Evaluation of Accessibility for People with Disability in Public Open Space

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Abstract. Public space should be accessible for all people regardless of certain circles. Accessibility is the availability of pathways for all people, including persons with disabilities and the elderly, measured by safety, convenience, usability and independent. This study evaluates the accessibility for PwDS in public open spaces in Banda Aceh City, Aceh Province, Indonesia. The areas used as the case study are Putroe Phang, Blang Padang and Taman Sari. The research method used is quantitative and qualitative by analyzing the willingness and suitability based on facilities and disability technical guidelines. The convenience of access in public open space measured by factors related to the form, dimensions, colors and textures of an access point. The results showed that Taman Sari has a better facilities and disability technical guidelines than the other two cases. In terms of conformity with the standardization of technical guidelines and convenience of access, Taman Sari is not yet fully functional, especially for persons with disabilities.

1. Introduction
The Public open space is an area used by various groups for both personally and community groups. The formation of public open spaces related to the parts of the natural and guided environment, where the public has the same opportunity to access these spaces freely. Public open space must be accessible to users without distinguishing physical or non-physical factors.

Generally, public open spaces created have not considered the convenience of persons with disabilities [1-3]. There is still some discrimination against persons with disabilities, with the unavailability of special facilities and access for them in the public area. In addition, the perception of the public that persons with disabilities are second-class citizens, who fulfil their needs and rights, can only be given if the first class community (normal society) has prospered. The failure access is also can be seen in pedestrian lines that do not care for children with special or normal needs, both of that have the same risk of accidents. For this reason, public open space should be accessible from a variety of ages for both those with normal physical conditions and those with physical disabilities.

In Banda Aceh, access to public spaces such as markets as public facilities is not sufficient for people with disabilities. Other research in Malaysia also explained that mall buildings could not fully facilitate the visitors from various backgrounds, both in terms of age and physical abilities. Public facilities in the external environment must pay attention to parking access, pedestrian, signs and markers, making it easier for users, especially persons with disabilities [4-5]. The impact of city growth physically and functionally measured in terms of accessibility and utilization. In urban areas, the size of accessibility viewed from aspects of proximity, distribution, road conditions and availability of transportation. While the benefits of public space in urban areas measured by comfort, quality, aesthetics and appearance. In Famagusta, Cyprus, public spaces are not useful and inaccessible due to lack of access for pedestrians, physical structures that do not support pedestrians, lack of safety and discomfort [6]. Both of public
buildings and public spaces, access for people with special needs should be comfortable, useful and easy to access. People with Disability (PwDs) also rely heavily on public transportation in urban areas.

Accessibility in the area of public transportation is still not maximal considering the needs of persons with disabilities. The case in the facilities of public transportation, often encountered with the lack of signs or facilities markers. The absence of special access for PwDs in the terminal area, physical transportation that does not support PwDs and the conditions of shelters that are not suitable for PwDs. Transportation access that is not friendly to diffable and does not facilitate the achievement of public spaces [7-8].

Based on the mentioned theories, the access to public areas that are commonly considered is the public buildings such as markets and malls and the access to urban transportation areas. Public open space is a city facility that used as a recreational area of the city with varied users of space. In this case, a deeper evaluation study would be focus on facilities in the public open space.

In evaluating the availability of public access there are four factors that affect the level of comfort, namely the condition of public furniture and physical attractions, vegetation and the condition of public furniture, the pathway for people with disabilities, and the existence of shelter [9]. Accessible must imply that the availability of facilities will not make people with special needs feel they need help to reach out, walk in and out, use facilities and are not considered beggars. For that reason, public open space must pay attention to the needs of PwDs [10]. On the surface of the pedestrian there are four factors can interfere with comfort or satisfaction, namely form, dimensions, colour and texture [11]. These factors are uses as benchmarks in evaluating public space in this study.

The Government has regulated the Facility Technical Guidelines and Accessibility in Building and the Environment [12]. One of the regulations related to accessibility, which must provide convenience for all people, including persons with disabilities and the elderly, in order to realize equal opportunities in all aspects of life and livelihood. For public access facilities, that need consideration as a disabled channel is in the parking area, drop of area and pedestrian lane. On diffable access points must pay attention to clear and safe surface conditions, sloping roads and have safety and have interconnected lines, thus assisting in achieving a facility from city scale to micro environment [13-14].

Control of design in the park can be considered feasible when fulfilling the principles of facilities and disability, namely the principle of safety; health; convenience; convenience; security; beauty and independence [15-16]. The facilities and disability technical guidelines that must be considered in public spaces [3,6,17-18] are:

i. Public toilets should be equipped with handrails where position and height are adjusted for wheelchair users and other disabled persons. The recommended handle has right-angled shape to help move the wheelchair user.

ii. The basic size of space in three dimensions refers to the anthropometry, equipment and space functions

iii. Pedestrian should be attention to the road surface, slope, stopping point, lighting, drainage, where minimum width was 120 cm and safety along the edge of pedestrian.

iv. The guideline should have guiding block located in front of the vehicle traffic lanes, in front of the entrance, on pedestrian as the environmental and building link and guides from public facilities to public transport.

v. The parking area for PwDs has an access point located between two parks and a ramp leading to a circulation pathway that has elevation differences.

vi. The angle of the ramp no more than 6°, the maximum length of the horizontal ramp no more than 900 cm, it minimum width 95 cm without the safety edge and 120 cm with the edge of the guard. The borders on the prefix or ending of the ramp should be free and flat, where illuminated with sufficient lighting and equipped handrails.

vii. Signs and markers needed on the direction and purpose of pedestrian paths, public toilets, special parking disabilities, facility names and places, public phone and atm.
Based on the information, the existence of public space also provides accessibility in accordance with the technical principles and technical guidelines and disability. This study will evaluate the extent of the feasibility of public space in Kota Banda Aceh for persons with disabilities (PwDs).

2. Research Methodology

2.1 Type of Research

The research is a case study by evaluating the accessibility in public spaces in Banda Aceh City, Aceh Province, Indonesia. The method of discussion used is qualitative and quantitative methods.

2.2 Location of the research

The observations of the public space as its functions, gathering place and public recreation place for communities. Figure 1 shows that the public open space chosen as the research location in the center of Banda Aceh. The first location is BlangPadang which is a public open space that is often used as a sports center, culinary center and venue for events such as exhibitions and concerts. Second location is a Taman Sari also known as Bustanussalatin Park. This park is often used as a playground for children and a place for organizing cultural events. The third location is PutroePhang, which is a historical park from the time of the Sultan Iskandar Muda Kingdom. Currently it functions as a playground and educational park for students from kindergarten to students. The three locations of public open spaces are the dominant open spaces that are the choice of the people of Banda Aceh and surrounding areas to gather to do recreational activities on a daily basis with different forms of activity and age of visitors.

![Figure 1. Location of the research.](image)

2.3 Research variables and operational definition

In this study, the dependent variable is accessibility, while the independent variable is the element of open space related to availability, conformity with standardization and convenience. Related to these variables, then the operational definitions are:

i. Accessibility is the availability of a path for everyone including PwDs and the elderly as measured by safety, convenience, usefulness and independence to achieve equal opportunity in all aspects of life and livelihood [9].

ii. Availability is the presence of persons with disabilities and the elderly access.

iii. Conformity is disabled facilities in public spaces that meet the technical guidelines and standardization.

iv. Convenience is disabled facilities in public space does not interfere with the user satisfaction by analyzing the form, dimension, color and texture.
2.4 Data collection techniques
The collected data is measurement data through field observation to assess the environmental situation of the three case studies related to the availability and fulfillment of standardization based on the principle of facility and accessibility. Surveys conducted with direct observation and measurement. Documentation is needed to determine the physical condition of the environment and feel the environment. Official data from related agencies in this case Dinas Tata Kota Banda Aceh and Dinas Pertamanan are also required to know the existing condition.

2.5 Data analysis
Stages of analysis performed are:

i. Identify available of accessibility for PwDs and the elderly by reviewing the facility's technical guidelines and disability.
ii. Evaluate accessibility compliance based on standardization on facility technical guidelines and disability.
iii. Evaluate the convenience of accessibility based on the study of form, dimension, color and texture.

3. Results and Discussion
3.1 Existing Conditions
3.1.1 Taman Sari. Figure 2 shows an overview of circulation and facilities that affect accessibility. The conditions of access and public facilities in this area can be seen in figure 3.

![Figure 2](image1.png)

Figure 2. The existing conditions in Taman Sari.

![Figure 3](image2.png)

Figure 3. The existing conditions in PutroePhang.

3.1.2 Taman PutroePhang. The figure 4 and figure 5 shows the accessibility and existing conditions in Putroe Phang also the facilities.
3.1.3 Blang Padang. The figure 6 and 7 shows the accessibility and existing conditions in Putroe Phang also the facilities.
3.2 Identification of Accessibility

Identification of facility base on the survey results shown in Figures 2, 4 and 6. Identification refers to the Facility's Technical Guidelines and Accessibility to Buildings and the Environment [17]. Available of accessibility based on technical guidance in each case study described in table 1. Table 1 and figure 8 show that Taman Sari has more complete technical availability of facilities and accessibility than the other two cases.

Table 1. The availability of Accessibility on Three public spaces.

| No | Technical guidelines | PutroePhang | Blang Padang | Taman Sari |
|----|----------------------|-------------|--------------|------------|
| 1. | Public toilets       | Available   | Available    | Available  |
| 2. | The basic size       | Available   | Available    | Available  |
| 3. | Pedestrian           | Available   | Available    | Available  |
| 4. | Guiding line         | Not Available | Not Available | Available |
| 5. | Parking Area         | Available   | Not Available | Available  |
| 6. | Ramp                 | Available   | Not Available | Available  |
| 7. | Signs and Markes     | Not Available | Not Available | Available  |
3.3 Evaluate accessibility compliance

Accessibility compliance in figure 11 evaluated based on the identification of access availability (figure 8). Conformity refers to the standardization of Facility Technical Guidelines and Accessibility on Building and environmental [2][5]. According to table 2 and figure 9, it is concluded that almost all of the accessibility in Blang Padang and Taman Sari is not up to standard.

Table 2. The accessibility compliance with technical guidelines.

| No  | Technical Guidelines                     | Accessibility compliance |
|-----|------------------------------------------|--------------------------|
|     |                                          | PutroePhang | Blang Padang | Taman Sari |
| 1.  | Public toilets                           |             |             |             |
| a.  | Embossed signs                           | NS          | NS          | NS          |
| b.  | Space                                    | NS          | NS          | NS          |
| c.  | High Closet 45-50 cm                     | NS          | NS          | NS          |
| d.  | Handrail                                 | NS          | NS          | NS          |
| 2.  | The basic size                           |             |             |             |
| a.  | Match the function                       | NS          | NS          | NS          |
| b.  | According to the need                    | NS          | NS          | NS          |
| 3.  | Pedestrian                               |             |             |             |
| a.  | Stable, Strong, weather proof            | NS          | S           | NS          |
| b.  | Mound <1,25 cm                           | NS          | S           | NS          |
| c.  | Max slope 2°                             | S           | S           | S           |
| d.  | Stoping point                            | S           | NS          | S           |
| e.  | Lighting                                 | S           | NS          | S           |
| f.  | Drainage away from pedestrian edge      | S           | S           | S           |
| g.  | One way lane 120 cm, two-way lane 160 cm | S           | S           | S           |
| h.  | The safety edge is 10 cm high and 15 cm wide | NS      | NS          | NS          |
| 4.  | Guiding line                             |             |             |             |
| a.  | Directional block                        | NS          | NS          | S           |
| b.  | Warning block                            | NS          | NS          | S           |
| 5.  | Parking Area                             |             |             |             |
| a.  | Access point                             | NS          | NS          | S           |
| b.  | Ramp                                     | NS          | NS          | NS          |
| 6.  | Ramp                                     |             |             |             |
| a.  | Max slope 6°                             | NS          | NS          | NS          |
b. Horizontal length <900 cm  
   S   S   S

c. Min width 95 cm without edge protection  
   NS  NS  NS

d. Max width 120 cm edge secured  
   NS  NS  S

e. Handrail  
   NS  NS  NS

f. Lighting  
   NS  NS  NS

7. Signs and Marks  
   NS  NS  S

**Note:**
S: Suitable  
NS: Not Suitable

### Figure 9. Accessibility compliance with technical guidelines.

Of all cases, most of the access to three cases of public space does not meet the technical guidelines. Compatibility is mostly found only in the pedestrian, but for connecting links to other public facilities are not easily accessible for persons with disabilities.

#### 3.4 The Evaluation of the Comfort Access

Evaluation of comfort measured based on four factors that can interfere with comfort or satisfaction, i.e. form, dimension, color and texture [4]. These four factors are reviewed based on access availability reviews. The results obtained based on figure 10 and table 3 are Blang Padang and Taman Putroe Phang does not have convenient access for PwDs, where Taman Sari has considered the convenience although not yet optimal.

### Table 3. Measure of Comfort Access.

| No | Measure of comfort | Comfort Access |
|----|--------------------|----------------|
|    | Public Toilet      |                |
| 1. | a. Form            | UC  UC  UC    |
|    | b. Dimension       | UC  UC  UC    |
|    | c. Color           | UC  UC  UC    |
|    | d. Texture         | UC  UC  UC    |
| 2. | The basic size     |                |
|    | a. Form            | UC  UC  UC    |
|    | b. Dimension       | UC  UC  UC    |
|    | c. Color           | UC  UC  UC    |
|    | d. Texture         | UC  UC  UC    |
| 3. | Pedestrian         |                |
4. Conclusions
The conclusions of this study are:
   i. Evaluation of suitability and comfort of access to public spaces is largely impartial for access for persons with disabilities (PwDs).
   ii. Standard conformity is seen only on pedestrian lines but connecting to nearby public facilities is not easily accessible to PwDs (not accessible).
   iii. The facilities and accessibility in the public spaces in Banda Aceh are not comprehensive to provide comfort to PwDs.
   iv. Of the three cases in this study, Taman Sari has considered the facilities and accessibility of people with disabilities, but the suitability and comfort has not been considered thoroughly.
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References
[1] Novita, Rita. Aksesibilitas Bangunan Fasilitas Publik bagi Penyandang Disabilitas di Kota Banda Aceh, (Riset), FKM-BKA Natural Aceh, (2015)
[2] Thohari,S, Pandangan Disabilitas dan Aksesibilitas Fasilitas Publik bagi Penyandang Disabilitas di Kota Malang, Indonesian Journal of Disability Studies, Volume 1 Issue 1, (Juni 2014), 27-37
[3] Huiyun Xiang, Motao Zhuh, Sara A. Sinclair, Lorann Stallones, J.R. Wilkins III, Gary A. Smith, Risk of vehicle–pedestrian and vehicle–bicyclist collisions among children with disabilities, Elsevier, Accident Analysis and Prevention 38 1064–1070, (2006)
[4] Irfan, Izziah, Anggraini.R, Kajian Aksesibilitas Kaum Difable Pada Gedung Pasar Aceh Berdasarkan Persepsi Masyarakat, Lansia dan Penyandang Cacat, Jurnal Teknik Sipil Universitas Syiah Kuala, Volume 1 Special Issue, Nomor 2, (2017), 533-542.
[5] Alaa BashitiI, Asiah Abdul Rahim, A Study On The Accessibility In Shopping Malls For People With Disabilities (Pwds) In Malaysia, International Journal of Natural Sciences Research Vol. 3, No. 1, (2015), pp. 9-20
[6] Nil Pasaogullari, Naciye Doratli, Measuring accessibility and utilization of public spaces in Famagusta, Elsevier, Cities, Vol. 21, No. 3, p. 225–232, 2004.
[7] Seyed Hassan Khalifeh Soltani, Mashita Sham, Mohamad Awangb & Rostam Yaman, Accessibility for Disabled in Public Transportation Terminal, Elsevier, Procedia - Social and Behavioral Sciences 35 (2012) 89 – 96,
[8] Endang Sri Wahyuni, Bhisma Murti, Hermano Joebagio, Public Transport Accessibility for People with Disabilities, Journal of Health Policy and Management(2016), 1(1): 1-7.
[9] Pratiwi. A.D, dan Ernawati.J, Tingkat Kenyamanan Fungsional Alun-Alun Batu sebagai Ruang Publik, Architecture Student Journal (2018)
[10] Harry Kurniawan, Familiarity in Designing a Mosque: A Practice of Universal Design, Programme Work Programme-Architecture for All Regions I, II, III & IV-Oral Presentations Tokyo, 26th September 2011
[11] Prijadi.R, Sangkertadi, Tarore.R.C, Pengaruh Permukaan Jalur Pedestrian Terhadap Kepuasan dan Kenyamanan Pejalan Kaki di Pusat Kota Manado, Media Matrasain, Volume 11, No.1, (Mei 2014), 43-54
[12] Pedoman Teknis Fasilitas dan Aksesibilitas Pada Bangunan Gedung dan Lingkungan. Nomor: 30/PRT/M/2006.
[13] Cullen, M. Improving Transport Accessibility for People with Disabilities, Office of the Prime Minister, Social Services Delivery, (2009).
[14] Henry, T. Policy On Persons with Disabilities, Office of the Prime Minister, Social Services Delivery, (2009).
[15] Widyaawati.K, dan Laksmitasari,R, Penilaian Ruang Bermain Anak di Kota Depok Sebagai Salah Satu Indikator Tercapainya Kota Layak Anak, Faktor Exacta 8 (3), (2015), 195-2017
[16] Persyaratan Teknis Fasilitas Publik bagi Penyandang Disabilitas. *Handicap International*, 2004.
[17] Bahri, Samsul. Upaya dan implementasi pemerintah kota terhadap peraturan menteri pekerjaan umum No: 30/prt/m/2006 tentang Pedoman teknis fasilitas dan aksesibilitas pada bangunan gedung dan lingkungan di Kota Banda Aceh. (Seminar). Seminar Terwujudnya Aksesibilitas Pada Bangunan Fasilitas Publik. Nopember 2015.
[18] C Venter, T Savill, T Rickert, H Bogopane, A Venkatesh, J Camba, N Mulikita, C Khula, J Stone and D Maunder, Enhanced Accessibility for People with Disabilities Living in Urban Areas, (2002)