Disability-friendly public space performance

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Abstract. Sustainable development goals no. 11 mentioned the need for reduced inequalities in disability. However, this equality in urban public spaces is not yet optimal. Public space is not yet sufficient in providing facilities for persons with disabilities. The purpose of this research is to measure the performance of public spaces based on perceptions of persons with disabilities. The approach method uses Importance performance analysis (IPA). IPA is considered a useful tool in examining customer satisfaction. Based on the results of surveys and IPA calculations, the performance of public spaces according to disabilities is generally not in accordance with their expectations. The performance components of public space ranged from 41.28% to 95% of the expectations of people with disabilities. Based on these results, better efforts from the city government and the community are needed to develop more disability-friendly public spaces.

1. Introduction
Sustainable Development Goals (SDGs) is one of the declarations that expects every plan to think about persons with disabilities. It is written in the SDGs program on Sustainable Cities and Communities, where the target in Point 11.7 states that by 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities [1]. But, Hasanvand [2] noted that Today, one of the problems in our cities is inappropriate urban public spaces in order to use physical disabled persons. The built environment can contribute to a more equal, inclusive and cohesive society if the places where we live, the facilities we use and our neighborhoods are designed to be accessible and inclusive [3].

Bandung city is one of the cities where the park's existence is quite high. Parks in the city of Bandung are made to be public spaces that can accommodate a variety of backgrounds and activities of the community, balancing the environment, forming a comfortable urban space and building a social sense. The increase in the number of park developments in the city of Bandung is not in accordance with the needs of persons with disabilities which in 2018 in the city of Bandung numbered around 1,591 people.

Stephen Carr [4] mentioned that public space is place where anyone has right to be without being excluded because of economic or social condition. Parks as a public space should be enjoyed by everyone, including people with disabilities, but not all parks in the city of Bandung can be accessed by people with disabilities.

Parks in Bandung City are less disability friendly, it is caused by many park components are not good, such as poor pedestrian conditions, guide strip are not available, poor ramp conditions, parking areas, play facilities, toilets, signs and road markings are not friendly for disability.

The purpose of this study is to assess park performance and identify the needs of park facilities based on perceptions of persons with disabilities. It is hoped that this study can provide input for city planners and related stakeholders in developing disability-friendly public spaces.
2. Methods
The scope of the study area covers the Bandung Wetan District, which is one of 30 (thirty) districts in the Bandung City area. Bandung Wetan District has an area of 339 hectares with a population of 32,341 people. Data collection is done by distributing questionnaires to a number of people with disabilities. The population in this study is the population of people with disabilities in the Bandung Wetan District with a total of 53 people. Determination of the number of sampling is done by using Slovin's Formula Sampling Techniques. The questionnaire in this study was distributed to 35 respondents with disabilities, consisting of 11 deaf people, 12 blind people and 12 disabled people. The questionnaire in this study uses a Likert scale, which is a tool to measure the attitudes or opinions of a person or a number of groups towards a social phenomenon [5]. Because there were limitations on the respondents, the questionnaire was not submitted directly but was guided in the form of interviews.

Questionnaire contains questions of respondents' opinions on the performance and expectations of city park components such as pedestrian (sidewalks), guide strips, ramps, parking areas, toilets, signs and park markings, and park supporting facilities. The results of the questionnaire are then processed quantitatively by the Importance Performance Analysis (IPA) method. The concept of IPA was introduced in 1977 by Martilla and James. Essentially, the idea of IPA comes from the theory of customer satisfaction as a function of the expectation on important attribute and the judgment of attribute performance.

3. Results

3.1. Pedestrian performance
Sidewalks according to FHWA [6] should have a minimum clearance width of at least 1.5 meters (5 feet). They should be paved with a smooth, durable material. Sidewalks should be kept in good condition, free from debris, cracks, and rough surfaces.

The results obtained by the assessment of disability on pedestrian performance as follows pedestrian availability 99.26%, pedestrian conditions 98.04%, hospitality 96.63%, security 95.92%, comfort 93.33%, pedestrian width 94.12%, Value pedestrian average performance of 95.9%.

3.2. Guide strip performance
A guide strip is a line means constructed in or on the road surface to facilitate orientation for sightless pedestrians in the following manner. Guide strips should be laid in a simple and logical manner and should not be located close to manholes or drains to avoid confusing sightless people. Guide strips should have a color which contrasts with the surrounding surface for the benefit of people with sight problems [7].

Based on the research, the results of the disability assessment of the guide lines is obtained as follows: the availability of the guide lines is 55%, conditions are 47.18%, clarity is 40.51%, the average value of the performance of the guide lines is 47.56%.
Table 2. Level of conformity between performance and guidelines expectations.

| Variable       | Level of Conformity | %     |
|----------------|---------------------|-------|
|                | X (performance)     | Y (Expectations) |
| Availability   | 88                  | 160   | 55 |
| Condition      | 67                  | 142   | 47.18 |
| Clarity        | 64                  | 158   | 40.51 |
|                | **average**         | **47.56%** |

*Source: Analysis Results, 2019*

3.3. Road ramp performance

Ramps are defined as locations where the grade exceeds 5 percent along an accessible path. Longitudinal grades on sidewalks should be limited to 5 percent, but may be a maximum of 1:12 (8.3 percent), if necessary. Long, steep grades should have level areas at intermittent distances (every 30 ft.), since traversing a steep slope with crutches, artificial limbs, or in a wheelchair is difficult and level areas are needed for the pedestrian to stop and rest [6].

Based on the research, the results of the disability assessment of the ramp performance are as follows the availability of road ramp 56.76%, ramp width 60.69%, ramp slope 56.82%, availability of handrail 40.26%. The average value of road ramp performance is 53.63%.

Table 3. Level of conformity between performance and road ramp expectations.

| Variable                  | Level of Conformity | %     |
|---------------------------|---------------------|-------|
|                          | X (performance)     | Y (Expectations) |
| Availability              | 84                  | 148   | 56.76 |
| Ramp Width                | 88                  | 145   | 60.69 |
| Ramp Slope                | 75                  | 132   | 56.82 |
| Availability of Handrail  | 62                  | 154   | 40.26 |
|                          | **Average**         | **53.63** |

*Source: Analysis Results, 2019*

3.4. Parking area performance

Each standard handicapped parking and van space must be 96 inches wide. The standard handicapped space should have a minimum of a 60-inch aisle. The van space should have a 96-inch aisle adjacent to the passenger side. A minimum overhead clearance of 98 inches is required to accommodate specially equipped vehicles [8]. Based on the research, the results of the disability assessment of the performance of the parking area obtained as follows the distance from the gate 66.19%, free parking space 57.46%, parking sign 42.2% and sidewalk ramp for the disabled 38.46% The average value of the performance parking area is 51.08%.

Table 4. Level of conformity between performance and parking area expectations.

| Variable                     | Level of Conformity | %     |
|------------------------------|---------------------|-------|
|                              | X (performance)     | Y (Expectations) |
| distance from the gate       | 94                  | 142   | 66.19 |
| free parking space           | 77                  | 134   | 57.46 |
| parking sign                 | 65                  | 154   | 42.20 |
| sidewalk ramp                | 60                  | 156   | 38.46 |
|                              | **average**         | **51.08** |

*Source: Analysis Results, 2019*
3.5. Toilet performance

According to AusAID, the toilet needs for disabilities are the availability of handrails with the correct height. Provide sufficient room around toilet bowls and wash basins to allow easy maneuverability by people in wheelchairs [9]. Based on the research, the results of the disability assessment on the performance of toilets are as follows: availability of toilets for disabilities 42.58%, signage for disabilities 32.29%, sufficiency of space 39.24%, availability of handrails 35.24%, layout of disability needs 49.38%, floor condition 47.71%, door condition 53.65%, emergency sound button 30.18%. The average value of toilet performance is 41.28%.

| Variable                              | Level of Conformity | %     |
|---------------------------------------|---------------------|-------|
| Availability                          | 66                  | 155   | 42.58 |
| signage for disabilities              | 52                  | 161   | 32.29 |
| sufficiency of space                  | 62                  | 158   | 39.24 |
| availability of handrails             | 56                  | 159   | 35.24 |
| layout of disability needs            | 80                  | 162   | 49.38 |
| floor condition                       | 73                  | 153   | 47.71 |
| door condition                        | 88                  | 164   | 53.65 |
| emergency sound button                | 48                  | 159   | 30.18 |

Average: **41.28%

Source: Analysis Results, 2019

3.6. Signs and marks performance

Disability assessment of the completeness of signs and markers, including the level of suitability of performance and expectations of disability to the availability of raised / braille signs for the blind, clarity of signs and park markings, completeness of signs and markers for disabilities. Based on the research, the results of the assessment of disability on the performance of park signs and markers as follows the availability of embossed / braille signs for blind people 59.62%, clarity of signs and park markings 48.63%, completeness of signs and park markings for disabilities 49.66%. The average performance value of signs and park markings is 52.64%.

| Variable                              | Level of Conformity | %     |
|---------------------------------------|---------------------|-------|
| availability of embossed / braille signs | 93                  | 156   | 59.62 |
| clarity of signs and park markings    | 71                  | 146   | 48.63 |
| completeness of signs and park markings | 73                  | 147   | 49.66 |

Average: **52.64%

Source: Analysis Results, 2019

3.7. Performance supporting facilities parks

Disability assessment of the completeness of park supporting facilities includes the level of suitability of performance and expectations of disability to the availability of chairs for disabilities, the availability of tables, playing facilities, audio visual, vegetation according to disability needs. Based on the research, the results of the disability assessment of the performance of park supporting facilities are as follows: the availability of chairs for disabilities is 100%, the availability of tables is 77.48%, the playing facilities are 52.38%, the audio visual is 33.55%, the vegetation is according to the disability needs 41.46%. The average value of the performance of park supporting facilities is 61.79%.
Table 7. Level of conformity between performance and supporting facilities expectations.

| Variable         | Level of Conformity | %    |
|------------------|---------------------|------|
|                  | X (performance)     | Y (Expectations) |
| availability of chairs | 153                | 147  | 104,10 |
| availability of tables    | 117                | 151  | 77,48  |
| playing facilities         | 77                 | 147  | 52,38  |
| audio visual               | 52                 | 155  | 33,55  |
| vegetation                 | 68                 | 164  | 41,46  |
| **Average**              |                    |      | 61,79  |

Source: Analysis Results, 2019

4. Discussion
Disabled citizens should have the equal right of access to public spaces as all other citizens. Discrimination occurs when they are not treated equally with others. The built environment can contribute to a more equal, inclusive and cohesive society if the places where we live, the facilities we use and our neighbourhoods are designed to be accessible and inclusive [10]. The results of the evaluation of the performance of public spaces according to disabilities in the city of Bandung are generally not good. The average performance of public space services in the city of Bandung based on the opinion of the disability is between 41.28 - 95.90% of the disability expectations.

The results of that study, in line with the results of Widanan's research [11] in the Taman Lumintang area of Denpasar which states that public space has not been independently accessible to people with disabilities. According to Masruroh [12] public facilities generally only provide limited access and facilities for persons with disabilities. Even the green open spaces in the form of city parks are still not friendly to the existence of persons with disabilities. the park does not accommodate the accessibility of persons with disabilities. This is in line with the results of Setiawan's research [13], who conducted research in the three city parks in Surakarta, it can be said that the provided facilities are not accessible for disability.

Dewang [14] in his research in Jakarta, one of the reasons for the lack of public space services for persons with disabilities is due to the lack of awareness of government officials to meet the needs of people with disabilities in the provision of public space. Limited knowledge of government officials about disability needs, and lack of funds allocated to provide disability accessibility. According to Mulazadeh [15] human culture has a profound influence on the construction of built environments and the lack of accessibility. Creating the built environment as such, is a key variable in enabling or disabling impaired people with regard to access to public space.

A United Nations [16] expert meeting identified a set of universal design principles appropriate to countries:

- Equitable use: the design is useful and relevant to a wide group of users;
- Flexibility in use: the design accommodates a wide range of individual preferences and abilities;
- Simple and intuitive use: the design is easy to understand regardless of the knowledge, experience, language skills or concentration level of the user;
- Perceptive information: the design communicates information effectively to the user regardless of the ambient condition or the sensory abilities of the user;
- Tolerance for error: the design minimizes the hazards and adverse consequences of unintended actions by the user;
- Low physical effort: the design can be used easily, efficiently and comfortably with a minimum of fatigue;
- Size and space: the size and space for approach, reach, manipulation and use should be appropriate regardless of the body size, posture or mobility of the user.
Functionality (designing which incorporates all types of individuals), contextual sensibility (harmony with the surrounding environment) and the impact of fairness to “reduce social and human impact on the most vulnerable members of the society” [17].

5. Conclusion

Research on disability-friendly public spaces in the city of Bandung shows unfavorable results because it is below the disability expectation that is between 41.28 - 95.90% of the disability expectations. The results of the study in the city of Bandung are in line with the condition of public spaces in the City of Denpasar [11], Jakarta [12,14], and Surabaya [13]. The poor condition of public spaces for disabilities shows the lack of stakeholder attention in providing disability-friendly public spaces.

Recommendation to the government and related stakeholders is the need to increase the development of parks based on the concept of Access for All so that it can be accessed by everyone included people with disabilities. In addition, it is necessary to increase the priority of developing park facilities and public spaces according to the needs of the disability.

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