Exploring Pedestrian Ways Quality for Better Urban Place: Necessary, Optional, and Social Activity

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Abstract. Walking is a non-motorized transportation option that has a large portion compared to the use of bicycles and traditional transportation. Previously, the quality assessment of pedestrians was only calculated based on their physical form. But now the pedestrian ways are not only seen as a facility to support the human movement but has become a public space. To investigate this, we surveyed Pahlawan Street, Semarang, Indonesia (N=90). The method using is PEQI (Pedestrian Environment Quality Index) which is a quantitative calculation based on the 5 indicators (crosswalk safety, pedestrian traffic, land use, street design, perceived walkability). We find that the most qualified pedestrian way is Segment I East (70.35), though the lowest is Segment III East (50.16). In particular, we find that the percentage of social and optional activity is higher than the necessary activity that been the user choose in Pahlawan Street.

1. Introduction

Nowadays, walking has been encouraged as a surrogate to other modes of transport to reduce congestion as a result of the usage of private vehicles in our cities. Walking as a mode of transport is often seen as one of the most sustainable parts of a transportation system because walking does not pollute or produce noise. Also, walking does not require much space in urban areas and creates few risks for other road users or people in public spaces [1], [2]. People had a better life when pedestrian access can give qualified service daily [3].

The phenomenon that occurs in Indonesia, based on a questionnaire conducted by urban mobility for Indonesia, the number of pedestrians in Indonesia, which in 2010 reached 12% of the total use of transportation modes for travel. Walking is surprisingly a non-motorized transportation option that has a large portion compared to the use of bicycles and traditional transportation (rickshaws, carts, wagon, etc.). Based on these facts, Semarang continues to strive to create a quality city for pedestrians. The existence of pedestrian facilities in the Semarang is no less important than facilities for motorized vehicles. The city arrangement that supports walking activities which is currently limited to the city center will continue to be planned for development to the periphery. If the integration of the development of pedestrian ways is sustainable and coupled with the improvement in the quality and expansion of the public transportation routes, the purpose of the city government to reduce pollution and congestion that is currently occurring in the Semarang will be achieved. Semarang does not seem to want to miss the development trend of cities in the world that have pedestrian ways that are convenient to pass.

In spite of the lack of user is a clear picture that several locations of pedestrian ways cannot serve the need of the pedestrian to move inside. However, the main function of the pedestrian ways is to accommodate people to reach their destination quickly without minimum obstacle. Walking itself has been correlated with many advantages for pedestrian’s well-being[4][5]. Walkable pedestrian ways are too difficult to realize because the condition of quality pedestrians does not only require facilities but also influenced by the willingness of pedestrians to maintain the conditions of pedestrian ways as an urban place[5], [6] [7][8].

The main reason why people do not want to use pedestrian ways is due to the limited protection against the weather. Weather protection will help pedestrians stay comfortable while traveling throughout unpredictable weather [9], [10]. The weather that comes too hot or suddenly rain gives less interest in pedestrians for accessing the pedestrian ways. On the other hand, besides doing the necessary activities, pedestrians also doing their social and optional activities. In many country, walking as a leisure time has been a trend during the past decade. [2], [11][9]

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Measuring environmental characteristic is an important step in understanding which areas are more (or less) useful to inhabitants active living[12] [13]. The utilization of pedestrian space is a routine or non-routine activity carried out by someone as an answer to the work or activities they carry out[14]. The activities discussed in this study are human activities in walking, namely necessary activity, optional activities, and social activities. Necessary activities can be in the form of walking activities to reach work, study or transit places for public transportation. Optional activities can be defined as recreational activities on pedestrian ways, including sports, walking, and enjoying the scenery. While social activities are carried out on pedestrian ways that are related to the presence of other people such as sports competitions, discussions, jokes and greeting each other[15]. The users that will be discussed in this study are the classification of pedestrians that are distinguished by age, gender, and occupation.

For this purpose, examining the quality of pedestrian ways and the activity is critical. Previously, the quality assessment of pedestrians was only calculated based on their physical form. But now the pedestrian ways are not only seen as a facility to support the human movement but has become a public space. Thus the assessment of the life of public space activities will be a benchmark for the success of a quality pedestrian way. PEQI (Pedestrian Environment Quality Index) becomes a pioneer in quantitative calculations based on the 5 indicators it has.

2. Method

2.1 Data collection and sampling design

The number of users of the pedestrian ways is difficult to know which changes every year (unstable), then population retrieval cannot be predicted with certainty. Thus, the sample of members to be taken from the sample is done by using the Sample Linear Time Function’s formula. Sample Method, Linear Time Function is the determination of the number of samples based on estimated time bonds.

\[ n = \frac{T - to}{t1} \]  \hspace{1cm} (1)

\( n \) : Number of samples selected
\( T \) : The time available for conducting research
\( to \) : 30 days x 24 hours = 720 hours/ month
\( t1 \) : The survey time
\( to \) : 6 hours/days x 30 days = 90 hours/month
\( t1 \) : 0,2 hours/days x 30 days = 6 hours/days

Based on the formulas and information above, the numbers of user samples to be examined in this study are as follows:

\[ n = \frac{T - to}{t1} = \frac{720-180}{6} = \frac{540}{6} = 90 \text{ responden} \]  \hspace{1cm} (2)

In this study, the sampling of the study was carried out using a random sampling method. The choice of this method is considered appropriate to be used in research whose population is unknown due to the number that changes every year (unstable). The type of sampling method used is the area sampling technique. The sampling area technique is considered appropriate in unknown geographical populations, achieved by treating several respondents in the local area as cluster sections as the research sample.

| Table 1. Research Measurement Sampling Scale |
|---|---|---|
| Place | Segment | Respondent | User (N=90) |
| East | Segment I | 25 | 72 |
| | Segment II | 25 |  |
| | Segment III | 12 |  |
| West | Segment I | 10 | 28 |
| | Segment II | 13 |  |
| | Segment III | 5 |  |
2.2 Analysis the using and activity of pedestrian ways

The utilization of pedestrian space is a routine or non-routine activity carried out by someone as an answer to the work or activities they carry out. The activities discussed in this study are human activities in walking, namely necessary activity, optional activities, and social activities. Necessary activities can be in the form of walking activities to reach work, study or transit places for public transportation. Selected activities can be defined as recreational activities on foot trails, including sports, walking, and enjoying the scenery. While social activities are activities carried out on pedestrian pathways that are related to the presence of other people such as sports competitions, discussions, jokes and greeting each other. The users that will be discussed in this study are the classification of pedestrians that are distinguished by age, gender, and occupation.

Extracting information through questionnaires was carried out by structured interviews on pedestrian ways in Pahlawan Street by dividing several segments at the research location. This is done due to differences in the characteristics of the collection of users and the activities of each part of the road and can be the basis for finding out the characteristics of pedestrians as users who are active on Pahlawan Street. The following is the division of segments at the research location.

![Segment of Pahlawan Street](image)

**Figure 1.** Segment of Pahlawan Street

2.3 Pedestrian Environment Quality Index (PEQI)

The approach of PEQI (Pedestrian Environmental Quality Index) which is the concept of assessing the quality of pedestrian ways towards wider choices of ways to improve the quality of public health, quality of life, avoid physical inability, and control stress in the environment. The focus of PEQI is whether existing pedestrian facilities are adequate, not only what can be improved in quality but also whether walking along the path will be a pleasant experience. This study will assess the quality of the pedestrian ways on Pahlawan Street as a pedestrian way based on the quality variable of PEQI. PEQI indicators has shown down bellow.

**Table 2. Pedestrian Environmental Quality Index (PEQI) Indicators.**

| No | Code  | PEQI Indicators       |
|----|-------|-----------------------|
| 1  | A1- A10 | Crosswalk Safety   |
| 2  | B1- B9  | Pedestrian Traffic  |
| 3  | C1- C3  | Street Design        |
| 4  | D1- D3  | Land Use             |
| 5  | E1- E11 | Percieved Walkability|
3. Result and Discussion

The lack of interest of pedestrians to access some pedestrian path points is a real picture that several locations that cannot serve pedestrians to the need to move inside. Quality pedestrian paths are still a necessity that is too difficult to realize, because the condition of quality pedestrians does not only require the addition of facilities, but is also influenced by the willingness of pedestrians to maintain their conditions in the use of pedestrian paths as a means of activities. Pahlawan Street which is one of the main corridors leading to the community activity center of Semarang City in Simpang Lima, has not been able to meet the needs of activities and users of pedestrian paths that require quality pedestrian space. At present, Pahlawan Street has got its place in the community because it is a service centre and office that serves the urban and regional needs of Central Java Province. However, the use of office space causes a less attractive pedestrian path to be used by pedestrians functionally.

3.1 Analysis the using and activity on the pedestrian ways

The use of pedestrian paths is an activity that utilizes the spaces available on Pahlawan Street. The following is an explanation of the types of use of pedestrian ways which are discussed in 3 categories of human activities in walking [15], [16], [17] according thru this analysis above.

3.1.1 Analysis of Necessary Activity

In necessary activities, travel activities will always be carried out regularly with regular time allocation. Utilization of the street space which also has office and education functions provides the potential for Pahlawan Street to be used by pedestrians who work as employees and students. Based on the distribution of questionnaires to 90 pedestrians, 5% of the respondents were students who said that almost every day on weekdays always passed Pahlawan Street, when they left and went home from college.

Pahlawan Street as an major office area has the large potential to become a destination for pedestrians to move to workplaces located on Pahlawan Street and the surrounding area. Based on the distribution of questionnaires to 90 pedestrians, 9% of pedestrian respondents among them work as bank and office employees who walk to the public service area where they work.

3.1.2 Analysis of Optional Activity

The use of pedestrian paths as an activity chosen by the community is a form of activity variation after being saturated and tired after carrying out necessary activities, or even a favorite activity which is the choice of pedestrians on Pahlawan Street. Optional activities for pedestrians include taking a stroll, eating and drinking, and exercising at those located along Pahlawan Street segment I to III.

Based on questionnaires to 90 pedestrian respondents on Pahlawan Street, 40% of respondents (40 respondents) pedestrians had the purpose of a relaxing walk. At certain times, this pedestrian respondent said that by doing recreational activities such as taking a stroll, then fatigue and fatigue after work can be eliminated. Besides being cheap and easy, enjoying the scenery around Pahlawan Street while taking a stroll can reduce stress levels and encourage themselves to be able to exercise lightly after a day of work.

3.1.3 Analysis of Social Activity

The social activity is an activity in which there is an interaction between two individuals, such as chatting and passive contact. Pedestrians who travel from the north to the south often stop to sit on public benches along the first and second strips of Pahlawan Street. According to 1% of pedestrian respondents, the activity of sitting on a public bench will be more complete if done while enjoying eating and drinking activities. Small food traders spread around Pahlawan Street, providing opportunities for the creation of interactions between individuals who can create social activities and economic opportunities for the community.
### Table 3. Research Measurement Sampling Scale

| Variabel      | Sub variabel | Categorias | User Sample N=90 (%) |
|---------------|--------------|------------|---------------------|
| Gender        | Pria         | weekday    | 11                  |
|               |              | weekend    | 6                   |
|               | Wanita       | weekday    | 51                  |
|               |              | weekend    | 22                  |
| Age           | 0-12 yo.     | weekday    | 0                   |
|               |              | weekend    | 3                   |
|               | 13-17 yo.    | weekday    | 8                   |
|               |              | weekend    | 36                  |
|               | 18-40 yo.    | weekday    | 10                  |
|               |              | weekend    | 31                  |
|               | 40-65 yo.    | weekday    | 0                   |
|               |              | weekend    | 9                   |
|               | >65 yo.      | weekday    | 1                   |
|               |              | weekend    | 2                   |
| Occupation    | Student      | weekday    | 10                  |
|               |              | weekend    | 13                  |
|               | college student | weekday | 4                  |
|               |              | weekend    | 14                  |
|               | entrepreneur  | weekday    | 8                   |
|               |              | weekend    | 12                  |
|               | civil servant | weekday    | 4                   |
|               |              | weekend    | 11                  |
|               | retairemen   | weekday    | 1                   |
|               |              | weekend    | 1                   |
|               | misc.        | weekday    | 7                   |
|               |              | weekend    | 13                  |

#### 3.2 Quality of Pedestrian Ways on Pahlawan Street

In the analysis of the quality of the pedestrian way, the Pedestrian Environmental Quality Index (PEQI) will illustrate the high and low quality of Pahlawan Street as a pedestrian way. In general, the quality of pedestrian paths is dominated by the quality of walking environment that is acceptable. While at peasant there is still a pedestrian environment that is not suitable for walking. Pahlawan Street segment I east has been the most qualified pedestrian segment with a value of 70.35, while segment III east is the lowest segment in providing quality pedestrian lines with a value of 50.16. As one of the protocol roads in Semarang City, Pahlawan Street is a collector road that has a quality that is not as optimal as a pedestrian ways according to PEQI calculations. This is because there are complementary elements at the intersection as well as each part of the road that is not complete in its planning.
4. **Conclusion**

Walking is a non-motorized transportation option that has a large portion compared to the use of bicycles and traditional transportation. We find that the most qualified pedestrian way is Segment I East (70.35), though the lowest is Segment III East (50.16). In particular, we find that the percentage of social and optional activity is higher than the necessary activity that been the user choose in Pahlawan Street. In conclusion, the high quality of pedestrian ways based on PEQI assessment does not affect the augmentation of necessary activity, optional, and social activity inside pedestrian ways.

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**Acknowledgments**

The researcher would like to thank to the Ministry of Research, technology, and Higher Education for funding this research through the “Beasiswa Unggulan”.

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International Conference on Science and Technology 2019
Journal of Physics: Conference Series 1569 (2020) 042020 doi:10.1088/1742-6596/1569/4/042020