because there are no facilities for people with disabilities, trash cans, seating, signs, or other amenities in the pedestrian area, the mean comfort level for the position of furniture types in the pedestrian area is 3.733, categorized as somewhat uncomfortable. This value corresponds to the conditions in segment 1 because the position of furniture in the pedestrian area is quite disruptive to pedestrian movement.
 - The comfort level for the type of vegetation has an average value of 6.311 with a very comfortable category, which is very appropriate to the conditions in segment 1, where vegetation with wide canopies dominates.
 - The comfort level for vegetation function has an average value of 6.478 with a very comfortable category, which is very appropriate to the conditions at the study location, because in segment 1 there is a lot of vegetation with wide canopies.
 - The comfort level of the vegetation position was categorized as very comfortable with a mean value of 6.444. Vegetation in segment 1 is not located on the pedestrian path, so it does not interfere with pedestrian activities, making it very suitable for current conditions at the study location.

Comfort level spatial segment 2 entry category rather comfortable with the average value of the means is 4.622 because influenced by: (Figure 10)

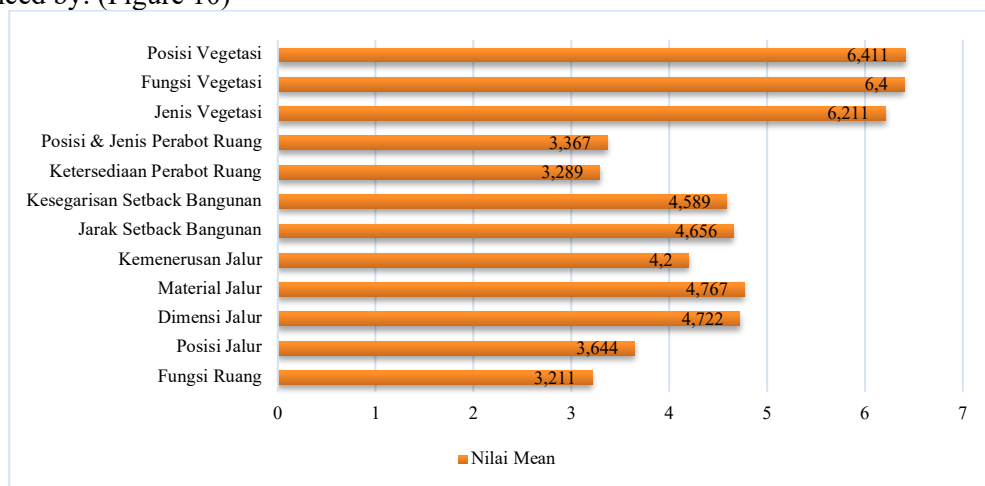


Figure 10. Segment 2 Assessment Results

- The average comfort value for pedestrian space function is 3.211 with a neutral category, which is quite appropriate to the conditions in segment 2, where pedestrian space has been converted into a parking area and a place for street vendors to trade.
- The average comfort rating for pedestrian paths was 3.644, categorized as neutral, which is quite consistent with existing conditions. Segment 2 has no interrupted pedestrian paths. However, in some locations, these paths vary in height due to their use in and out of alleys, houses, and other buildings.

- c. The average pedestrian comfort score of 4.722 indicates a somewhat comfortable category. Given that the average pedestrian path width in segment 2 is 1 meter, this is quite appropriate for current conditions.
- d. The pedestrian path material was considered somewhat comfortable, with a mean value of 4.767. This is in accordance with the conditions in segment 2. The type of material used for the pedestrian path varies because many of the pedestrian path materials in that segment are still damaged. According to the Regulation of the Minister of Public Works Number 03 of 2014 concerning Pedestrian Guidelines, the material used for pedestrian paths or sidewalks must have a high level of durability so that it can be used for a long period of time.
- e. The pedestrian comfort level regarding the continuity of the pedestrian path had a mean value of 4.200, categorized as neutral, which corresponds to the physical conditions in segment 2, as many factors influence continuity. The pedestrian path is 65% constricted due to the tight vegetation and numerous street vendors and parked vehicles. Furthermore, the dominant vehicle access road obstructs the pedestrian path.
- f. The comfort level of the building setback distance to the pedestrian path was assessed at 4.656, and categorized as somewhat comfortable. This is in line with the current situation, as in segment 2, the width of the building setback is predominantly between 3 and 5 meters, with some points as low as 0 to 1.5 meters, which is certainly very disruptive to pedestrian comfort.
- g. The average value of the comfort level towards the building setback alignment is 4.589, with a somewhat comfortable category, which corresponds to the current situation in segment 2, because the building setback alignment d At some point, the buildings differ significantly from each other. Furthermore, the building alignment in the road corridor becomes irregular due to the existing semi-permanent buildings or kiosks.
- h. Due to the lack of street furniture in segment 2, the comfort level regarding the availability of pedestrian space furniture had a mean value of 3.289, categorized as somewhat uncomfortable. This value aligns with the conditions at the research location, which only has street lighting. There are no seats, signs, trash cans, or facilities for the disabled.
- i. The mean comfort rating for furniture position in pedestrian spaces was 3.367, categorized as somewhat uncomfortable. This aligns with the conditions in segment 2, as furniture positioning in pedestrian spaces significantly disrupts pedestrian movement.
- j. The comfort level for vegetation types had a mean value of 6.211, indicating a very comfortable category. This closely aligns with conditions in segment 2, where the majority of vegetation types are those with wide canopies.
- k. The mean comfort level for vegetation function was 6.400, categorized as very comfortable. This closely aligns with the conditions at the study site, as segment 2 contains a significant amount of vegetation that acts as a barrier to reduce noise and pollution and protects road users from sun exposure.
- l. Comfort level to position vegetation own mean value of 6.411 with very comfortable category . This is very appropriate with condition existing on site study , because position vegetation in segment 2 is not is on the pedestrian path .

Comfort level spatial segment 3 entry category rather comfortable with the average value of the means is 4.498 because influenced by: (Figure 12)

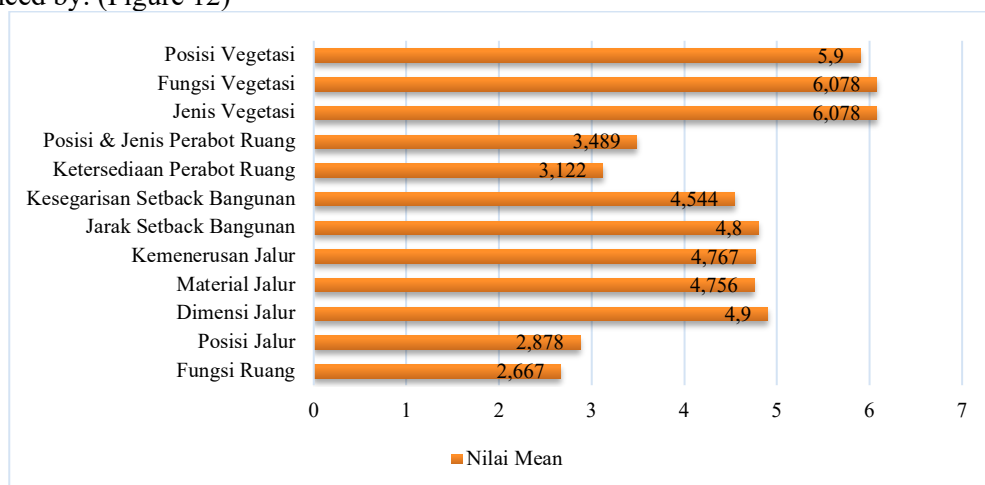


Figure 12. Segment 3 Assessment Results

- a. Comfort level to function room pedestrians have mean value of 2.667 with category No comfortable . This is very suitable with condition existing in segment 3. Conditions function room many pedestrians on segment 3 diverted

- function become a trading area for street vendors as well used as a parking area . This is aggravated with existence parking the rickshaw that is there almost all along track segment 3.
- b. Comfort level to position track pedestrians have mean value of 2.878 with category rather No comfortable . This is in accordance with condition existing . In segment 3 there is no there is track pedestrians are cut off , but in some point Still there is different paths height Because used as access enter or out of the alley, house , and building other
 - c. Comfort level to dimensions track pedestrians have mean value of 4.900 with category rather comfortable . This is Enough in accordance with condition existing Because average lane width pedestrians in segment 3 by 1 meter.
 - d. Track material pedestrians are assessed rather comfortable with mean value of 4.756, which shows sufficient comfort . This is Already in accordance with conditions in segment 3. Track material pedestrians still Lots found in condition damaged , and the type of material used sometimes changed .
 - e. Comfort level pedestrians towards continuity track pedestrians are assessed in a way a total of 4,767, and categorized as rather comfortable . It fits with condition physical in segment 3 because Lots factors that cause continuity . The pedestrian path becomes squeezed Because position cramped vegetation , vehicles parking , and 75 five street vendors (PKL). In addition , the condition road enter dominant and stopping vehicles track pedestrian .
 - f. Comfort level building setback distance to track pedestrians are classified as rather comfortable , with an average of 4800. This is in accordance with condition moment this , because in segment 3 width building boundaries /setbacks dominated by 3-5 meters, even in some place even 0-1.5 meters. This is certain bother comfort pedestrian .
 - g. Because the building setback alignment in segment 3 is less comfortable , level comfort to building setback alignment accept the average value is 4.544 and is categorized as rather comfortable . It fits with conditions that exist in segment 3. At point certain buildings different in a way significant One each other. Next , the line buildings in the corridor road become No regular Because semi- permanent buildings or existing kiosks .
 - h. Because it does not There is furniture road in segment 3, level comfort to availability furniture room pedestrians have the mean value is 3.122 and is categorized as rather No comfortable . This value in accordance with conditions at the location research . We only own light street lighting .
 - i. Due to position furniture in the room pedestrians often bother movement pedestrians , such as position pole light a little road eat track pedestrians , mean comfort value to position furniture in the room pedestrians is 3,489 , which is appropriate with conditions that exist in segment 3.
 - j. Comfort level to type vegetation own average value of 6.078 with category comfortable , appropriate with conditions that exist in segment 3, because type existing vegetation dominated by vegetation with title wide .
 - k. Comfort level to function vegetation own average value of 6.078 with category comfortable , appropriate with conditions at the location study , because Lots vegetation with function become a sequence barrier .
 - l. Due to position vegetation in segment 3 is not is on the pedestrian path , so that No bother activity pedestrians , mean comfort value position vegetation is 5,900, which is appropriate with conditions existing at the location study .

CONCLUSION

In a way overall , level comfort track pedestrians in segment 1 are considered comfortable with score 5.078, segment 2 is considered rather comfortable with score 4.622, and segment 3 is considered rather comfortable with score 4.498. Function space , path pedestrians , building setbacks , furniture roads and vegetation is a number of variables used . Based on the above findings , there are some suggestions that can given related with results study This :

- a. The district government must improve the spatial function and location of pedestrian paths, as they significantly impede pedestrian movement on Jalan KH. Mustain, which leads to tourist attractions such as the Kambang Putih Museum and the Tomb of Sunan Bonang.
- b. To improve pedestrian comfort in the KH. Mustain Street Corridor, further research should be conducted on pedestrian comfort aspects such as visual comfort and other factors that influence general comfort.

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