Evaluation and Design Public Facilities for People with Disabilities in Al-Hakim Mosque, Indonesia

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Abstract—Public facilities can be accessed by everyone, whether they have physical limitations or not. The Al-Hakim Mosque in Padang City is one of the facilities that is a place of worship for Muslims as well as a tourist attraction in West Sumatra. The research was conducted by identifying the inhibiting factors for persons with disabilities when using these facilities, designing these facilities to be easy to use by persons with disabilities (especially wheelchair users), and making a budget plan for making these facilities. Identification of inhibiting factors is done by making checklist to see the various obstacles experienced by wheelchair users and selecting anthropometric variables needed in designing public facilities. The results of this study are in the form of public facility designs that can be used by wheelchair users, the percentage of the suitability of these public facilities after the design is carried out, and the costs required to build these facilities.

Keywords: Public Facilities, Accessibility, Wheelchair Users, Universal Design Standard, people with disabilities.

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1. Introduction

Every human being has the right to live life when at home, office, or in a public place. When in public, the facilities are only adequate for people with don’t have a physical disability. Disabilities people do not have access when at public places, because the facilities are less or not available for people with disabilities. People with disabilities are often underestimated, this is because their needs are difficult to fulfill (Jumarni, 2017). The number of persons with disabilities in Indonesia is quite large. Data obtained from the social ministry of the Republic Indonesia in 2021 say that the highest number of people with disabilities is in West Java Province with a total of 27,595 people and the lowest number of people with disabilities is in West Papua Province with a total of 296 people. West Sumatra is ranked 11th among 34 provinces in Indonesia with a total of 6,745 persons with disabilities. The number of people with disabilities with physical illness or movement disorders is the highest number with 65,450 people and chronic disease is the least number with 2487 people. The number of people with disabilities, especially in West Sumatra, has quite a large number and the number of physically ill has the highest number of other diseases experienced by people with disabilities in Indonesia, so it is necessary to conduct research related to the use of public facilities for them.

There are several things of concern for persons with disabilities when in public places. This makes it difficult for people with disabilities to carry out activities when in public places because of the lack or absence of public facilities for them. Some examples of the lack or absence of these facilities are the absence of handrails in the toilets, the absence of a flat hiking trail for wheelchair users, the absence of symbols for persons with disabilities to inform persons with disabilities that these facilities can be used by persons with disabilities. Indonesia has set how to design public facilities so that they can be used easily for everyone without exception. The regulation is stated in the Regulation of the Minister of Public Works Number 14/PRT/M/2017. This regulation is made so that everyone including persons with disabilities is able and easy to use the existing public facilities to carry out life activities. In addition to the Regulation of the Minister of Public Works Number 14/PRT/M/2017, there are more universal
design rules for public facilities. This rule is called the Universal Design (UD) Standard. This rule applies to all facilities in each country.

A survey has been conducted on users of public facilities at the Al-Hakim Mosque in Padang City to find out whether these public facilities are easy to use for people with disabilities, especially for wheelchair users. The total number of surveys conducted was 17 people. The survey results say that 91% of public facilities for men's toilets are not yet easily accessible for wheelchair users, 92% stated that the facilities for men's ablution are still not easily accessible for wheelchair users, as many as 41% stated that the road ramp in front of the mosque was easily accessible even though, as many as 82% said that the ramp in the men's toilet is not yet easily accessible for wheelchair users, the majority of respondents said it was necessary to add handwashing facilities for wheelchair users. This is because wheelchair users find it difficult to reach the ablution facilities which also function as hand washing facilities for the general public, as many as 88% stated that the parking lot is not yet easily accessible for wheelchair users.

Fig. 1. Al-Hakim Mosque, Padang City

Based on the previous research that has been done regarding evaluation and designing public facilities for disabled people, the research only discusses the design of public facilities for disabled people with one standard, namely the Regulation of the Minister of Public Works Number 14/PRT/M/2017. This research only discusses two public facilities plus one additional public facility in the mosque and there is no budget plan if the public facilities will build that has been designed based on standards.

2. Methods

Persons according to the Big Indonesian Dictionary (KBBI) are people who suffer from something, while disability is a condition that damages or limits a person's mental and physical abilities. Article 1 number 1 of Law No. 8 of 2016 states that persons with disabilities are people who experience physical, intellectual, mental, and/or sensory limitations for a long time so that when interacting with the environment it is often difficult to participate fully and effectively with citizens. others in having the same rights (Widinarsih, 2019). Article 4 paragraph 1 of Law No. 8 of 2016 explains that there are people with disabilities, namely 1. Persons with Physical Disabilities, Persons with Intellectual Disabilities, Persons with Mental Disabilities, and Persons with Sensory Disabilities (Widinarsih, 2019). Based on room guidelines and standards for removing barriers for persons with disabilities and the elderly, there are several different types of disability, namely not outpatient, semi outpatient, vision, and hearing (Shobri et al, 2018).

Accessibility means access. According to the Regulation of the Minister of Public Works No. 30 of 2006 concerning Technical Guidelines for Facilities and Accessibility in buildings and the
environment, accessibility is the convenience provided for all people including persons with disabilities and the elderly to get equal opportunities in life (Jumarni, 2017). Several regulations serve as standards for the accessibility of persons with disabilities. These regulations include Law of the Republic of Indonesia Number 19 of 2011, Regulation of the Minister of Public Works Number 14/PRT/M/2017, Law of the Republic of Indonesia Number 8 of 2016, and Universal Design.

Ergonomics comes from the Greek words ergon and nomos. Ergon means 'work or effort', while nomos means 'rules'. Ergonomics is the study of human aspects and characteristics (ability, strengths, limitations, etc.) related to work and processing the information obtained to design good products, tools, machines, environment, and work systems. Productive work systems and good work quality as well as ease, comfort, and work efficiency with due regard to occupational health and safety are the main objectives of ergonomics (Iridiastadi and Yassierli, 2014).

Anthropometry comes from the word Anthropos which means human and metricos which means measurement. Anthropometry can be defined as the science that deals with aspects of human physical size. Anthropometry is a science that covers measurement methods, modeling the dimensions of the human body, and application techniques to make designs. Anthropometry is divided into two types, namely structural anthropometry (static) and functional anthropometry (dynamic). The results of static or dynamic anthropometric measurements are generally called anthropometric data (Iridiastadi and Yassierli, 2014).

3. Result and Discussion

Public facilities for toilets, ablution places, ramp, hand washing basins, and parking spaces at the Al-Hakim Mosque, Padang City were evaluated. The evaluation was carried out by making a checklist table for the suitability of toilet facilities, ablution facilities, ramp, hand washing basins, and parking lots based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017. Public facilities for toilets, ablution places, ramp, hand washing basins, and parking spaces at the Al-Hakim Mosque, Padang City were evaluated. A large percentage of the suitability of public facilities is obtained based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017. The following is the result of calculating the percentage of suitability for toilet facilities, ablution places, ramps, hand washing basins, and parking lots which can be seen in Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Facility</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cleansing Room</td>
<td>92%</td>
<td>Even though the suitability value is high, there is no information that this facility can be used by wheelchair users</td>
</tr>
<tr>
<td>2</td>
<td>Toilet</td>
<td>50%</td>
<td>There are several criteria that do not match</td>
</tr>
<tr>
<td>3</td>
<td>Road Ramp</td>
<td>33%</td>
<td>Relatively low</td>
</tr>
<tr>
<td>4</td>
<td>Washbasin (none)</td>
<td>0%</td>
<td>Not appropriate</td>
</tr>
<tr>
<td>5</td>
<td>Parking lot</td>
<td>0%</td>
<td>Not appropriate</td>
</tr>
</tbody>
</table>

Based on the percentage of conformity of toilet facilities, ablution places, ramp, hand washing basins, and parking lots that are still not following the Regulation of the Minister of Public Works Number 14/PRT/M/2017, it is necessary to make improvements to the design of these facilities based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 so that the facility is by the requirements in Indonesia and based on the Universal Design Standard so that the design can be used by the general public at large for wheelchair users.
1. Improvement of Public Facilities Design

The size of the wheelchair refers to the Regulation of the Minister of Public Works Number 14/PRT/M/2017 and Indonesian anthropometric data. Size of wheelchair can be seen in Table 2.

Table 2. Size of Wheelchair

<table>
<thead>
<tr>
<th>No</th>
<th>Body Dimension</th>
<th>Percentile</th>
<th>Tolerance</th>
<th>Total Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hip Width (Female)</td>
<td>95</td>
<td>-</td>
<td>39 cm</td>
<td>Seat Length</td>
</tr>
<tr>
<td>2</td>
<td>Popliteal Length (Man)</td>
<td>95</td>
<td>-</td>
<td>51 cm</td>
<td>Seat Width</td>
</tr>
<tr>
<td>3</td>
<td>Popliteal Height (Female)</td>
<td>5</td>
<td>Footwear = 10 cm</td>
<td>36.9 cm + 10 cm = 46.9 cm</td>
<td>Seat Height to Ground</td>
</tr>
<tr>
<td>4</td>
<td>Shoulder Width (Male)</td>
<td>95</td>
<td>-</td>
<td>47.8 cm</td>
<td>Backrest Length</td>
</tr>
<tr>
<td>5</td>
<td>Sitting Shoulder Height (Male)</td>
<td>95</td>
<td>-</td>
<td>64.5 cm</td>
<td>Backrest Height to Seat</td>
</tr>
<tr>
<td>6</td>
<td>Sleeve Length (Male)</td>
<td>95</td>
<td>-</td>
<td>48.3 cm</td>
<td>Armrest Length</td>
</tr>
<tr>
<td>7</td>
<td>Wrist Circumference (Male)</td>
<td>95</td>
<td>-</td>
<td>21.5 cm</td>
<td>Armrest Width</td>
</tr>
<tr>
<td>8</td>
<td>Foot Length (Male)</td>
<td>95</td>
<td>-</td>
<td>26.6 cm</td>
<td>Footrest Length</td>
</tr>
<tr>
<td>9</td>
<td>Footwear Width (Male)</td>
<td>95</td>
<td>-</td>
<td>28.2 cm</td>
<td>Footrest Width</td>
</tr>
<tr>
<td>10</td>
<td>Popliteal Height (Female)</td>
<td>5</td>
<td>-</td>
<td>36.9 cm</td>
<td>Footrest Support Length</td>
</tr>
<tr>
<td></td>
<td>Palm</td>
<td>5</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Circumference (Female)</td>
<td>95</td>
<td>-</td>
<td>22.7 cm</td>
<td>Wheel Width</td>
</tr>
<tr>
<td>12</td>
<td>Sitting Elbow Height (Male)</td>
<td>5</td>
<td>-</td>
<td>17.5 cm</td>
<td>Armrest to Seat Distance</td>
</tr>
</tbody>
</table>

- Toilet

Constraints for wheelchair users when using the toilet:

- The size of the toilet is not following the standards that have been set so that wheelchair users have limited space for movement.
- The width of the toilet door is 78 cm, making it difficult for persons with disabilities to enter the toilet because the width of the door for persons with disabilities is at least 90 cm.
- The toilet is not equipped with a sink or sink.
- The toilet is not equipped with a handrail.
- The toilet is not equipped with a trash can.
- The toilet door is not equipped with a kick plate.
- The toilet door is not equipped with a symbol for persons with disabilities.

From the constraints mentioned, the following are recommendations for designing toilet facilities for wheelchair users:

- The size of the toilet is adjusted to the standards that have been set for wheelchair users.
- The width of the toilet door is adjusted to the size that
- The toilet is equipped with a sink.
— The toilet is equipped with a handrail.
— The toilet is equipped with a trash can.

— The toilet door is equipped with a kick plate.
— The toilet door is equipped with a symbol for persons with disabilities.

The design for the toilet based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 can be seen in Fig. 2.

![Fig. 2. Toilet based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017](image)

The design for the toilet based on Universal Design Standard can be seen in Fig. 3.

![Fig. 3. Toilet based on Universal Design Standard](image)

• Ablution Place

Constraints of wheelchair users when using the ablution place:

— The place for ablution is only available for people who do not use a wheelchair.
— The height of the water faucet is too high, making it difficult to reach wheelchair users.

Of the 2 obstacles mentioned, the following are recommendations for the design of ablution facilities for wheelchair users:
- The dimensions of the ablution area are adjusted to the dimensions of the wheelchair user.
- Provide an additional handrail on the wall where the ablution is intended as a tool.

The design for the ablution Place based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 can be seen in Fig. 4.

![Fig. 4. Ablution Place based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017](image4)

The design for the ablution place based on Universal Design Standard can be seen in Fig. 5.

![Fig. 5. Ablution Place based on Universal Design Standard](image5)

- Ramp

Constraints for wheelchair users when using road ramp:
- There is no flat surface as a resting place.
- There is no handrail on the road ramp in front of the mosque.
- The shape of the road ramp in the male toilet is circular (helix) and has no flat surface, thus making wheelchair users overwhelmed when using this facility.

From the constraints that have been mentioned, the following are recommendations for designing road ramp facilities for wheelchair users:
- Adjustment of the dimensions of the road ramp based on the regulations and dimensions of wheelchair users so that they are easily accessible by wheelchair users.
- Adding a handrail to the road ramp in front of the mosque.
- Make a flat surface for the road ramp, so that wheelchair users do not get tired easily when using these facilities.
- Change the shape of the road ramp in the men's toilet to a square shape, making it possible to make a flat surface on the ramp.

The design for the Ramp in front of the mosque based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 can be seen in Fig. 6.
Fig. 6. Ramp In Front of the Mosque based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017

The design for the ramp at the men toilet based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 can be seen in Fig. 7.

Fig. 7. Ramp at the Men Toilet based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017

The design for the Ramp in front of the mosque based on Universal Design Standard can be seen in Fig. 8.

Fig. 8. Ramp in Front of the Mosque based on the Universal Design Standard

The design for the ramp at the men toilet based on Universal Design Standard can be seen in Fig. 9.

Fig. 9. Ramp at the Men Toilet based on Universal Design Standard
• Hand Washing Facilities

The Al-Hakim Mosque in Padang City does not have a hand washing basin that is intended for normal people or wheelchair users. Both the Regulation of the Minister of Public Works Number 14/PRT/M/2017 and the Universal Design Standard must provide hand washing basins in the toilet.

The design for the hand washing facilities based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 can be seen in Fig. 10.

![Fig. 10. Hand Washing Facilities based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017](image)

The design for the Hand Washing Facilities based on Universal Design Standard can be seen in Fig. 11.

![Fig. 11. Hand Washing Facilities based on the Universal Design Standard](image)

• Parking Lot

Constraints for wheelchair users when using parking facilities:

- The size of the parking facility for wheelchair users does not exist.
- There is no symbol for parking signs for persons with disabilities with contrasting colors and signs to distinguish them from public parking lots.
- There is no parking space for wheelchair users.

The design for the parking lot based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 can be seen in Fig. 12.
The design for the parking lot based on Universal Design Standard can be seen in Fig. 13.

Of the 3 obstacles mentioned, the following are recommendations for improving the design of parking facilities for wheelchair users:

− There must be a parking space for wheelchair users.
− A parking space symbol for wheelchair users is provided.

The size of the parking lot for wheelchair users must be made so that wheelchair users can use the facility.

2. Percentage of Conformity of Facility Design Improvement Result

Improvements in the design of toilet facilities, ablution places, road ramp, hand washing basins, and parking lots have increased the percentage of conformity with the design of the Minister of Public Works Regulation Number 14/PRT/M/2017. The following table shows the increase in the percentage of conformity of public facilities with the Regulation of the Minister of Public Works Number 14/PRT/M/2017 which can be seen in Table 3.

<table>
<thead>
<tr>
<th>No</th>
<th>Facility</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Toilet</td>
<td>82%</td>
</tr>
<tr>
<td>2</td>
<td>Cleansing Room</td>
<td>92%</td>
</tr>
<tr>
<td>3</td>
<td>1. Ramp the Way in Front of the Mosque</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>2. Ramp Walk in the Men’s Toilet</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Washbasin</td>
<td>75%</td>
</tr>
<tr>
<td>5</td>
<td>Parking Lot</td>
<td>100%</td>
</tr>
</tbody>
</table>
3. Calculation of Estimated Cost of Public Facilities

The calculation of the estimated cost or budget plan (RAB) aims to estimate the costs that will be incurred to repair the public facilities that have been designed. In making the budget, it is necessary to measure the size of public facilities that have been designed, the unit price of public facilities equipment, analysis of the unit price of work (AHSP) based on the Regulation of the Minister of Public Works Number 28/PRT/M/2016, and a list of work unit prices (HSP) for the City of Padang, 2021 in the third quarter. All public facilities are assumed by making all these facilities from scratch (not renovation).

The steps in conducting a budget design in this study can be seen as follows:

- Calculating the volume of all public facilities.
- Do a volume recap.
- Make an analysis of the unit price of work (AHSP) for each public facility.
- Make BOQ (Bill of quantity).

- Regulation of the Minister of Public Works Number 14/PRT/M/2017
- The total design budget for the design of public facilities is obtained from adding up all BOQs from public facilities so that the total draft budget is Rp. 104,433,701.
- Universal Design Standard
- The total budget plan (RAB) is done by adding up all BOQs from public facilities. So that the RAB based on the Universal Design Standard is Rp. 249,574,369.

4. Benefits of Design Implementation

Evaluating and designing public facilities at the Al-Hakim Mosque in Padang City so that these facilities are easy to use by wheelchair users. The evaluation was carried out based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 and the design of public facilities at the mosque was carried out following the Regulation of the Minister of Public Works Number 14/PRT/M/2017 and the Universal Design Standard. The design that has been made is calculated by calculating the estimated cost of the design that will be carried out with the assumption that the facility is made from scratch. From this work, benefits are obtained if this design is implemented, namely wheelchair users can use public facilities at the mosque easily without any obstacles, the Al-Hakim Mosque in Padang City can use this design as a guide if they will implement facilities that are friendly to chair users. wheels and the Padang City Al-hakim Mosque can see a reference for how much budget will be spent if they are going to design public facilities for people with disabilities that are following standards.

5. The Value of Implementing a Public Facility Design

The value of these public facilities if implemented with the amount of money spent based on the calculation of the estimated cost, namely:

- Persons with disabilities, especially wheelchair users, are easy to use these facilities.
- Apart from being a place of worship, the Al-Hakim Mosque in Padang City can be a tourist attraction in West Sumatra. So that with the implementation of the facility design, all visitors (both normal people and people with disabilities, especially wheelchair users) can use the facilities available at the Al-Hakim Mosque, Padang City, so that more visitors can visit the mosque.
- Adding the value of beauty to the Al-Hakim Mosque in Padang City
4. Conclusion

The inhibiting factors of the public facilities studied at the Al-Hakim Mosque in Padang City can be seen from the criteria contained in the Regulation of the Minister of Public Works Number 14/PRT/M/2017. Based on these criteria, the percentage of facility suitability can be calculated. The percentage of suitability for male toilet facilities is 50%, male ablution places are 77%, road ramp is 33%, hand washing basins are 0%, and parking spaces are 0%. Design improvements that have been made based on anthropometric data, Minister of Public Works Regulation Number 14/PRT/M/2017, and Universal Design Standards. There are some addition stuffs for ablution places, toilet, road ramp, hand washing basins, and parking lots. There is an increase in the suitability of the designed public facilities. For toilet facilities, the percentage of conformity is 82%, ablution facilities are 92%, road ramp in front of the mosque and men's toilets are 100%, hand washing basins are 75%, and parking lots are 100%. The amount of financial planning that has been made in the design of public facilities based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 is Rp. 104,103,701. The amount of financial planning that has been made in the design of public facilities based on the Universal Design Standard is Rp. 249,574,369. The Padang City Al-Hakim Mosque provides a budget limit of Rp. 238,000,000. It can be seen that the RAB based on the Regulation of the Minister of Public Works Number 14/PRT/M/2017 can be used because the RAB falls within the limits provided by the Al-Hakim Mosque, Padang City. With this facility design, there will be benefits if the design is implemented, namely wheelchair users can use public facilities at the mosque easily without any obstacles, the Al-Hakim Mosque in Padang City can use this design as a guide if they will implement the facility which is friendly for wheelchair users, and the Padang City Al-hakim Mosque can see a reference for how much budget will be spent if they plan to design public facilities for people with disabilities according to standards.

References