Disabled-Friendly Public Spaces in Covid 19 Pandemic: Improving Service Facilities and Accessibility based on the User’s Perception in Alun-Alun Batu City

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Abstract. An inclusive and easily accessible public space, including for persons with disabilities, is one of the goals contained in the SDGs by 2030. The Batu City Government has tried to create a friendly public space by providing facilities and utilities that make it easier for people with disabilities to access it seen on Alun-Alun Batu. The ongoing covid 19 pandemic causes limited visits to Alun-Alun Batu and affects the condition of existing facilities. This research aims to develop the concept of facilities and accessibility based on the perception of disabled users. The analytical methods in this research are the perception assessment of disabled users with IPA analysis and the conformity assessment method according to the current pandemic conditions. The results show that out of 16 facilities, half of the facilities are in unsuitable condition and other facilities are not suitable for disabled users. The priority of upgrading facilities are objects in quadrants I IPA which consists of toilets, traffic parks, carousel, and gazebos/smoking areas. The second priority is facilities located in quadrant II such as parking lots, playgrounds, Ferris wheels, and offices. And the third priority is for facilities located in quadrant III IPA such as dancing fountains, stage performances, seats, rubbish bin, and tourism information.

Keywords: disable, facilities, public space

1. Introduction
Public space is a common place to carry out functional activities that bind the community either in daily activities or in celebration [1]. Public space is one of the goals of achieving the Sustainable Development Goals (SDGs), where the target is to provide universal access to public spaces and green spaces that are safe, inclusive, and easily accessible, especially for women and children, the elderly, and persons with disabilities by 2030 [2]. We know it as a concept of an inclusive public space. As a city with a commitment to creating an inclusive public space, Batu City has begun to improve the existing service facilities, especially for people with disabilities. Data shows that Batu City had 171 persons with disabilities in 2019. The government needs to accommodate the necessity for existing facilities, one of which is by assessing the satisfaction of persons with disabilities. Their satisfaction with the ease of access to public facilities and green open spaces can improve the welfare of people with disabilities [3]. Mainly since the Covid-19 pandemic has limited their activities while in public places. Therefore, this study aims to assess the satisfaction of disabled users with public spaces in Batu City during the pandemic so that the government must make recommendations to accommodate their needs following appropriate health protocols.
2. Methods

2.1. Research Variable
This research uses a user perception approach. They assess the facilities and accessibility in Aloon-Aloon Batu. The indicators measured in this study are shown in table 1.

| Variables                  | Indicators                                                                 |
|---------------------------|-----------------------------------------------------------------------------|
| Equitable use             | Perceptions of the disabled about access to facilities                      |
| Flexibility in use        | Perceptions of the disabled about the completeness of the facilities for them|
| Perceptible information   | Disabilities' perceptions of signage                                         |
| Simple and intuitive use  | Disabilities' perception of the image/symbol at the entrance                |
| Tolerance for error       | Differables' perceptions of materials and the slopingness of access to facilities |
| Low physical effort       | Disabled's perception of ram at the entrance of the information service center|
| Size and space for approach and use | Perception of the disabled about the width of the entrance to the information service center |

2.2. Population and Sample
The population in this research was people with physical disabilities in Batu City, which amounted to 171 people from Development Planning Agency at Sub-National Level in East Province, 2021.

The sample calculation uses the slovin formula because the researcher knows the total population. The formula used is:

\[ n = \frac{N}{1 + Ne^2} \]

N is the amount of the population, n is the amount of the sample and e is the margin of error. The pandemic covid-19 caused differences in the target (according to the Slovin formula) with the findings of respondents. Moreover, the ability to understand the questionnaire is different from people in general. Most Deaf and people with speech impairments filled out questionnaires because the two types of disabilities were still able to communicate well and were in the mild disease category. Meanwhile, the visually impaired fill the questionnaire least than others because there are limitations in understanding the questionnaire, so they need a companion to understand the questionnaire.
Table 2. Number of Respondents.

| Disable Types          | Respondents Target (according to the slovin formula) | Result Respondents | Amount | Percentage |
|------------------------|------------------------------------------------------|--------------------|--------|------------|
| Physically handicapped | 41                                                   | 22                 | 54%    |
| Visual Impairment      | 12                                                   | 2                  | 8%     |
| Deaf and Speech Impairment | 11                                             | 47                 | 436%   |
| Total                  | 63                                                   | 71                 |        |

2.3. Data Collection Methods

Respondents in this research were people with disabilities who joined the Shining Deaf Community in Batu City, the Indonesian Blind Association (PERTUNI) in Batu City, Eka Mandiri Special School (SLB), and the State Special School (SLBN) in Batu City. The first step is to search for disabled communities or foundations through social media Twitter and Google. After that, the researcher got a contact person from one of the disabled communities in Batu city, namely Shining Tuli Batu. In the second stage, the contact person from Shining Tuli Batu provided a contact person for another disabled community, namely PERTUNI Batu. After searching for contact persons, the researcher distributed questionnaires to the physically disabled community members. Next step, we distributed a questionnaire to students at Batu SLBN, which contact person we got via google. Finally, to prevent the spread of COVID-19, the questionnaires given to SLBN Batu and SLB Eka Mandiri were taken home and filled out at home by students.

Figure 2. Flowchart of Correspondence With Respondents.

2.4. Analysis Methods

Researchers used the IPA method to assess the quality of facilities and accessibility of Alun-Alun Batu City. IPA analysis measures user satisfaction through variables or factors [4]. The perception of the users of space is one option to determine the quality of public space [5]. User perception will be measured using a Likert scale that has various answers from positive-negative conditions [6]. Satisfaction could be measured by comparing the performance and importance of a facility. The performance and importance of the facilities at Batu Alun-Alun are presented in the following five categories.
Some things become criteria for the suitability or satisfaction of respondents [7]. For example, if the performance value is less than its importance, the respondent can be said to be dissatisfied. On the contrary, if the performance value is more than its importance, the respondent is said to be satisfied. In addition, stated that the quality of space could be measured by knowing the satisfaction of its users [8]. It means there is a connection between the level of suitability or satisfaction with disabilities with the quality of the facilities found.

Table 4 The correlation between suitability level and physical quality of Aloon-Aloon Batu City.

| Suitability Score | Interpretation               | Physical Quality |
|-------------------|------------------------------|------------------|
| >100%             | Very satisfied               | Excellent        |
| 100%              | Moderately satisfied         | Good             |
| 66% – 99%         | Neither satisfied nor        | Fair             |
|                   | dissatisfied                 |                  |
| 33% - 65%         | Moderately dissatisfied      | Poor             |
| 0% - 32%          | Very dissatisfied            | Very Poor        |

Source: Supranto, 2006

The IPA method presents the assessment results in the form of a Cartesian diagram consisting of four quadrants [4]. Each quadrant has its characteristics, namely quadrant I (concentrate these), quadrant II (keep up the good work), quadrant III (low priority), and quadrant IV (possible overkill). The x-axis represents the performance of the facility, while the y-axis represents the importance of the facilities in Aloon-Aloon Batu City.

Figure 3. IPA Diagram of Facilities and Accessibility in Aloon-Aloon Batu City.

\[ \bar{X} = \frac{\sum x_i}{n} \quad \text{And} \quad \bar{Y} = \frac{\sum y_i}{n} \]

\( \bar{X} \) is an average score on facility and accessibility performance assessment in Aloon-Aloon Batu, \( \bar{Y} \) is an average score on facility and accessibility importance assessment in Aloon-Aloon Batu and \( n \) is the number of respondents.
3. Result and Discussion

Users with disabilities rated the 16 facilities available at Alloon-Alloon Batu City, namely parking lots, entrances, service center offices, tourism information, information boards, toilets, rubbish bin, gazebos, seats, dancing fountain area, Traffic Park, Ferris wheel, carousel, playground, and stage performance. Based on the survey results, most disabled said they were not satisfied with the facilities and accessibility services at Batu Square. It is proven by the suitability level of Alun-Alun Batu facilities which is only 64%.

Table 5. Facilities and Accessibility Quality in Alun-Alun Batu.

| No | Facilities and Accessibility | An Average of Indicators | Suitability Level | Criteria | Quality Level |
|----|-------------------------------|--------------------------|-------------------|----------|---------------|
|    |                               | ∑x/n                     | ∑y/n              | (∑x/∑y)  |               |
| 1  | Parking Lots                  | 2.18                     | 4.18              | 52%      | Moderately Dissatisfied | Poor |
| 2  | Entrance                      | 2.93                     | 4.13              | 71%      | Neither satisfied nor dissatisfied | Fair |
| 3  | Service center offices        | 2.8                      | 4.12              | 68%      | Neither satisfied nor dissatisfied | Fair |
| 4  | Office                        | 2.4                      | 4.11              | 58%      | Moderately dissatisfied | Poor |
| 5  | Information Boards            | 3.28                     | 4.19              | 78%      | Neither satisfied nor dissatisfied | Fair |
| 6  | Toilet                        | 2.32                     | 4.25              | 55%      | Moderately dissatisfied | Poor |
| 7  | Rubbish Bin                   | 3.17                     | 4.2               | 75%      | Neither satisfied nor dissatisfied | Fair |
| 8  | Gazebo / Smoking area         | 2.68                     | 4.19              | 64%      | Moderately dissatisfied | Poor |
| 9  | Seats                         | 2.97                     | 4.19              | 71%      | Neither satisfied nor dissatisfied | Fair |
| 10 | Fountain area                 | 3.16                     | 4.27              | 74%      | Neither satisfied nor dissatisfied | Fair |
| 11 | Dancing fountain area         | 3.09                     | 4.2               | 74%      | Neither satisfied nor dissatisfied | Fair |
| 12 | Traffic Park                  | 1.97                     | 4.22              | 47%      | Moderately dissatisfied | Poor |
| 13 | Ferris wheel                  | 2.19                     | 4.15              | 53%      | Moderately dissatisfied | Poor |
| 14 | Carousel                      | 2.52                     | 4.23              | 60%      | Moderately dissatisfied | Poor |
| 15 | Playground                    | 2.24                     | 4.16              | 54%      | Moderately dissatisfied | Poor |
| 16 | Stage Performance             | 3.11                     | 4.2               | 74%      | Neither satisfied nor dissatisfied | Fair |
|    | Average                       | 2.69                     | 4.19              | 64%      | Moderately dissatisfied | Poor |

Figure 4. IPA Diagram of Alloon-Alloon Batu’s Facilities and Accessibility.
The focus of the subsequent discussion is the facilities located in quadrant 1. These facilities require immediate treatment to accommodate people with disabilities while in the Aloon-Aloon Batu. The existing condition also shows that the facility has not been equipped with several supporting facilities for the disabled, such as ramps, guide lanes, and special toilets for the disabled. Hence, users with disabilities are dissatisfied with the service facilities at this location.

A. Toilet
Based on the analysis results, toilet facilities are categorized as poor service by disabled users. The following table shows the perception of disabled users towards toilet facilities.

| Criteria          | Quality Level | An Average | Suitability Level |
|-------------------|---------------|------------|-------------------|
|                   |               | $\frac{\sum x}{n}$ | $\frac{\sum y}{n}$ |
| Toilet            | Poor          | 2.32       | 4.25              |
|                   |               | 57%        | Moderately dissatisfied |

There are several indicators that the facility is of poor quality. Some are guide paths, special toilets for the disabled, braille in toilets, emergency lights and bells, and handrails.

The recommendation for improving the quality of Complementary Toilet Facilities based on the existing condition in several indicator shows in figure

![IPA Diagram of Toilet](image-url)
Figure 6. Recommendations design for Improving the Quality of Complementary Toilet Facilities, (a) Accessible Toilet, (b) Handrail, (c) Emergency lights and bells, (d) Size of toilet.

Table 8. Recommendations for Improving the Quality of Complementary Toilet Facilities.

| Indicators            | Existing Condition                                                                 | Improvement Recommendation                                                                 |
|----------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Accessible Toilet    | Alun-Alun Batu does not yet have an accessible toilet for disabled users in its existing condition. The accessible restroom for the disabled has a unique standard size, and the physically disabled use it to feel comfortable. | The minimum size of accessible toilets for disabled users is 1.6 m x 2.3 m.                   |
| Handrail             | In the existing condition of the toilet, there is no handrail. The handrail serves as a handle for the disabled to move from the wheelchair to the toilet. And valuable for the security of disabled users. | Addition of a handrail next to the toilet equipped with a hand sanitizer nearby.              |
| Guiding Block        | Aloon-Aloon Batu does not yet have a guide route in the existing condition. People with visual impairments use guide paths to move around and serve as a guide when accessing the square. | Adding guiding blocks to accessible toilets.                                                 |
| Emergency lights and bells | There are no bells and emergency lights in the Aloon-Aloon Batu toilets in the existing condition. Bells and emergency lights are helpful as a security tool when an incident or unexpected thing occurs. | Added emergency bells and lights for accessible toilets.                                     |
| Size of toilet       | Because there are no accessible toilets available, they hope that the size of the toilet will suit their needs. | The minimum size of accessible toilets for disabled users is 1.6 m x 2.3 m.                   |
B. Gazebo/Smoking Area

Based on the analysis results, gazebos/smoking areas are categorized as poor service by disabled users. The following table shows the perception of disabled users towards gazebos/smoking area.

**Table 9. Quality of Gazebo/Smoking Area.**

| Criteria          | Quality Level | An Average $x = \frac{\sum x}{n}$ | Suitability Level $y = \frac{\sum y}{n}$ | Quality Level |
|-------------------|--------------|------------------------------------|------------------------------------------|---------------|
|                   |              | 2.68                               | 4.19                                     | Moderately dissatisfied |
|                   |              | 64%                                |                                         | Poor |

There are two indicators or attributes with poor quality: guiding blocks and braille. Users give a poor quality perception because all these indicators are not yet available in Aloon-Aloon Batu City.

**Figure 7. IPA Diagram of Gazebo/Smoking Area.**

(a) Guiding Block (b) Braille signage

**Figure 8. Recommendations design for improving the quality of Gazebo/Smoking Area, (a) Guiding Block, (b) Braille signage.**

**Table 10. Recommendations for improving the quality of Gazebo/Smoking Area.**

| Indicators      | Existing Condition                                                                 | Improvement Recommendation                                                                 |
|-----------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Guiding Block   | Aloon-Aloon Batu does not yet have a guide block in the existing condition. People with visual impairments use guide trails to move around and guide when accessing this place. | The addition of guiding blocks around the gazebo/smoking area that is connected to other facilities. |
| Braille signage | There is no braille signage in the provision of the gazebo/smoking area in the existing condition. However, Braille is considered important because it contains information about the facilities. | The addition of braille signage in the gazebo/smoking area with a height not exceeding 150 cm and a minimum size of braille letters is 5 cm. |
C. Traffic Parks

Based on the analysis results, traffic park areas are categorized as poor service by disabled users. The following table shows the perception of disabled users towards Traffic Park.

| An Average | Suitability Level | Criteria | Quality Level |
|------------|-------------------|----------|--------------|
| $\frac{\sum x}{n}$ | $\frac{\sum y}{\sum y}$ | $47\%$ | Moderately dissatisfied | Poor |

| Criteria          | Quality Level |
|-------------------|---------------|
| $\sigma_{L}$      | Poor          |
| $\sigma_{M}$      | Moderately dissatisfied |

Disabled users give poor assessment because there are no guiding blocks, park’s name, and other indicators in the traffic park.

![IPA Diagram of Traffic Park](image)

Figure 9. IPA Diagram of Traffic Park.

![Recommendations design for Improving the Quality of Traffic Park](image)

Figure 10. Recommendations design for Improving the Quality of Traffic Park, (a) Guiding block, (b) Traffic park location sign.

| Indicators                  | Existing Condition                                                                 | Improvement Recommendation                                                                 |
|-----------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Guiding block               | Aloon-Aloon Batu does not yet have a guide route in the existing condition. However, people with visual impairments use guide paths to move around and serve as a guide when accessing this facility. | The addition of a guiding block for disabled users while in the park is connected from entry to exit. |
| Traffic park location sign  | In the existing condition, there is no information board for the park’s name. Meanwhile, based on the results, the provision of the sign is considered necessary by the respondents. | The addition of traffic park signage is 70 cm x 20 cm in front of the traffic park. |
D. Carousel

Based on the analysis results, disabled users categorized the carousel as medium quality. The following table shows the perception of disabled users toward the carousel.

| Criteria          | Quality Level                   | Level | Suitability Level |
|-------------------|---------------------------------|-------|-------------------|
| Neither satisfied | neither satisfied nor dissatisfied | 60%   | Fair              |

Although this facility gets a medium score, there are still indicators that need to be improved by the Batu City government. These indicators are the guiding block and the braille signage, which is not yet available in this facility.

![IPA Diagram of the Carousel](image1)

**Figure 11.** IPA Diagram of the Carousel.

![Recommendations for Improving the Quality of The Carousel](image2)

**Figure 12.** Recommendations for Improving the Quality of The Carousel, (a) Guiding Block, (b) Clarity of information facility name, (c) Information board about the carousel.
Table 14. Recommendations for Improving the Quality of The Carousel.

| Indicators                  | Existing Condition                                                                 | Improvement Recommendation                                                                 |
|-----------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Guiding Block               | Aloon-Aloon Batu does not yet have a guiding block in the carousel facility. Therefore, people with visual impairments use this indicator to play at the carousel. | The management could add a guiding block in the carousel play area for disabled users.       |
| Clarity of information      | The writing on the carousel signboard is visible in the existing condition, but it is not legible because it is tiny. Therefore, the provision of writing/signage for the carousel is an indicator that must be fulfilled immediately. | Adding a sign with a size of 70cm x 20 cm                                                   |
| Information board about the | In the existing condition, there is no information board about the carousel. Additional indicators need to be added for all categories of users, including disabled users. In addition, the size needs to be considered so that users do not crowd when reading the information because of the pandemic condition. | The size of the information board uses A2 or a standing banner that contains information and pictures related to the procedure for using the carousel. |
| carousel                    |                                                                                   |                                                                                             |

4. Conclusion

In general, disabled users expressed dissatisfaction with the completeness of supporting facilities when they were in Aloon-Aloon Batu City. Four facilities need to be improved immediately because they are in quadrant 1. The IPA quadrant of the four facilities shows that the guiding block and braille indicators are not yet available, even though some people with disabilities need these indicators in public spaces. In addition, the existence of the ramp needs to be a concern of the management, especially for disabled users who want to ride the facility, such as the Ferris wheel and carousel.

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