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Planning Pedestrian Paths for Trade and Service Areas of Balikpapan City with the Walkability Concept

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Keywords

Pedestrian Way; Walkability; Multicriteria Satisfaction Analysis; Photo Mapping Analysis; Balikpapan

Abstract

Corridor of the commercial area of Jalan MT. Haryono Balikpapan City specifically from the MT. Haryono Bridge to the Traffic Light Beruang Madu Monument has the characteristics of high mobility by motorized vehicles. Under these conditions, efforts are needed to encourage non-motorized movements. One of the efforts that have been made in the provision of pedestrian paths in the trade and service area. However, the lane has several problems, such as damaged sidewalks, motorized vehicles that often park around the sidewalks, and there are no guiding blocks for disabled users. Therefore, this study aims to plan a pedestrian path in the commercial area in the corridor of Jalan MT. Haryono uses the concept of walkability. This research uses walkability suitability analysis, community satisfaction level analysis, and Photo Mapping analysis. The results of the suitability analysis showed that segment 1 of the research area was not following the walkability and it was necessary to improve the pedestrian path infrastructure and add supporting facilities such as chairs, trash cans, CCTV, and shade plants, to guide blocks. While in segment 2, almost all of the variables are appropriate and require maintenance of several pedestrian path facilities. In the analysis of the level of community satisfaction using the Multicriteria Satisfaction Analysis, the planning priorities of the 4 walkability indicators are obtained. The results of this analysis show that segment 1 requires planning for the development of safety and comfort indicators, while segment 2 requires planning related to the development of safety and beauty indicators. The results of Photo Mapping show that it is necessary to add road barrier facilities, guiding blocks, parking ban signs, resting chairs, green lanes, repairing pedestrian lane infrastructure, and improving zebra crossing in segment 1. Segment 2 requires additional parking ban markers, speed bumps, chairs, trash cans, green paths, and care for weeds growing along the walkways

1. INTRODUCTION

The development of cities in Indonesia today causes an increase in movement activity which causes the city to become crowded (Nilayanti, 2012). The high activity of this movement causes the need for urban facilities to increase (Harahap, 2013). With this development, the government is required to be able to provide facilities and infrastructure to the community to support its activities (Abis, 2012).

The pedestrian path is a mandatory facility in urban planning. A pedestrian path is a facility made for people who do not use motorized vehicles. In essence, the pedestrian path is also the same as the vehicle path, namely as a container or community facility for moving places. In addition, the pedestrian path is also a public space that can create social interaction. Pedestrian paths are concerned with pedestrian safety aspects so that they can feel safe and comfortable passing through the lane. This is supported by article 25 of Law no. 22 of 2009 every public traffic lane must be equipped with lanes for people with special needs (disabled).

Balikpapan City is located in East Kalimantan Province and is a city that is often visited by outsiders so Balikpapan City is a dense city. The city of Balikpapan has a role in increasing the density of the city, especially for the use of land that functions as a trade and service area. This trade and service area has an impact on increasingly congested traffic conditions due to activities in this area and makes movement activities in this area more crowded. Vehicles that crowd this area will have an impact on the movement in this area (Siswanto, 2015).

In the South Balikpapan sub-district, there is Jalan MT Haryono which is located between 3 villages, namely Damai Village, Damai Bahagia Village, Damai Baru Village, precisely along the road from MT Haryono Bridge to Simpang Lampu Merah Tugu Bear Madu which is a trade and service area that has been listed on the RTRW years 2012-2032. This area is dominated by trade and service activities which cause quite high attraction and generation (Meytika, 2020). However, the pedestrian facilities on this road are inadequate, such as the damage to some sidewalks, the size that looks small, vehicles using pedestrian paths as parking lots, so that there are no Guiding Blocks (disabled lanes) for people with special needs, which is not appropriate. with the guidelines for the 2018 PUPR Ministry Pedestrian Technical Planning. Road Corridor. Haryono is often passed by the community, especially at lunchtime and coming home from work. This, in addition to endangering users, can also reduce public interest in walking, causing congestion.

One of the concepts in pedestrian path planning that can solve this problem is walkability which has a planning focus on determining facilities for sidewalk users that prioritizes aspects of safety and comfort for users in carrying out activities. (Ayu, 2020). This concept is a concept that has been widely used in several cities in Indonesia such as Depok City, Salatiga City, and Jakarta City.

From the above problems, research is needed to formulate recommendations for pedestrian paths with the concept of walkability on order to pay attention to the public to use pedestrian paths according to their functions and reduce traffic congestion, so that it can be a consideration for the Balikpapan city government towards pedestrian paths. With this analysis, it can be seen that the level of community satisfaction with the pedestrian path in this corridor is related to the walkability

2. METHODS

Data collection techniques from this study were in the form of a primary survey and the results of a pedestrian path user questionnaire. By using 2 research segments, namely from the MT Bridge. Haryono to the Pertamina gas station intersection along ±426 M is segment 1 and the Pertamina gas station Interchange to the Sun Bear Monument Red Light along ±588 M is segment 2. The total distance of the study is ±1.014 Km.

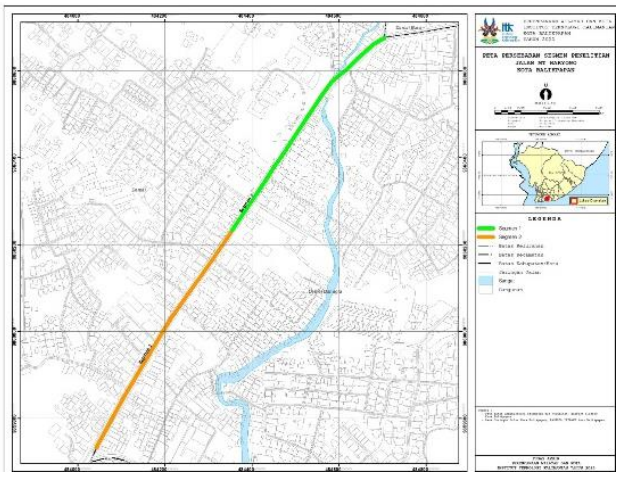


Figure 1. Research Segment Map
Sources: Primary Survey, 2022

The sample of this study is all users of pedestrian paths along the pedestrian paths in the trade and service area on Jalan MT. Haryono uses the method of determining the sample as purposive sampling where this method considers certain things to determine the target sample. The provisions needed from the research sample are people who are over 17 years old and are users of pedestrian paths in the research area. The total sample used is based on the results of calculations using the Bernoulli method, which is 96.04 which is rounded up to 100 samples. This method is used because it is not known with certainty the number of pedestrian path users in the research area and is strengthened by the theory which reads For conditions where the exact number is not known, 100 respondents in the research area can be used (Tan, 2014). Of the 100 respondents, they were

divided based on the research segment, namely 50 for segment 1 with a composition of 25 respondents for the right and left sides and 50 for segment 2 with the same composition.

The variables of this study refer to 4 indicators of walkability, namely security, comfort, safety, and beauty. The following is a table of variables for each indicator

Table1. Variable for Research

Indicator	Variable
Security	1. Pedestrian Line Conflict with Other Transportation Modes
	2. Availability of Pedestrian Paths
	3. Crossing Availability
	4. Constraints/Obstacles
	5. Security Against Crime
Convenience	1. Supporting Facilities
	2. Disability Supporting Infrastructure
Safety	1. Crossing Security
	2. Rider Behavior
Beauty	1. Support Facility
Sources	*Author's Analysis, 2022*

3. RESULT AND DISCUSSION

This study has 3 results of the analysis that are considered as recommendations for planning pedestrian paths on Jalan MT. Haryono Balikpapan City. The first is to find out the suitability of existing conditions with the concept of walkability based on the author's perception based on facilities supporting the concept of walkability, to determine the level of community satisfaction by using the Multicriteria Satisfaction Analysis to find out what indicators of walkability require planning recommendations. With this method, it is possible to know more deeply about the level of community satisfaction with the walkability, and the last is a descriptive photo mapping analysis to be able to provide planning recommendations on the results of the community satisfaction level with the walkability indicator. The following is a discussion of the results of the analysis

3.1 WALKABILITY CONFORMITY ANALYSIS

The results of this analysis indicate the existing condition of the research area on walkability. Suitability table for walkability of each research segment

Table 2. Result of the Walkability Conformity Analysis of Segment 1 Left Side

Indicator	Variable	Match /Not Match
Security	Conflict of Pedestrian Paths with Other Transportation Modes	Not Match
	Availability of Pedestrian Paths	Match
	Availability of Crossings	Match
	Constraints/Barriers	Not Match
	to Crimes	Not Match
Comfort	Supporting Facilities	Not Match
	Infrastructure Supporting Disabled	Not Match
Safety	Security Crossings	Not Match
	Behavior of Riders	Not Match
Aesthetic	Supporting Facilities	Not Match
	Sources	*Author's Analysis, 2022*

Table 3. Result of the Walkability Conformity Analysis of Segment 1 Right Side

Indicator	Variable	Match/Not Match
Security	Conflict of Pedestrian Paths with Other Transportation Modes	Not Match
	Availability of Pedestrian Paths	Match
	Availability of Crossings	Match
	Constraints/Barriers	Not Match

Indicator	Variable	Match/Not Match
	to Crimes	Not Match
Comfort	Supporting Facilities	Not Match
	Infrastructure Supporting Disabled	Not Match
Safety	Security Crossings	Not Match
	Behavior of Riders	Not Match
Aesthetic	Supporting Facilities	Not Match
	Sources	*Author's Analysis, 2022*

Table 4 Result of the Walkability Conformity Analysis of Segment 2 Left Side

Indicator	Variable	Match /Not Match
Security	Conflict of Pedestrian Paths with Other Transportation Modes	Not Match
	Availability of Pedestrian Paths	Match
	Availability of Crossings	Match
	Constraints/Barriers	Match
	to Crimes	Match
Comfort	Supporting Facilities	Not Match
	Infrastructure Supporting Disabled	Not Match
Safety	Security Crossings	Match
	Behavior of Riders	Match
Aesthetic	Supporting Facilities	Match
	Sources	*Author's Analysis, 2022*

Table 5. Result of the Walkability Conformity Analysis of Segment 2 Left Side

Indicator	Variable	Match /Not Match
Security	Conflict of Pedestrian Paths with Other Transportation Modes	Not Match
	Availability of Pedestrian Paths	Match
	Availability of Crossings	Match
	Constraints/Barriers	Match
	to Crimes	Match
Comfort	Supporting Facilities	Not Match
	Infrastructure Supporting Disabled	Match
Safety	Security Crossings	Match
	Behavior of Riders	Match
Aesthetic	Supporting Facilities	Match
	Sources	*Author's Analysis, 2022*

From the results of the analysis above, it can be concluded that the condition and availability of pedestrian path facilities for each walkability in segment 1 are still not suitable and require additional maintenance of pedestrian path facilities. In segment 2, research on the condition and availability of pedestrian path facilities for each walkability is almost all appropriate, but for the variable supporting facilities, it is not appropriate and requires addition and maintenance of pedestrian path facilities. The following is a list of table variables that do not match

Table 6. Inappropriate Research Variables

Segment	Sides	Variable
Segment 1	Left	1. Pedestrian Path Conflicts With Other Transportation Modes 2. Obstacles/Obstacles 3. Security Against Crime 4. Supporting Facilities 5. Disabled Supporting Infrastructure 6. Crossing Security 7. Rider Behavior 8. Supporting Facilities

Segment	Sides	Variable
Segment 2	Right	1. Pedestrian Path Conflicts With Other Transportation Modes 2. Obstacles/Obstacles 3. Security Against Crime 4. Supporting Facilities 5. Disabled Supporting Infrastructure 6. Crossing Security 7. Rider Behavior 8. Supporting Facilities
	Left	1. Pedestrian Route Conflict with Other Transportation Modes 2. Supporting Facilities 3. Disabled Supporting Infrastructure
	Right	1. Pedestrian Path Conflicts With Other Transportation Modes 2. Supporting facilities

Sources: Author's Analysis, 2022

3.2 COMMUNITY SATISFACTION LEVEL ANALYSIS

This analysis uses the Multicriteria Satisfaction Analysis which produces an action diagram in the form of 4 quadrants. This diagram is a consideration of the planning priorities of the 4 walkabilities. The output of this analysis has an action diagram with 2 input diagrams, namely importance in the form of respondents' results and performance in the form of results from researchers. Here are the results of the analysis

Table 7. Results of Analysis of the Percentage of Community Satisfaction Levels and Researcher Assessment of Segment 1 Left Side

Indicator	Average of Importance	Average of Performance
Security	51%	45%
Comfort	49%	25%
Safety	50%	38%
Aesthetic	54%	50%
	Sources	*Author's Analysis, 2022*

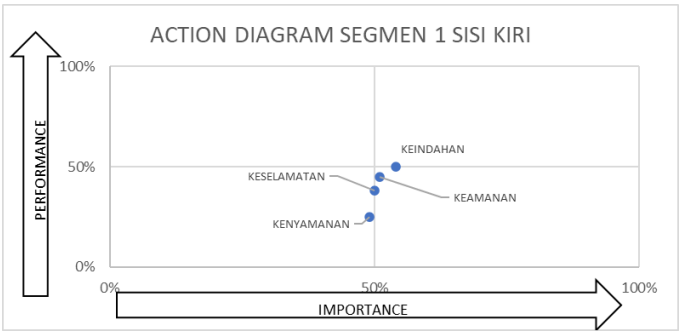


Figure 2. Action Diagram Segment 1 Left Sides
Sources: Author's Analysis, 2022

The results of the above analyses show that indicators that require planning priority are security indicators.

Table 8. Results of Analysis of the Percentage of Community Satisfaction Levels and Researcher Assessment of Segment 1 Right Side

Indicator	Average of Importance	Average of Performance
Security	57%	50%
Comfort	55%	35%
Safety	55%	50%
Aesthetic	55%	50%
	Sources	*Author's Analysis, 2022*

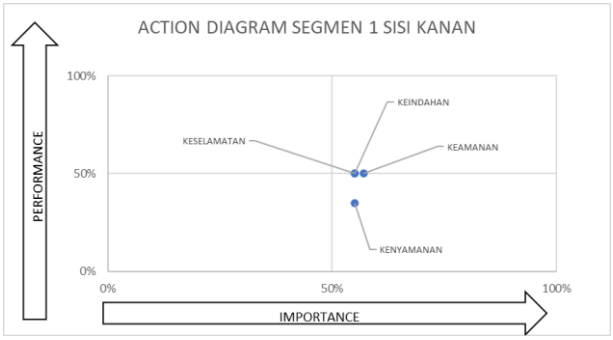


Figure 3. Action Diagram Segment 1 Right Side
Sources: Author's Analysis, 2022

The results of the above analyses show that indicators that require planning priority are comfort indicators.

Table 8. Results of Analysis of the Percentage of Community Satisfaction Levels and Researcher Assessment of Segment 2 Left Side

Indicator	Average of Importance	Average of Performance
Security	48%	65%
Comfort	45%	38%
Safety	51%	75%
Aesthetic	45%	50%
	Sources	*Author's Analysis, 2022*

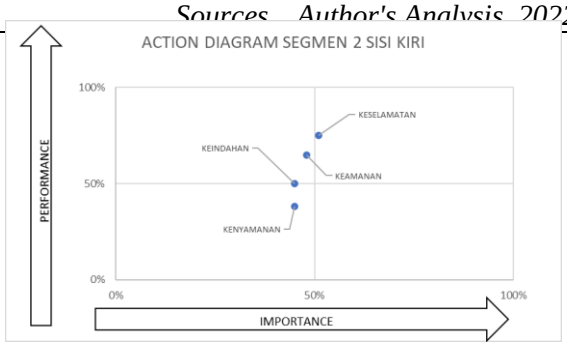


Figure 4. Action Diagram Segment 2 Left Sides
Sources: Author's Analysis, 2022

The results of the above analyses show that indicators that require planning priority are safety indicators.

Table 8. Results of Analysis of the Percentage of Community Satisfaction Levels and Researcher Assessment of Segment 2 Right Side

Indicator	Average of Importance	Average of Performance
Security	50%	55%
Comfort	51%	50%
Safety	54%	75%
Aesthetic	52%	22%
	Sources	*Author's Analysis, 2022*

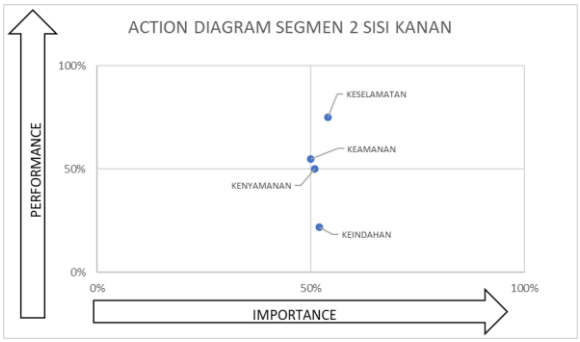


Figure 5. Action Diagram Segmen 2 Right Sides
Sources: Author's Analysis, 2022

The results of the above analyses show that indicators that require planning priority are aesthetic indicators.

3.3 PHOTO MAPPING ANALYSIS

Planning Pedestrian Paths for Trade and Service Areas of Balikpapan City with the Walkability Concept After obtaining the direction for the development of the action diagram for each research segment, then a photo mapping analysis is carried out to find out which parts require the development of the research segmentation by considering the existing photos of the research area. . This analysis is useful to be able to provide development recommendations related to the existing condition of research segmentation by providing an overview and development recommendations.

The results of the analysis of community satisfaction show which indicators require planning recommendations for each research segment. The following are indicators that require planning recommendations

Table 9. Indicator of Planning

Segment	Segment Sides	Indicator
Segment 1	Left	Security
	Right	Comfort
Segment 2	Left	Safety
	Right	Aesthetic
	Sources	*Author's Analysis, 2022*

After knowing what indicators require planning recommendations for each research segment, then a review of the existing conditions is carried out following the condition of the pedestrian facilities for each indicator and provides planning recommendations. The following is a photo mapping for the two research segments

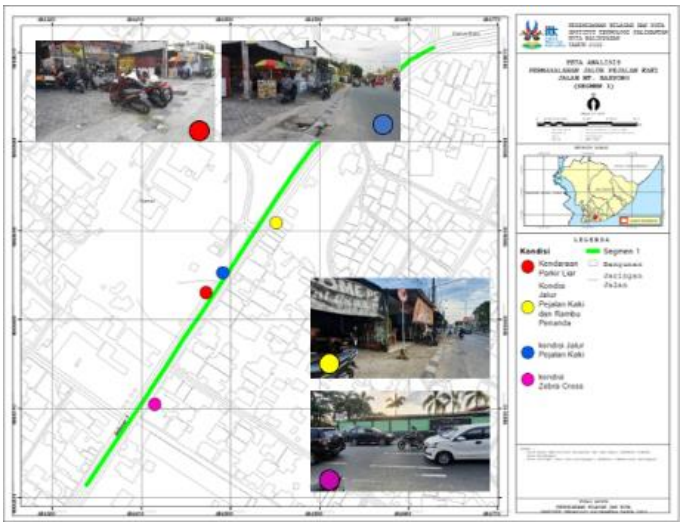


Figure 6. Photo Mapping Segment 1
Sources: Author's Analysis, 2022

Segment 1 of the study from the results of the analysis of the level of community satisfaction on the left and right sides explains that the walkability indicators that require planning recommendations are indicators of safety and comfort. For security indicators, several improvements were made, such as the condition of damaged road infrastructure and the provision of road barriers, repairing zebra crossings, controlling street vendors' activities, and providing security facilities such as CCTV and security posts. For comfort indicators, it is necessary to add signage/marking boards such as parking restrictions, provision of seats, repair of plant pots, and building pathways for people with disabilities, namely guiding blocks/guiding tiles. The following are recommendations for segment 1.

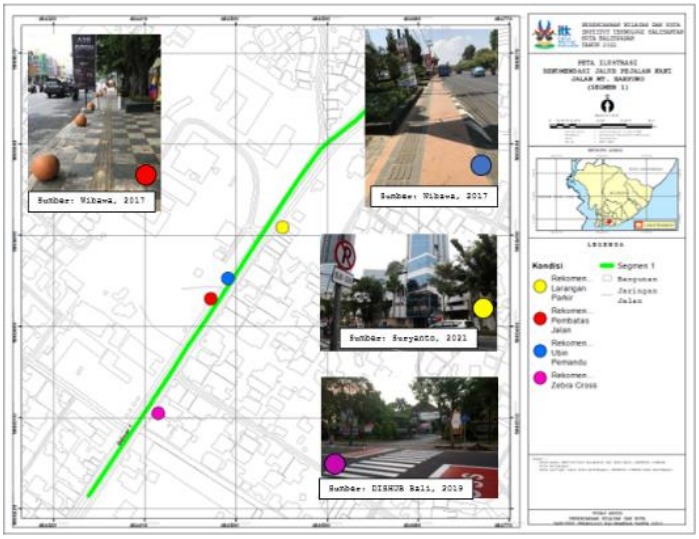


Figure 7. recommendations for Segment 1
Sources: Author's Analysis, 2022

One of the road planning recommendations in this segment is the improvement of pedestrian path infrastructure which can take an example such as on Jalan Soegijapranata, Semarang City with pavement using tiles and equipped with *blocks/*guiding tiles. To prevent parking on pedestrian paths, bollards can be provided, such as on Jalan Imam Bonjol, Semarang City, and prohibition of parking at crowded times, such as on Jalan Tunjungan, Surabaya. Furthermore, crossing facilities can be planned as in the picture where there is ZOSS (Zona Selamat Sekolah) because the position of the *zebra cross is* close to Kartika Kindergarten such as on Jalan Danadak, Denpasar City

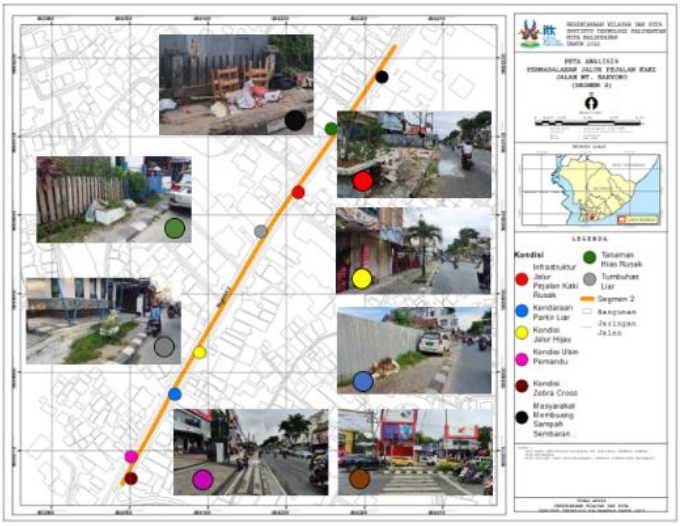


Figure 8. Photo Mapping Segment 2
Sources: Author's Analysis, 2022

Segment 2 of the research from the results of the analysis of the level of community satisfaction on the left and right sides explains that the walkability indicators that require planning recommendations are safety and beauty indicators. For security indicators, maintenance related to infrastructure is needed, and the addition of bollards and parking restrictions on pedestrian paths so that access to the zebra cross is not blocked by vehicles parked carelessly. For indicators of beauty, it requires to care for ornamental plants and wild plants as well as providing trash cans so that there is no littering activity on pedestrian paths. It is also necessary to repair the damaged pedestrian path infrastructure



Figure 9. recommendations for Segment 2
Sources: Author's Analysis, 2022

One of the planning recommendations that can be applied to segment 2 is repairing damaged pedestrian lane infrastructure such as the example on Jalan Soegijapranata Semarang City and planning to overcome illegal parking is to provide road barriers in the form of bollards such as on Jalan Imam Bonjol Semarang City. Furthermore, recommendations for green line problems can be rearranged with simple concepts such as on Jalan Ahmad Yani, Semarang City. Furthermore, for waste problems in this segment, you can add trash bins with a maximum distance of 10 meters, such as on Jalan Pengran Diponogoro, Central Jakarta Province.

4. CONCLUSIONS

Research has been carried out related to pedestrian paths in the trade and service area of Jalan MT. Haryono, Balikpapan City, precisely along the MT Bridge road corridor. Haryono to the Red Light of the Sun Bear Monument.

suitability analysis walkability shows that segment 1 for the comfort and safety indicators is not following the supporting variables for these indicators, so it requires some planning recommendations for these indicators. For segment 2, most of the variables of each indicator are following the concept of walkability planning.

The results of the analysis of the level of community satisfaction in segment 1 on the left side show that the security indicator has a low level of satisfaction and the action diagram is an indicator that requires follow-up in providing planning recommendations. For segment 1, the right side shows comfort indicators requiring follow-up in providing planning recommendations. Furthermore, segment 2 on the left side shows safety indicators that need maintenance and the addition of several pedestrian path facilities. Finally, for segment 2, the right side shows that beauty indicators require follow-up in providing planning recommendations.

The results of the photo mapping to provide planning recommendations in segment 1 are recommendations for security indicators that require several improvements such as the condition of damaged road infrastructure materials and the provision of road dividers, zebra crosses, controlling the activities of street vendors, and providing security facilities such as CCTV and security posts. For comfort indicators, it is necessary to add signage/marking boards such as parking restrictions, giving seats, repairing plant pots, and building paths for people with disabilities, namely blocks/guiding tiles. Segment 2 requires recommendations for security indicators, maintenance related to infrastructure, and the addition of bollards and parking restrictions on pedestrian paths so that access to the zebra cross is not blocked by vehicles parked carelessly. For indicators of beauty, it requires to care for ornamental plants and wild plants as well as providing trash cans so that there is no littering activity on pedestrian paths. It is also necessary to repair the damaged pedestrian path infrastructure

5. ACKNOWLEDGMENTS

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