Advance Sustainable Science, Engineering and Technology (ASSET)
Vol. 7, No.1, January 2025, pp. 02501022-01 ~ 02501022-013
ISSN: 2715-4211 DOI: https://doi.org/10.26877/asset.v7i1.1465

Improving Road and Sidewalk Accessibility for Persons with Disabilities: Infrastructure Challenges and Legal Compliance in Indonesia

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Abstract. Research to address significant challenges related to public infrastructure accessibility, especially for disabilities, regarding regulations that govern accessibility, the implementation in the field is still far from adequate. The research aims to evaluate the condition of public infrastructure, identify accessibility barriers for disabilities, and provide recommendations for future improvements. A mixed-methods approach, with participatory research methodology, provides significant contributions to disability and urban planning. Probability sampling method, with 150 respondents, physical, intellectual, and sensory disabilities, as well as experiences and challenges of accessibility. Data analysis, qualitative and quantitative methods, thematic analysis to analyze qualitative data about PWD experiences, descriptive and inferential statistical analysis for quantitative data. The findings indicate that road and sidewalk infrastructure is inadequate, with uneven surfaces, a lack of supporting facilities such as ramps, and unclear signage. Persons with disabilities are isolated from participating in public spaces, highlighting the gap between regulations and their implementation on the ground. The findings emphasize the integration of universal design in future infrastructure planning. Involving disabilities in planning results in more inclusive and effective solutions. Improving training and awareness for urban planners, along with regular monitoring of public infrastructure, ensures compliance with accessibility standards, moving towards a Smart Disability City (SDC)

Keywords: Urban Accessibility, Disability Infrastructure, Universal Design, Disability Rights, Indonesia

Received 2025-01-08, Accepted 2025-01-08, Available Online by 2025-01-31)

1. Introduction

Accessibility to public spaces is a fundamental aspect that ensures that people with disabilities can fully participate in society. The design and implementation of accessible public facilities are crucial for

promoting inclusivity and equality. Public spaces serve as important centers for social interaction, economic activity, and cultural exchange, and their accessibility is crucial for fostering an inclusive society [1]. The lack of accessible infrastructure not only limits the physical movement of people with disabilities but also reinforces social exclusion, highlighting the urgent need for comprehensive urban planning that prioritizes accessibility [2].

The condition of public spaces in the city of Parepare currently reflects a mix of progress and ongoing challenges related to accessibility for people with disabilities. Although several initiatives have been implemented to improve accessibility, many public facilities still show significant barriers, such as poorly designed ramps, inadequate signage, and a lack of facilities [3]. A broader study reflects this situation, revealing the architectural and systemic barriers faced by people with disabilities in various urban environments [4]. The role of roads and sidewalks is essential in Parepare, as they not only connect various public spaces but also serve as crucial pathways for mobility. To enable people with disabilities to fully participate in public life, it is crucial to design this infrastructure with universal accessibility in mind [5]. The most advanced cities in Europe and other continents feel the pressure to transform into smart cities, although there is a gap regarding how the services and functions of these cities transition to smart services. Advanced cities use network infrastructure and advanced technology to enhance economic and political efficiency, as well as social and economic development [6].

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The problem statement is the unavailability of roads and sidewalks that can be independently accessed by persons with disabilities, as well as the lack of understanding among persons with disabilities about their rights, despite the existing legal framework protecting them under Law No. 8 of 2016. Therefore, the aim of this research is to identify and reveal the specific barriers faced by individuals with disabilities in accessing public spaces and services. This approach aligns with the findings of Sakawati et al. (2022), who emphasize the need to evaluate public services from an accessibility perspective to enhance public satisfaction [7]. In addition, the integration of technology, such as mobile applications that provide real-time accessibility information, is a new innovation that can significantly improve navigation in urban environments for people with disabilities [8].

The main objective of this research is to enhance and explore the understanding of the perceptions of persons with disabilities (PWD) regarding accessibility in public spaces, with a particular focus on roads and sidewalks. To achieve this goal, we outline the following details: 1) We will identify and investigate the environmental barriers that persons with disabilities (PWD) face in public spaces, particularly those related to road and sidewalk accessibility. This includes examining the physical infrastructure and its adequacy in meeting the needs of persons with disabilities [2]; 2) aims to understand and explore social attitudes and stigma related to disabilities, which significantly affect how people with disabilities perceive their accessibility experiences. Understanding these attitudes will provide insights into the broader social context that shapes the experiences of people with disabilities [9]. 3) By utilizing qualitative methods to understand the personal experiences of persons with disabilities (PWD), we can gain a deeper understanding of their perceptions of accessibility. Therefore,

the importance of integrating accessibility standards to promote inclusivity and fair participation in digital educational resources [10]; 4) The goal is to provide policy and practice information to policymakers and urban planners, along with evidence-based recommendations, to improve accessibility in public spaces and universal design in order to achieve the Smart Disability of City.

2. Methods

This research applies a qualitative and quantitative approach. This research will adopt a qualitative research approach, which is suitable for exploring the perceptions of people with disabilities regarding accessibility in public spaces. We anticipate that this approach will yield relevant and efficient design solutions. Qualitative research is characterized by its focus on understanding phenomena from the participants' perspective, making it ideal for capturing detailed views of people with disabilities regarding accessibility [11]. Figure 1 illustrates the stages of the research method. This research consists of five main steps: problem identification, literature review, user-centered design solutions, results, and conclusion.

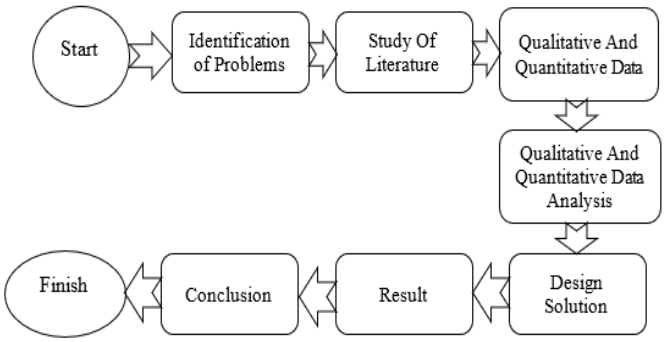

Figure 1. Stages of Research Methodology

1.1. Identification Of Problems

The initial stage of this research is crucial for identifying key issues through interviews with road and sidewalk users with disabilities. These interviews aim to gather detailed information about the needs and preferences of users for disability-friendly road and sidewalk designs. The design approach focuses on a deep understanding of users, their needs, and the context of product use [12]. Detailed explanation as follows:

a. The probability sampling method with participants being individuals, those with physical disabilities, intellectual disabilities, and sensory disabilities, educational levels, ages, occupations, and socioeconomic status, all from low-income backgrounds, all having experience using roads and sidewalks, providing various diverse perspectives. The number of respondents is 150 samples.
b. Qualitative Data Analysis:
   Thematic analysis is an approach that involves the identification, analysis, and systematic reporting of patterns (themes) within data. Thematic analysis allows researchers to explore the richness and complexity of the experiences of people with disabilities, revealing nuanced perspectives on accessibility challenges. Researchers can identify recurring themes related to physical barriers such as uneven sidewalks and lack of ramps, social barriers such as stigma and discrimination, and the impact these barriers have on their daily lives and social participation, thereby providing a comprehensive picture of the research topic.
c. Quantitative Data Analysis:
   Descriptive statistics are used to look at visual data and figure out how common different types of barriers are (like potholes, uneven road surfaces, and not having any ramps). This is

done to see how well infrastructure meets current accessibility standards and to help make policy suggestions. Correlation analysis can also be used to explore the relationship between various variables, such as sidewalk conditions and the frequency of use reported by people with disabilities.

1.2. Study of Literature

The next stage involves a literature review to identify theories or studies that address similar issues. Understanding the context and previously proposed solutions is crucial in this step. In supporting this research, the focus is on previous studies and other reference sources related to user experience, user-centered design solutions, roads, and sidewalks for people with disabilities.

1.3. Qualitative and Quantitative Data

User perception design is a design methodology that prioritizes users throughout the design process. This approach focuses on a deep understanding of users' needs, preferences, and behaviors by actively involving them at every stage of development. Qualitative research is characterized by its focus on understanding phenomena from the participants' perspective, making it ideal for capturing detailed views of individuals with disabilities regarding accessibility [11]. The research cycle, road design, sidewalks, and iterative testing ensure that the final product is intuitive, efficient, and satisfying for the end users. Detailed explanation as follows:

a. Understanding the Context of Use
   Understanding the use of context involves identifying and understanding the problems faced by users. This stage serves as the foundation for creating an effective design. The result of this stage is a detailed description that informs the development of appropriate design solutions.
b. Determine User Requirements
   Determining Requirements Users are the focus of the data collection stage, which focuses on establishing success criteria for design solutions. We develop their specifications at this stage to ensure that the resulting design meets the needs and expectations of the users.
c. Design Solution
   After gathering information about user needs, the next step is to design a solution. This stage involves users using existing roads and sidewalks according to their expectations.
d. Evaluation of the requirements

The next step involves evaluating the designed solution. The objective is to determine if the solution has satisfied the needs of potential users. Is it already in accordance with the standards set by the government or not?

3. Result and Discussion

The Summary of Participants' Experiences with Roads and Sidewalks in Parepare City reveals that participants with disabilities in Parepare reported a variety of experiences while navigating roads and sidewalks. Many expressed feelings of frustration and despair because the inadequate infrastructure failed to meet their needs. Participants highlighted that sidewalks are often uneven, poorly maintained, or even nonexistent in some areas, making mobility difficult and unsafe. For example, individuals who use wheelchairs or mobility aids often encounter obstacles such as potholes, cracks, and interference from street furniture, hindering their ability to navigate public spaces effectively [13]. Participants also noted that the lack of accessible pedestrian crossings and traffic signals further exacerbated their difficulties. Many reported feeling vulnerable when trying to cross busy streets, as the lack of curb cuts and proper traffic signals made it difficult to navigate safely. This lack of accessibility not only affects their physical mobility but also contributes to feelings of social exclusion and isolation, as they often avoid going out due to the challenges posed by the built environment [14]. Overall, the experiences

shared by the participants emphasize the urgent need for improvements in road and sidewalk accessibility in Parepare.

The Indonesian government has ensured access for persons with disabilities, one of which is through Law No. 8 of 2016 on disabilities. Meanwhile, Ministerial Regulation PUPR No. 14/PRT/M/2017 mandates that the provision of public facilities, such as roads and sidewalks in public spaces, must comply with technical regulations for persons with disabilities. The city of Parepare has issued Regional Regulation No. 7/2023, which pertains to the implementation of respect, protection, and fulfillment of the rights of persons with disabilities. Based on data from the Parepare City BPS in 2022, the population of persons with disabilities in Parepare City reached 414, with a sample size of 150 in this study.

The following table displays the characteristics of the sample:

Table 1. Gender

	Gender	Frequency	Percent
Valid	Male	83	55.3
	Female	67	44.7
	Total	150	100.0

Table 2. Age

	Age	Frequency	Percent
Valid	10-20 Years	6	4.0
	21-30 Years old	40	26.7
	31-40 Years old	34	22.7
	41-50 Years old	38	25.3
	50 Years and above	32	21.3
	Total	150	100.0

Table 3. Disability Status

	Disability Status	Frequency	Percent
Valid	Physical Disability	59	39,3
	Intellectual Disability	19	12,7
	Sensory Disability	72	48,0
	Total	150	100.0

Table I, presents the characteristics of respondents based on gender, revealing that the majority of respondents are male at 55.3% and female at 44.7%. Table II, which focuses on the age of respondents,

shows that the average percentage is nearly the same for all respondents, with the exception of the age group 10–20, which accounts for only 4%. In Table III, the majority of respondents 48%, have sensory disabilities, while 39,3% have physical disabilities. The remaining respondents, out of the total 150, either have intellectual disabilities.

Next, we will discuss the respondents' perceptions of public space facilities, particularly roads and sidewalks, in the city of Parepare:

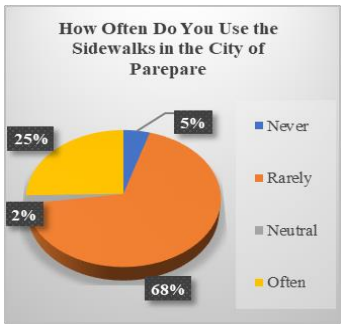

Figure 2. Frequency of sidewalk usage

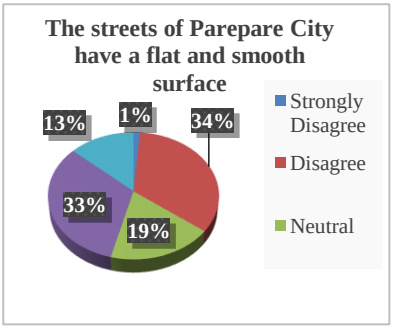

Figure 3. Road surface conditions

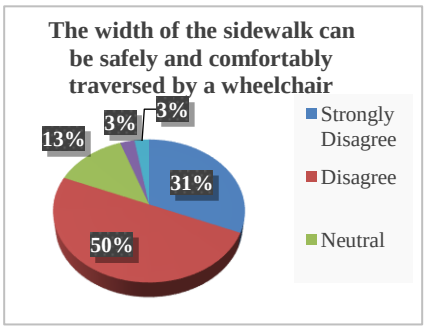

Figure 4. Sidewalk Width Condition

Figure 1, shows the frequency of respondents' perceptions regarding sidewalk usage, with 68% rarely using the sidewalk, 25% often using it, and the remainder either never using it or being neutral among the total sample of 150. Figure 2 shows respondents' perceptions of the road surface condition, with 1% strongly disagreeing, 34% disagreeing, 19% being neutral, 33% agreeing, and the remaining 13% strongly agreeing. Therefore, while the responses and perceptions of the respondents are nearly identical, the actual conditions on the ground indicate that certain roads and sidewalks are indeed unfriendly to individuals with disabilities. Out of 150 respondent samples, Figure 3 reveals that 31% strongly disagree, 50% disagree, 13% neutral, 3% agree, and the remaining 3% strongly agree. This indicates that the sidewalk width falls short of the government-established standards.

The study aims to identify the common obstacles that individuals with disabilities encounter in the city of Parepare. This study identifies several common barriers faced by individuals with disabilities in Parepare, which significantly affect their mobility and accessibility. The main barriers include: 1) Participants reported that uneven surfaces, the absence of pedestrian paths, and poorly designed sidewalks create significant physical barriers. Participants also stated the absence of proper pedestrian crossings, tactile paving, and accessible signage as examples of inadequate infrastructure. Participants noted that the lack of these features not only makes navigation difficult but also poses safety risks when crossing the street [15]; 2) Social Attitudes and Stigma: In addition to physical barriers, participants

highlighted the impact of societal attitudes toward disabilities. Many expressed feelings of stigma and discrimination, which can make them reluctant to use public spaces at all. The social dimension of this accessibility is very important, as it affects their desire to interact with the community [16].

Field survey results reveal that the condition of roads and sidewalks does not meet the standards set by the Indonesian Minister of Public Works and Public Housing Regulation No. 14/PRT/M/2017. These regulations pertain to the provision of public facilities, including roads and sidewalks, in public spaces. These facilities must comply with technical provisions for persons with disabilities. The following figure illustrates this clearly:

Figure 5. Sidewalk Obstacles: Potholes and Trash Bins

Figure 6. A Tree In The Middle Of The Sidewalk Presents A Sidewalk Obstacle.

Figure 7. Road Deviation: Ramp And Signs Are Missing

Figures 4, 5, and 6. The current state of roads and sidewalks fails to meet established standards, posing challenges for individuals with disabilities to participate in public activities. It seems that the sidewalks have holes, and their condition is similar to the absence of clear signs at intersections, while a width of more than 1.5 meters is already up to standard. The lack of knowledge among planners and field implementers about which standards to follow is a contributing factor. The city government should use these findings to determine compliance with international or national standards. Limited Awareness and Training: Participants noted that the lack of awareness and training among city planners and public service providers regarding the needs of persons with disabilities contributes to the persistence of these barriers.

1.4. Factors Affecting Research:

1) The analysis of how environmental design affects perception reveals that environmental design significantly shapes the perceptions of persons with disabilities (PWD) regarding accessibility in public spaces, particularly roads and sidewalks in Parepare. Respondents reported that well-designed environments significantly enhance their mobility and confidence when navigating public spaces. We must clearly identify features such as smooth and flat surfaces, accessible ramps, and clear signage as essential elements that facilitate easier movement and contribute to a positive perception of accessibility. The shortcomings of this design not only hinder physical access but also foster feelings of frustration and exclusion among users. Respondents stated that

the presence of physical barriers often leads to the perception of public spaces as unfriendly and unsafe, reinforcing their reluctance to engage with the community. According to studies conducted by Sakawati et al. (2022), respondents often perceive public spaces as unfriendly and unsafe due to physical barriers [7]. These findings emphasize the importance of integrating universal design principles into urban planning to create inclusive environments that meet the needs of all individuals, regardless of their abilities [17].

2) Discussion on Public Attitudes and Their Impact on Accessibility: The accessibility experiences of People with Disability (PWD) in Parepare are significantly influenced by public attitudes towards disability. Research reveals that negative societal attitudes, including stigma and discrimination, create additional barriers that complicate navigation in public spaces. Participants reported experiencing prejudice from the general public, which often manifested in unhelpful or dismissive behavior from service providers, such as bus drivers and store employees, Barzallo et al. (2022) conducted this study [18]. These negative interactions can make persons with disabilities (PWD) reluctant to use public transportation and access services, further isolating them from community participation. Moreover, this study highlights that positive attitudes and awareness among the community can enhance the accessibility experience. Participants noted examples where supportive interactions with community members and service providers made a significant difference in their ability to navigate public spaces effectively. This shows that promoting a culture of inclusivity and understanding is crucial for improving the accessibility landscape for PWD [19]. Educational initiatives aimed at raising awareness about disability issues and promoting empathy can play a crucial role in changing public attitudes and improving overall accessibility in urban environments.

1.5. Interpretation of Discussion Findings:

The findings of this study are in line with the existing literature on accessibility and disability, especially in the context of urban environments like Parepare. Previous studies have highlighted the important role of environmental design in shaping the experiences of persons with disabilities (PWD) in public spaces. For example, Selanon (2023) emphasises that urban green spaces can enhance accessibility and promote street life for people with disabilities, indicating that wise urban planning can significantly improve the quality of life for individuals with disabilities [20]. This is consistent with the experiences reported by participants in this study, noting that well-maintained sidewalks and accessible paths greatly facilitate their mobility. Shirtcliff et al. (2021) discuss a socio-ecological approach that aligns with these findings, encouraging a comprehensive understanding of the impact of the built environment on community health and accessibility [21].

The implications of this research for urban planning and policy development in the City of Parepare are very profound. First, these findings indicate that urban planners should prioritize the integration of universal design principles in the development of public spaces. This includes ensuring that sidewalks are well-maintained, equipped with ramps, and designed to accommodate various disabilities. In previous research, such design considerations not only enhance physical accessibility but also promote social inclusion and community engagement. However, we must remove the references Booth et al. (2023), because they do not directly support this claim. Involving people with disabilities in discussions about accessibility can provide valuable insights into their needs and preferences, leading to more effective and user-centred solutions [22]. Findings from earlier studies that support co-creation in urban design, like those by Lim & D'souza (2021), support this participatory approach by making accessibility initiatives more useful and effective *[23]*.

1.6. Interpretation of Discussion Finding and Recommendations to Accessibility

These findings highlight several critical areas for improvement in urban planning and policy development in Parepare to enhance accessibility for people with disabilities. (PWDs). First, we must build sidewalks with smooth and even surfaces, equip them with ramps, and design them to accommodate various disabilities. In another study, such design considerations not only facilitate

mobility but also encourage social inclusion and community engagement [24]. It is essential for policymakers to establish clear accessibility standards and guidelines in accordance with national and international best practices. Urban planning should thoroughly document the general trends in the use of technology to improve accessibility, despite the lack of specific research on smart technology in the context of disabilities [24].

Involving individuals with disabilities in discussions about accessibility can provide valuable insights into their unique needs and preferences, leading to more effective and user-centered solutions. Research by Perry et al. (2021), suggests that this approach can enhance the responsiveness of urban environments to the needs of persons with disabilities (PWD)[25]. This participatory approach can help eliminate the stigma associated with disabilities by promoting understanding and empathy within the broader community [26]. Involving people with disabilities in the planning process aligns with the principles of social justice and equality, ensuring that all community members have a voice in shaping their environment [13]. To facilitate this engagement, urban planners should establish regular forums or workshops where individuals with disabilities can share their experiences and provide feedback on the proposed designs.

1.7. Interpretation of Discussion Finding and Recommendations to Accessibility

At this point, the design of the roads and sidewalks is being made in line with Minister of PUPR Regulation No. 14/PRT/M/2017. This regulation says that public facilities like roads and sidewalks in public areas must meet technical standards for people with disabilities and the Guidelines for Planning Pedestrian Facilities from the Indonesian Ministry of PUPR. Here is the design view:

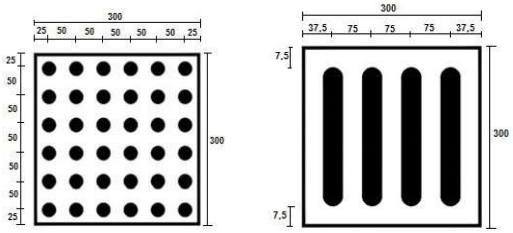

Figure 8. The type and size of the guiding block

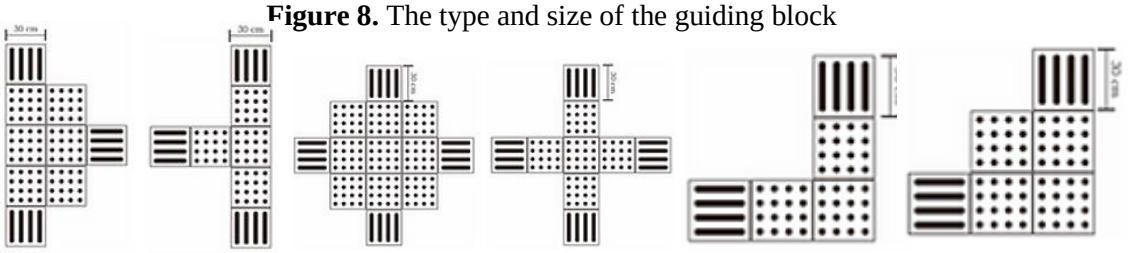

Figure 9. Type of Guide Path for the Visually

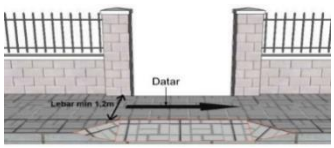

Figure 10. Entrance road and perpendicular curb ramp

Figure 11. Perspective and dimensions of the path are used together

Figure 12. The bus stop is located behind the pedestrian walkway

Figure 13. Access for pedestrians with special needs at the bus stop

Figure 14. Pedestrian platform on the road

Figure 15. Pedestrian platform at the intersection

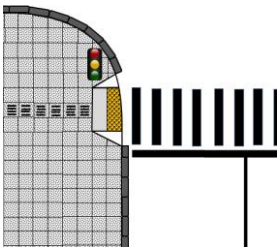

Figure 16. Placement of warning tiles on sidewalk ramps

Figure 17. Placement of warning tiles at the end of the pedestrian crossing

4. Conclusion

The main findings of this research are related to infrastructure conditions. Many research participants reported that road and sidewalk infrastructure is inadequate, often uneven, poorly maintained, or even nonexistent, which complicates mobility and safety, especially for people with disabilities. Regarding the experiences of Persons with Disabilities (PWD), they feel frustrated and socially isolated due to the lack of accessibility, which hinders their participation in public life. Furthermore, when it comes to following the law, laws like Law No. 8 of 2016 and Minister of PUPR Regulation No. 14/PRT/M/2017 are not being followed on the ground, which shows that urban planners need more training and education.

Meanwhile, practical implications: 1) Universal Design: City planners must integrate universal design principles in the development of public spaces to ensure accessibility for all, including people with disabilities; 2) Participation of Persons with Disabilities: Involving persons with disabilities in discussions about accessibility can provide valuable insights and result in more effective and user-centered solutions; 3) Infrastructure Improvement: Infrastructure improvements such as road surface leveling, ramp additions, and clear signage are very important for enhancing accessibility.

Recommendations for Real-World Implementation: 1) Training and Awareness: Increasing awareness and training for urban planners and public service providers about the needs of people with disabilities to reduce existing barriers; 2) Supervision and Evaluation: Conduct periodic supervision and evaluation of public infrastructure to ensure compliance with established accessibility standards; 3) Multi-Stakeholder Collaboration: Organizing workshops and forums that involve various stakeholders, including the disability community, to share experiences and feedback on the proposed design; 4) Use of Technology: Utilizing technology and socio-technical tools to improve the accessibility of sidewalks and other public facilities.

Acknowledgements

Aimed at expressing gratitude to DIKTI through the research grant with the DRTPM program for 2024 and LPPM Universitas Muhammadiyah Parepare as research motivators, to fellow lecturers at Universitas Muhammadiyah Parepare for their input, to brothers and sisters from the disability community in Parepare City who have been respondents, and to the Social Service for the 2022 disability data. Thank you also to the students of Muhammadiyah University who provided input during the data collection.

Referrences

[1] V. S. Pineda, “What Is Inclusive and Accessible Public Space?,” *The Journal of Public Space*, vol. 7, no. 2, pp. 5–8, 2022, doi: 10.32891/jps.v7i2.1607.

[2] Ç. Erçin, “Analysing the Design Criteria of Public Open Spaces for the Disabled Persons: An Evaluation of Kumsal Park in Northern Cyprus,” *European Journal of Sustainable Development*, vol. 12, no. 3, p. 277, 2023, doi: 10.14207/ejsd.2023.v12n3p277.

[3] A. S. Amin, M. A. A. Razak, and N. M. Akhir, “Access to Transportation: The Experiences of Women With Physical Disabilities,” *International Journal of Academic Research in Business and Social Sciences*, vol. 11, no. 6, 2021, doi: 10.6007/ijarbss/v11-i6/10219.

[4] B. A. Whaley, “The Americans With Disabilities Act and Equal Access to Public Spaces,” *Laws*, vol. 13, no. 1, p. 5, 2024, doi: 10.3390/laws13010005.

[5] D. Fernando, H. Galpaya, G. Hurulle, and C. Mobley, “Disability and Place of Living: Experiences of Disability, Accessibility, and Inequality in Four Regions of Myanmar,” *Scandinavian Journal of Disability Research*, vol. 25, no. 1, pp. 170–182, 2023, doi: 10.16993/sjdr.954.

[6] S. Mozūriūnaitė and J. Sabaitytė, “To what extent we do understand smart cities and characteristics influencing city smartness,” *Journal of Architecture and Urbanism*, vol. 45, no. 1, pp. 1–8, 2021, doi: 10.3846/jau.2021.12392.

[7] H. Sakawati, A. C. Susilawati, and S. Sulmiah, “Accessibility of Public Services for Persons With Disabilities at the Makassar City Social Service,” *Jurnal Ad Ministrare*, vol. 9, no. 2, p. 485, 2022, doi: 10.26858/ja.v9i2.38971.

[8] M. R. d. Rosa and E. N. Pereira, “Design and Development of a Collaborative App With Accessibility Information About Tourist Sites,” *Interfaces Científicas - Humanas E Sociais*, vol. 9, no. 2, pp. 496–511, 2021, doi: 10.17564/2316-3801.2021v9n2p496-511.

[9] A. Watharow and S. Wayland, “Making Qualitative Research Inclusive: Methodological Insights in Disability Research,” *Int J Qual Methods*, vol. 21, 2022, doi: 10.1177/16094069221095316.

[10] D. Rakhmawati and F. M. Dewanto, “Development of Counseling Sites with Digital Accessibility Features for the Blind and Visually Impaired Students,” vol. 7, no. 1, pp. 1–11, 2025.

[11] N. Sisinyize, “Enhancing Access to Learning Aids and Resources at Windhoek Correctional Facility,” *J. Edu. For. Sustainable Inno*, vol. 1, no. 2, pp. 106–112, 2023, doi: 10.56916/jesi.v1i2.571.

[12] W. Maulana Prawiro and E. Rosi Subhiyakto, “User-Centered Design Approaches to Enhance Employee Attendance Applications,” *Advance Sustainable Science Engineering and Technology*, vol. 6, no. 3, p. 02403025, 2024, doi: 10.26877/asset.v6i3.798.

[13] D. Labbé, “Multiple-Stakeholder Perspectives on Accessibility Data and the Use of Socio-Technical Tools to Improve Sidewalk Accessibility,” *Disabilities*, vol. 3, no. 4, pp. 621–638, 2023, doi: 10.3390/disabilities3040040.

[14] G. Bulgan and A. Oksay, “A Research of Overcoming the Barriers in Tourism Design by the Perspective of Tourists With Disabilities and Stakeholders in Antalya,” *Journal of Tourism Theory and Research*, vol. 7, no. 1, pp. 22–31, 2021, doi: 10.24288/jttr.839150.

[15] K. P. Rojas, “Disability Inclusive Public Transport in a City in Perú,” *Asian Journal of Education and Social Studies*, pp. 21–27, 2021, doi: 10.9734/ajess/2021/v15i230376.

[16] V. Fast and J. Guo, “Putting Pedestrians First: Sidewalk Infrastructures, Width Patterns and COVID–19,” *Gi_forum*, vol. 1, pp. 242–250, 2021, doi: 10.1553/giscience2021_02_s242.

[17] I. Pujiyanti, “Study of Accessibility Principles for Persons With Disabilities in Yogyakarta City Spatial Regulation,” *IOP Conf Ser Earth Environ Sci*, vol. 1218, no. 1, p. 12016, 2023, doi: 10.1088/1755-1315/1218/1/012016.

[18] A. P. Barzallo, J. M. Fariña, and E. Á. d. Andrés, “Public Open Spaces: Enabling or Impeding Inclusive Evacuation During Disasters,” *The Journal of Public Space*, vol. 7, no. 2, pp. 79–92, 2022, doi: 10.32891/jps.v7i2.1474.

[19] M. Patrick and I. McKinnon, “Co-Creating Inclusive Public Spaces: Learnings From Four Global Case Studies on Inclusive Cities,” *The Journal of Public Space*, vol. 7, no. 2, pp. 93–116, 2022, doi: 10.32891/jps.v7i2.1500.

[20] P. Selanon, “The Importance of Urban Green Spaces in Enhancing Holistic Health and Sustainable Well-Being for People With Disabilities: A Narrative Review,” *Buildings*, vol. 13, no. 8, p. 2100, 2023, doi: 10.3390/buildings13082100.

[21] B. A. Shirtcliff, R. Manzo, and R. Scudder, “Crosscutting Environmental Risk With Design: A Multi-Site, Multi-City Socioecological Approach for Iowa’s Diversifying Small Towns,” *PLoS One*, vol. 16, no. 6, p. e0252127, 2021, doi: 10.1371/journal.pone.0252127.

[22] M. Booth, P. Kalutara, and N. Abbasi, “Re-Thinking Spatial Design in Homes to Include Means and Access Restriction With Material Impacts as Passive Suicide Prevention Methods: A Systematic Review of Design for Australian Homes,” *Buildings*, vol. 13, no. 6, p. 1452, 2023, doi: 10.3390/buildings13061452.

[23] S. Lim and C. D’souza, “Wheeled mobility use on accessible fixed-route transit: A field study in environmental docility,” *Int J Environ Res Public Health*, vol. 18, no. 6, pp. 1–23, 2021, doi: 10.3390/ijerph18062840.

[24] K. Lepoglavec, “Accessibility of Urban Forests and Parks for People With Disabilities in Wheelchairs, Considering the Surface and Longitudinal Slope of the Trails,” *Sustainability*, vol. 15, no. 10, p. 7741, 2023, doi: 10.3390/su15107741.

[25] M. O. Perry *et al.*, “‘Enticing’ but Not Necessarily a ‘Space Designed for Me’: Experiences of Urban Park Use by Older Adults With Disability,” *Int J Environ Res Public Health*, vol. 18, no. 2, p. 552, 2021, doi: 10.3390/ijerph18020552.

[26] K. Du, A. B. Mohosin, A. Amin, and T. Hasan, “Influence of Education on Sexual and Reproductive Health Service Utilization for Persons With Disabilities in Nationwide Bangladesh: An Explanatory Sequential Mixed-Methods Study,” *Reprod Health*, vol. 19, no. 1, 2022, doi: 10.1186/s12978-022-01352-7.