



ASSESSING AND IMPROVING ACCESSIBILITY FOR PERSONS WITH DISABILITIES AT THE RELIGIOUS HERITAGE SITE OF SUNAN KUDUS TOMB IN INDONESIA WITH A UNIVERSAL DESIGN AND ERGONOMIC APPROACH

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ABSTRACT

Ensuring that tourist attractions are easily accessible to all groups is one of the main objectives of the Sustainable Development Goals (SDGs) by 2030. Easily accessible tourist attractions contribute to social justice and improve the overall quality of human development for all segments of society, in particular individuals. People with disabilities who often encounter obstacles when they want to visit these destinations. Therefore, it is very important to implement measures that improve the accessibility of tourist attractions, including information, physical facilities, and services. This is especially related to religious tourism at the Sunan Kudus Tomb, one of the religious tourist attractions in Kudus City. The method used in this research is based on universal design principles. Accessibility assessment data is collected using a checklist aligned with 7 universal design principles, including fairness in use, flexibility, simplicity and intuitiveness, clear information, tolerance, minimal energy consumption, and consideration of size and space for users. In addition, the study refers to the technical criteria outlined in Regulation No. 14/PRT/M/2017 of the Ministry of Public Works and Housing. The study found that accessibility ratings varied across facilities. Specifically, the entrance was the only facility categorized as accessible. In contrast, the exit, ablution area, and entrance hall were categorized as less accessible. In addition, toilets and signs & information were classified as inaccessible. Proposed improvements to the accessibility of Sunan Kudus religious tourism sites can be made by adopting an ergonomic approach.

Keywords:

Assessment; Accessible; Tourism; Person with Disabilities; Universal Design Principle; Ergonomic

1. INTRODUCTION

Inclusive and easily accessible public spaces for people with disabilities are one of the goals of the Sustainable Development Goals 2030 (SDGs 2030) [1]. One public space that receives little attention for accessibility is tourist attractions. Accessibility in tourist attractions is a contemporary issue [2]. Conceptualizing accessible tourism for all community groups is of utmost importance for the future. Accessible tourism was designed to accommodate everyone, regardless of age, disability, illness, physical limitations, or even those traveling with luggage or young children. It encompasses physical accessibility to facilities and infrastructure, affordability, and the availability of relevant information [3]. The central concept advocated by inclusive tourism is to view tourism as a transformative tool where marginalized groups participate equally in both the ethical creation and enjoyment of tourism, ensuring

fair distribution of its benefits. Developing inclusive tourist destinations, aided by technology, can enhance accessibility for tourists with disabilities in terms of physical, sensory, and informational aspects [4]. The concept of accessibility is divided into three main pillars: physical, informational, and service-based. Eliminating physical barriers by applying universal design principles to the design of every building is something that needs to be considered [5].

People with disabilities as subjects sometimes face cognitive barriers when accessing tourist attractions. Viewed historically, cognitive barriers take the form of exclusion and social marginalization because people with disabilities lack power and a voice in participation [6]. They have encountered significant obstacles in cultural spheres, including the arts, sports, and recreation [7]. Considering the wide range of needs expressed by tourists with disabilities, it is essential to incorporate their requirements when designing accessible tourist environments and activities [8]. The satisfaction of tourists with disabilities hinges on how well their specific needs are met, including accessibility to public spaces, recreational areas, and hotel bathrooms [9]. Perceived accessibility significantly influences their motivation to travel again [10]. People with disabilities have equal entitlement to rights such as life, social welfare, accessibility, and the ability to live independently, just like individuals without disabilities [11]. Thus, disability covers a wide range of physical and mental disorders that can hinder or reduce a person's ability to carry out daily activities [12]. People with disabilities can be classified into various groups based on the types of limitations they experience. The World Health Organization (WHO) provides three categories of disability: (1) Impairment, which refers to a condition involving abnormalities or loss of psychological or anatomical structure or function, (2) Disability, which represents an inability or limitation resulting from an impairment, preventing individuals from performing activities considered normal for humans, and (3) Handicap, which denotes a condition that hinders a person's ability to fulfill their normal roles, taking into account factors such as age, gender, and cultural context [13].

One of the prominent religious tourism destinations in Indonesia is the Tomb of Sunan Kudus, located in the city of Kudus. Kudus is part of a district in Central Java with an area of 42,516 hectares. The city is rich in local Islamic culture and is known for its tolerance toward adherents of other religions, reflected in traditions such as Dandangan, Kupatan, Bulusan, and Buka Luwur. Additionally, Kudus does not use beef in its traditional food to show respect for the Hindu community. Today, Kudus is known as "Kota Kretek" (Clove City) and "Kota Santri" (City of Santri), which is closely tied to the roles of two Wali Allah (saintly figures), Sunan Muria and Sunan Kudus, who were part of the Walisongo and played an important role in spreading Islam in Java during the 15th and 16th centuries [14].

Sunan Kudus, whose real name was Sayyid Ja'far Shodiq, was originally from Palestine and later settled in Kudus. The area, formerly known as Tajug, was transformed into Kudus Darussalam, a more civilized and inclusive city for people of various beliefs. Sunan Kudus studied under Sunan Kalijaga and spread Islam in Central Java with a tolerant approach to local culture. In his preaching, he did not discriminate based on social status, ethnicity, or religion. He used wisdom-filled stories to attract people to Islam, such as the story of respect for cows, which aimed to instill compassion for all of God's creatures. Some of Sunan Kudus' legacies still stand today, including Al Aqsha Mosque and Kudus Tower, which have become significant symbols of Kudus City [15].

Within the Al Aqsha Mosque and Kudus Tower complex lies the Tomb of Sunan Kudus, a religious tourism site built in 1549 AD. This historic site is renowned for its blend of Islamic and Hindu architecture [16]. One notable annual tradition is the Buka Luwur ceremony, during which the luwur (cloth covering the tomb, gravestone, and surrounding structures) is replaced. This event takes place on the 10th of Muharram to commemorate the anniversary (*haul*) of Sunan Kudus. It involves more than a thousand people, primarily residents of Kauman and surrounding areas, and lasts for ten days. The local community believes that the used luwur from Sunan Kudus' tomb carries blessings, as it has been infused with prayers and Qur'anic recitations from visiting pilgrims. Additionally, the *selamatan* (communal feast) involves distributing *sego jangkrik* (a special rice dish wrapped in banana leaves), which is believed to confer various benefits. It is thought to promote good health, enhance soil fertility when scattered, and accelerate livestock growth when mixed into animal feed [17].

Currently, the Tomb of Sunan Kudus has developed into a major religious tourism destination for Muslim communities in Indonesia (Figure 1). Various facilities have been provided to enhance visitors' comfort and ensure easy accessibility. However, accessibility remains a major challenge for tourists with disabilities when visiting the Tomb of Sunan Kudus. Based on initial observations, several accessibility issues have been identified in various facilities at the site. These issues include a lack of signage and informational boards, inaccessible ablution facilities for people with disabilities, and the absence of ramps in the main tomb area.



Figure 1. The Sunan Kudus Tomb Religious Tourism Site

The problem of accessibility barriers for people with disabilities in several facilities at the Sunan Kudus tomb religious tourism site can be overcome through a universal design approach. Universal design is a human-centered approach to product and environmental design that can be used by all groups, regardless of age, gender, and diversity, as much as possible, without the need for adaptation or special design [18]. In general, universal design provides benefits for all groups, including both able-bodied individuals and those with special needs. The Universal Design approach seeks to minimize the challenges individuals face over their lifetimes due to life changes or unexpected disabilities. It aims to develop environments and products that ensure equal accessibility for all people, regardless of their diverse characteristics. Universal Design views the entire population inclusively, acknowledging the spectrum of human abilities and bodies [19].

The Universal Design principles (UDP) offer guidelines for UD developers, applicable to the assessment of products and environments. The design principles outlined by Mace [20] and Null can be summarized in four key points: supportiveness, adaptability, accessibility, and safety orientation [21]. Providing comfort and information is part of the principles of Universal Design, which is created through easily accessible design [22]. An additional seven principles and related guidelines were introduced by the Center for Universal Design in 1997, as they found Mace's (1985) principles to be vague and prone to duplicity. These seven principles of universal design include (1) equitable use, (2) flexibility in use, (3) simplicity and intuitiveness, (4) perceptible information, (5) tolerance for error, (6) low physical effort, and (7) appropriate size and space for approach and use [23].

Previous research by Sari et al. emphasized the importance of universal design in creating accessible tourism [24]. Wan and Yim King Penny conducted research evaluating the application of universal design only to signposts at heritage sites in Macao. They found that the signposts at Macao heritage sites did not comply with universal design principles [25]. Vardia et al., in a study of universal access to India's Jantar Mantar Heritage, concluded that providing universal design to cultural heritage sites is mutually beneficial, showing sensitivity, compassion for diversity, and respect for vulnerable populations [26].

This research aims to assess the accessibility of people with disabilities at the religious tourism facilities at Sunan Kudus cemetery, using universal design Principles and based on the technical criteria outlined in the Ministry of Public Works and Housing Regulation number 14/PRT/M/2017 [27].

2. METHODS

The methods section describes the rationale for applying specific procedures or techniques to identify, select, andThis research utilized qualitative methods. We gathered accessibility data through a checklist approach, incorporating the seven principles of universal design (UDP), the technical criteria outlined in Ministry of Public Works and Housing Regulation number 14/PRT/M/2017, and insights from Suhardi's earlier study [28].



The study will be structured into three phases, outlined as follows:

1. Field Study and Literature Study
2. Evaluate the accessibility of the object using checklists developed based on the Ministry of Public Works and Housing Regulation number 14/PRT/M/2017 and Universal Design Principles (UDP). The checklist is detailed in Table 1. Steps for evaluating the accessibility of the object are as follows:
 - a) Examine the condition of the object based on the indicators specified in the checklist.
 - b) Document the condition of the object.
3. Determine the object's accessibility index using the following guidelines:
 - a) Assign weights to each response option for every sub-category of the accessibility assessment. A fully accessible response is weighted two, a partially accessible response is weighted one, and a non-accessible response is weighted zero.
 - b) Calculate the overall accessibility assessment by summing the weighted scores and dividing by the maximum possible score.
 - c) Compare the calculated accessibility index with the values in Table 5. An index between 0.00 and 0.33 indicates a lack of accessibility; 0.34-0.66, partial accessibility; and 0.67-1.00, full accessibility.

3. RESULT AND DISCUSSION

Field observations show that there were six facilities at the Sunan Kudus Tomb Religious Tourism Site, which were assessed using the universal design principles approach outlined in the Ministry of Public Works and Housing Regulation number 14/PRT/M/2017. Table 1 lists the six facilities to be assessed.

Table 1. Accessibility Assessment Area on The Sunan Kudus Tomb Religious Tourism Site

Assessment Area	Visual	Description
Entrance		The entrance is wheelchair-accessible, with a ramp, but the ramp is too narrow for wheelchair users.
Exit door		Wheelchair users can access the width of the exit door, but there is no ramp.

Assessment Area	Visual	Description
Toilet		The toilet cannot be used by disabled people who use wheelchairs to circulate, and there is no ramp (the position of the toilet is higher than the ablution area)
Ablution area		An ablution area is not available: <ul style="list-style-type: none"> • Footrest • Hanger • handrail for people with disabilities • mirror • a seat in front of the water tap
Tomb hall		There are no ramps for access to and from the tomb hall, and there are no handrails on the walls.
Signs & information		Signs and information are not sufficiently accessible to the normal people, let alone to people with disabilities. This is caused by: <ul style="list-style-type: none"> • Lack of contrast between text and background. • Absence of raised letters and Braille to support visually impaired users. • Materials made of wood, which make them less durable, and lettering painted directly on the wall, which causes it to fade easily. • Signage height exceeding 160 cm, which does not comply with the PUPR Regulation No. 14 of 2017.

3.1 ACCESSIBILITY ASSESSMENT OF THE SUNAN KUDUS TOMB RELIGIOUS TOURISM SITE USING A UNIVERSAL DESIGN PRINCIPLE

The accessibility Assessment for individuals with disabilities during religious tourism at the Sunan Kudus tomb focuses on the available facilities: entrances, exit doors, ablution area, toilets, tomb hall, and signs & information. This assessment utilizes universal design principles, which include (1) equitable use, (2) flexibility in use, (3) simplicity and intuitiveness, (4) perceptible information, (5) tolerance for error, (6) low physical effort, and (7) appropriate size and space for approach and use. Table 2-7: An overview of the findings from the accessibility data collection based on these seven universal design principles:

Table 2. Accessibility Assessment at The Entrance Facilities on The Sunan Kudus Tomb Religious Tourism Site

Facilities	7 UD Principles	Technical Requirements	Accessible	Less	Not
				Accessible	Accessible
Entrance	Equitable Use	Rams must have a slope of 6 degrees or a height-to-slope ratio of 1:10. Rams outside the building must have a slope of at most 5 degrees or a height-to-slope ratio of 1:12.	✓		
		The effective width of the ramp must be at least 95 cm without the safety edge or curb, and 120 cm with the safety edge or curb.			✓
	The flat surface at the beginning and end of the ramp must be textured, non-slip, equipped with warning tiles, and have a minimum length equal to the ramp's width (120 cm).			✓	
	The main entrance/exit door of a public building must have an effective opening width of at least 90 cm, while other doors must have an effective opening width of at least 80 cm.	✓			
	Flexibility in Use	The door must be free from any obstacles that could prevent it from opening or closing completely.	✓		
	Simple and Intuitive Use	Doors that are not recommended for use by people with disabilities, including children and the elderly, are: <ul style="list-style-type: none"> • Manual sliding doors. • Heavy doors that are difficult to open/close. • Doors with two small doors. • Doors that open in two directions ('push' and 'pull'). • Doors with handles that are difficult to operate, especially for people with physical disabilities and visual impairments. 	✓		
	Perceptible Information	Exits are equipped with clear and informative markings for all groups.			✓
Tolerance for Error	The door handle must be non-slip and should not have a rotary lever.	✓			
Low Physical Effort	The door is not very heavy and opens and closes easily.	✓			
Size and Space for Approach and Use	The main entrance/exit doors of public buildings must have a minimum effective opening width of 90 cm, while other doors should have a minimum effective opening width of 80 cm.	✓			
Total			7	0	3

Table 3: Accessibility Assessment at Exit Door Facilities on The Sunan Kudus Tomb Religious Tourism Site

Facilities	7 UD Principles	Technical Requirements	Accessible	Less	Not
				Accessible	Accessible
Exit Door	Equitable Use	Rams must have a slope of 6 degrees or a height-to-slope ratio of 1:10. Rams outside the building must have a slope of at most 5 degrees or a height-to-slope ratio of 1:12. The effective width of the ramp must be at least 95 cm without the safety edge or curb, and 120 cm with the safety edge or curb. The flat surface at the beginning and end of the ramp must be textured, non-slip, equipped with warning tiles, and have a minimum length equal to the ramp's width (120 cm). The main entrance/exit door of a public building must have an effective opening width of at least 90 cm, while other doors must have an effective opening width of at least 80 cm.	✓		✓ ✓ ✓
	Flexibility in Use	The door must be free from any obstacles that could prevent it from opening or closing completely.	✓		
	Simple and Intuitive Use	Doors that are not recommended for use by people with disabilities, including children and the elderly, are: <ul style="list-style-type: none"> • Manual sliding doors. • Heavy doors that are difficult to open/close. • Doors with two small doors. • Doors that open in two directions ('push' and 'pull'). • Doors with handles that are difficult to operate, especially for people with physical disabilities and visual impairments. 	✓		
	Perceptible Information	Exits are equipped with clear and informative markings for all groups.			✓
	Tolerance for Error	The door handle must be non-slip and should not have a rotary lever.	✓		
	Low Physical Effort	The door is not very heavy and opens and closes easily.	✓		
	Size and Space for Approach and Use	The main entrance/exit doors of public buildings must have a minimum effective opening width of 90 cm, while other doors should have a minimum effective opening width of 80 cm.	✓		
Total			6	0	4

Table 4: Accessibility Assessment at Toilet Facilities on The Sunan Kudus Tomb Religious Tourism Site

Facilities	7 UD Principles	Technical Requirements	Accessible	Less Accessible	Not Accessible
Toilet	Equitable Use	The clear width of the toilet door is at least 70 cm, except for toilets for people with disabilities, which are 90 cm.	✓		
		The door of a toilet for people with disabilities opens to the outside and has a free space of at least 152.5 cm between the door and the outer surface of the toilet.		✓	
		If the door to a toilet for people with disabilities opens towards the inside of the toilet, it must provide sufficient free space for the wheelchair user to perform a 180-degree turning maneuver and open/close the door. The door to the disabled toilet is equipped with an alarm light (panic lamp). Toilets for people with disabilities must have handrails to facilitate wheelchair users' transition from the wheelchair to the toilet and back.			✓ ✓ ✓
	Flexibility in Use	The lever on the toilet must be placed in a location that is easily accessible to people with disabilities.		✓	
	Simple and Intuitive Use	Each men's and women's toilet must provide at least one toilet for people with disabilities and one for children.			✓
	Perceptible Information	Toilets are equipped with clear and informative markings for all user groups.		✓	
	Tolerance for Error	The toilet floor covering is textured and non-slip.	✓		
	Low Physical Effort	Toilet doors for people with disabilities come equipped with self-closing hinges.			✓
It is necessary to equip toilet doors for people with disabilities with a kick plate at the bottom to benefit wheelchair users and blind individuals.				✓	
Size and Space for Approach and Use	The dimensions of a toilet for people with disabilities should be at least 152.5 cm x 227.5 cm, taking wheelchair users' needs into account.			✓	
		Total	2	3	7

Table 5: Accessibility Assessment at Ablution Area Facilities on The Sunan Kudus Tomb Religious Tourism Site

Facilities	7 UD Principles	Technical Requirements	Accessible	Less Accessible	Not Accessible	
Ablution Area	Equitable Use	The distance between taps in the ablution area is 80-100 cm.	✓			
		The height of the faucet should be between 80 cm and 100 cm.	✓			
		Equipment that can be provided in the ablution area includes:				✓
		• Footrest with a slope of 30 degrees and a low side height of 21 cm				✓
		Equipment that can be provided in the ablution area includes:				✓
		• A place to put personal items during ablution.				✓
		Equipment that can be provided in the ablution area includes:				✓
• Hanger.				✓		
Equipment that can be provided in the ablution area includes:				✓		
• Mirror.				✓		
		There are handrails for people with disabilities at a height of 120 cm from the floor.			✓	
	Flexibility in Use	There is a front seat for people with disabilities, 40 cm high.			✓	
	Simple and Intuitive Use	The ablution area must be easily and safely accessible to the user.	✓			
		The ablution room must be easily and safely accessible.		✓		
	Perceptible Information	The ablution area should be equipped with clear and informative signs for all user groups.			✓	
	Tolerance for Error	The floor of the ablution area must be made of a rough-textured, non-slippery, easy-to-clean material.	✓			
		Ablutions must have adequate lighting and ventilation.	✓			
	Low Physical Effort	Using the ablution water tap should be easy to open or automatic.	✓			
	Size and Space for Approach and Use	The ablution area space should be 5% of the building area.	✓			
		Total	7	1	7	

Table 6: Accessibility Assessment at Tomb Hall Facilities on The Sunan Kudus Tomb Religious Tourism Site

Facilities	7 UD Principles	Technical Requirements	Accessible	Less Accessible	Not Accessible
Tomb hall	Equitable Use	Wheelchair users can access the wide door to the tomb hall. If there is a difference in floor height between the tomb hall and the surrounding area, a ramp must be provided for wheelchair users.			✓
	Flexibility in Use	Signs and markings must be informative and easy for every user to recognize.	✓		✓
	Simple and Intuitive Use	There are TV text/facilities, teletext/running text for deaf people. (sign language).			✓
	Perceptible Information	Information regarding directions to the tomb area is clear. Guidance information is also available in Braille.	✓		✓
	Tolerance for Error	The tomb hall floor must be non-slip.	✓		
	Low Physical Effort	The door of the tomb's main area is not very heavy, easy to open and close, and unobstructed.	✓		
	Size and Space for Approach and Use	The tomb hall space must be available to all community groups, including disabled people, without exception.	✓		
		Total	5	0	4

Table 7: Accessibility Assessment at Information Sign Facilities on The Sunan Kudus Tomb Religious Tourism Site

Facilities	7 UD Principles	Technical Requirements	Accessible	Less Accessible	Not Accessible
Signs & information	Equitable Use	Requirements for signs used: <ul style="list-style-type: none"> • Embossed signs or Braille letters that can be read by blind people and other people with disabilities, with a minimum distance of 1 cm between the Latin letters and the Braille letters. • Signs in the form of international signs and symbols. • Signs and backgrounds must be made of non-glare materials. • Characters and symbols should • Contrast with their background, whether light characters on a dark background or vice versa. • The proportion of letters or characters on signs must have a width-to-height ratio between 3:5 and 1:1, with a letter thickness between 1:5 and 1:10. • The height of the letters and numbers on signs must be determined based on the viewing distance from where the sign is read." 	✓		✓
	Flexibility in Use	Signs and markings must be informative and easy for every user to recognize.			✓
	Simple and Intuitive Use	Signs in the form of images and symbols should be created using an embossed printing system, making the meaning easy and quick to interpret.	✓		
	Perceptible Information	Signs and markings must be informative and easy for every user to recognize.			✓
	Tolerance for Error	The background color of signs and markings must adhere to safety sign and color standards.			✓
	Low Physical Effort	They should be placed appropriately and precisely to ensure unobstructed views.	✓		
	Size and Space for Approach and Use	These signs should be positioned at counters/information counters and security unit posts that facilitate communication using sign language.			✓
Total			3	1	8

3.2 ACCESSIBILITY INDEX VALUE OF THE SUNAN KUDUS TOMB RELIGIOUS TOURISM SITE

Assessment of the Sunan Kudus Tomb Religious Tourism Site facilities is conducted to establish the specifications of all current facilities and assess their compliance with the Ministry of Public Works and Housing Regulation number 14/PRT/M/2017 and the Universal Design principles (UDP), following the collection of data from six facilities within the Sunan Kudus Tomb Religious Tourism Site. Subsequently, a summary of the accessibility index from these six facilities at the Sunan Kudus Tomb Religious Tourism Site is compiled (Table 8). The Sunan Kudus Tomb Religious Tourism Site accessibility index value is computed during the data processing phase using the formula specified in the reference [28].

$$AI = \frac{A + LA + NA}{N \text{ total} \times K \text{ ideal}}$$

Where:

A : number of accessible x 2

LA : number of less accessible x 1

NA : number of not accessible x 0

N total : total number of indicators

K ideal : score ideal = 2

Table 8. Summarizes The Accessibility Index Values of the Sunan Kudus Tomb Religious Tourism Site

Assessment Area	Accessibility Index	Accessibility Category	Index
Entrance	$(7 \times 2) + (0 \times 1) + (3 \times 0) / 20 = 0,70$	Accessible	
Exit door	$(6 \times 2) + (0 \times 1) + (4 \times 0) / 20 = 0,60$	Less Accessible	
Toilet	$(2 \times 2) + (3 \times 1) + (7 \times 0) / 24 = 0,29$	Not Accessible	
Ablution area	$(7 \times 2) + (1 \times 1) + (7 \times 0) / 30 = 0,50$	Less Acceptable	
Tomb hall	$(5 \times 2) + (0 \times 1) + (4 \times 0) / 18 = 0,55$	Less Acceptable	
Signs & information	$(3 \times 2) + (1 \times 1) + (8 \times 0) / 24 = 0,29$	Not Accessible	

3.3 PROPOSED ENTRANCE IMPROVEMENT

Overall, the accessibility assessment at the entrance is in the accessible category (see Table 9). However, there is still room for improvement, in line with the ergonomic approach (anthropometry) and the Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.

Table 9. Proposed Entrance Improvement

Assessment Area	Improvement	Ergonomic Approach	Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.
Entrance	Ramp width and handrail size	The handrail diameter can be determined using anthropometric data, with a 5th percentile of 3,6 cm.	Ramps at the entrance must have a minimum width of 95 cm if there is no safety handrail, and 120 cm if there is.
	Design a flat surface.	Flat surface design can use anthropometric data on stride length to determine flat surface length at the 50th percentile, set at 60 cm. And use anthropometric data on sole width for the pattern texture distance on a flat surface, with a 5th percentile of 7.28 cm.	The flat surface at the beginning and end of the ramp must be textured and non-slip.
	Informative signs on the ramp	Tactile design can use anthropometric data for sole width at the 95th percentile of 11,43 cm.	<ul style="list-style-type: none"> • High color contrast between the ramp and the surrounding area. • Accessibility symbols for wheelchair users. • Floor markings for the start and end of the ramp

3.4 PROPOSED EXIT DOOR IMPROVEMENT

Based on the results of the accessibility assessment of the exit door using a universal design approach in Table 10, improvements are needed, including ergonomic listening and compliance with Regulation No. 14/PRT/M/2017 of the Ministry of Public Works and Housing.

Table 10. Proposed Exit Door Improvement

Assessment Area	Improvement	Ergonomic Approach	Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.
Exit Door	Ramp slope angle	Can use lower limb anthropometric data with the 5th percentile	Rams must have a slope of 6 degrees or a height-to-slope ratio of 1:10. Rams outside the building must have a slope of at most 5 degrees or a height-to-slope ratio of 1:12
	Ramp width and handrail size	The handrail diameter can be determined using anthropometric data, with a 5th percentile of 3,6 cm.	The effective width of the ramp must be at least 95 cm without the safety edge or curb, and 120 cm with the safety edge or curb.
	Flat surface	Flat surface design can use anthropometric data on stride length to determine flat surface length at the 50th percentile, set at 60 cm. And use anthropometric data on sole width for the pattern texture distance on a flat surface, with a 5th percentile of 7.28 cm.	The flat surface at the beginning and end of the ramp must be textured and non-slip.
	Informative signs on the exit door	The height of the informative sign placement can be measured using anthropometric data on the height of the hand reach upwards, with the 5th percentile, namely 191.98 cm	Signs and information are not sufficiently accessible to the normal people, let alone to people with disabilities. This is caused by: <ul style="list-style-type: none"> • Lack of contrast between text and background. • Absence of raised letters and Braille to support visually impaired users. • Materials made of wood, which make them less durable, and lettering painted directly on the wall, which causes it to fade easily.

3.5 PROPOSED TOILET IMPROVEMENT

Based on the results of the accessibility assessment of toilets using a universal design approach in Table 11, improvements are needed, with reference to ergonomic listening and the Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.

Table 11. Proposed Toilet Improvement

Assessment Area	Improvement	Ergonomic Approach	Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.
Toilet	Space for wheelchair users' circulation in the toilet	Can use wheelchair dimensions as a measure of the space for a 180-degree manoeuvring	If the door to a disabled toilet opens towards the inside of the toilet, it must provide sufficient free space for the wheelchair user to perform a 180-degree turning maneuver and open/close the door
	Panic button and panic lamp on the toilet door	Can use anthropometric data on hand reach upwards when sitting at the 5th percentile (73.42 cm) to determine the height of the panic button. To determine the height of the panic lamp, one can use anthropometric data on hand reach upward at the 50th percentile 5, which is 191.98 cm.	The door to the disabled toilet is equipped with an alarm light (panic lamp)
	Handrail	The handrail diameter can be set to 3.6 cm at the 5th percentile. For the handrail height, anthropometric data for standing elbow height at the 5th percentile (93.22 cm) can be used.	Toilets for disabled people must have handrails to facilitate wheelchair users' transition between the wheelchair and the toilet.
	Self-closing toilet door	Can use anthropometric data of hand reach upwards when sitting with percentile 5, which is 73.42 cm, to determine the height of the door handle	Toilet doors for people with disabilities come equipped with self-closing hinges.

Assessment Area	Improvement	Ergonomic Approach	Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.
	An iron plate at the bottom of the toilet door	For the width of the iron plate, you can use the anthropometric data of Shoulder Width with the 5th percentile, namely 36.83 cm, and for the height of the iron plate, use the dimensions of the Height of the Wheelchair Legs from the floor.	It is necessary to equip toilet doors for people with disabilities with a kick plate at the bottom for the benefit of wheelchair users and blind individuals.
	Toilet Dimension	Taking into account the dimensions of the wheelchair and the wheelchair maneuvering space with adjusted tolerances	The dimensions of a toilet for people with disabilities should be at least 152.5 cm x 227.5 cm, with wheelchair users' needs in mind.

3.6 PROPOSED ABLUTION AREA IMPROVEMENT

Based on the accessibility assessment of the ablution area using a universal design approach in Table 12, improvements are needed to address ergonomic issues and comply with Regulation No. 14/PRT/M/2017 of the Ministry of Public Works and Housing.

Table 12. Proposed Ablution Area Improvement

Assessment Area	Improvement	Ergonomic Approach	Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.
Ablution area	Footrest for ablution	For the height of the footrest, you can use anthropometric data on knee height at the 5th percentile, which is 30 cm. For the width of the footrest, you can use anthropometric data on shoulder width at the 50th percentile, which is 43.41 cm. For the depth of the footrest, you can use anthropometric data on the length of the sole with the 95th percentile, which is 26.86 cm. And for the angle of the footrest, you can use anthropometric data on the Ankle Flexion Angle with a slope of 10 degrees.	Equipment that can be provided in the ablution area includes: Footrest with a slope of 30 degrees and a low side height of 21 cm
	Hanger	Can use anthropometric data for the height of the hand reach upwards with the 5th percentile, namely 143.71 cm	Equipment that can be provided in the ablution area includes: Hanger
	Mirror	For the height of the upper mirror, you can use the anthropometric data for hand reach upwards at the 5th percentile, which is 143.71 cm. For the height of the lower mirror, you can use the anthropometric data for hand reach upward at the 5th percentile, which is 96.21 cm.	Equipment that can be provided in the ablution area includes: Mirror
	Handrail	The handrail diameter can be determined using anthropometric data, with a 5th percentile of 3,6 cm.	There are handrails for people with disabilities at a height of 120 cm from the floor.
	Sitting platform for ablution	For the height of the Sitting platform for ablution, you can use the 5th percentile anthropometric data for popliteal height, which is 37.5 cm. For the length of the Sitting platform for ablution, you can use the 95th percentile for popliteal length, which is 53.81 cm. For the width of the Sitting platform for ablution, use the 95th percentile hip width, which is 42.52 cm.	There is a front seat for disabled people with a 40 cm height.
	Sign & Information	The height of the informative sign placement can be measured using anthropometric data on hand reach upwards at the 5th percentile, namely 191.98 cm.	The ablution area should be equipped with clear and informative signs for all user groups.

3.7 PROPOSED TOMB HALL IMPROVEMENT

Based on the results of the accessibility assessment of the tomb hall using a universal design approach in Table 13, improvements are needed to address ergonomic listening and to comply with Regulation No. 14/PRT/M/2017 of the Ministry of Public Works and Housing.

Table 13. Proposed Tomb Hall Improvement

Assessment Area	Improvement	Ergonomic Approach	Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.
Tomb Hall	Entrance width	The data use anthropometric data for the 95th percentile shoulder width (51.5 cm) and the wheelchair width, with appropriate tolerances.	Wheelchair users can access the wide door to the tomb hall.
	Ramp	The handrail diameter can be determined using anthropometric data, with a 5th percentile of 3,6 cm.	Ramps at the entrance must have a minimum width of 95 cm if there is no safety handrail, and 120 cm if there is.
	Monitor text	Can use anthropometric data for the height of the hand reach upwards, with the 5th percentile, namely 191.98 cm, to determine the height of the text monitor	There are TV text/facilities, teletext/running text for deaf people. (sign language).
	Sign with Braille letters.	The height of the informative sign placement with Braille can be measured using anthropometric data: the hand reach when sitting at the 5th percentile, namely 96.21 cm.	Guidance information is also available in Braille.

3.8 PROPOSED SIGNS & INFORMATION IMPROVEMENT

Based on the results of the accessibility assessment of signs & Information using a universal design approach in Table 14, improvements are needed to address ergonomic listening and to comply with the Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.

Table 14. Proposed Sign & Information Improvement

Assessment Area	Improvement	Ergonomic Approach	Ministry of Public Works and Housing Regulation number 14/PRT/M/2017.
Sign & Information	Embossed signs or Braille letters	The height of the informative sign placement can be measured using anthropometric data on hand reach at the 50th percentile, namely 191.98 cm. The height of the informative sign placement with Braille can be measured using anthropometric data: the hand reach height when sitting at the 5th percentile, namely 96.21 cm.	Requirements for signs used: Embossed signs or Braille letters that can be read by blind people and other people with disabilities, with a minimum distance of 1 cm between the Latin letters and the Braille letters
	Signs and symbols	The height of the informative sign placement can be measured using anthropometric data on hand reach upwards at the 5th percentile, namely 191.98 cm.	Signs in the form of international signs and symbols
	Signs and backgrounds	Anthropometry Data: Visual Contrast Sensitivity with a minimum contrast ratio of 70% between letters and background	<ul style="list-style-type: none"> • Signs and backgrounds must be made of non-glare materials • Characters and symbols should • contrast with their background, whether light characters on a dark background or vice versa
	Font size	For maximum reading distance, you can use Eye Vision Range Anthropometric Data with the 95th percentile, namely a letter height of 25 mm can be read from a distance of 1 meter, a letter height of 100 mm can be read from a distance of 4 meters, a letter height of 250 mm can be read from a distance of 10 meters, and a letter height of 200 mm for outdoor signage from Visual Ability Anthropometric data.	The proportion of letters or characters on signs must have a width-to-height ratio between 3:5 and 1:1, with a letter thickness between 1:5 and 1:10

4. CONCLUSION

Based on the assessment conducted at the Sunan Kudus Tomb Religious Tourist Site, it is evident that the site is currently inadequate to accommodate people with disabilities. Accessibility assessment of six facilities at the Sunan Kudus Tomb Religious Tourism Site resulted in the following findings: one area is accessible (Entrance), three areas are less accessible (Exit, ablution area, and tomb room), and two areas are inaccessible (Toilets and Signs & information).

Recommendations for improving facilities that are less accessible or not accessible with a portable system can be made, given that the Sunan Kudus Tomb Religious Tourism Site is a cultural heritage building under the Ministry of Public Works and Housing Regulation number 14/PRT/M/2017. Meanwhile, suggestions for research. Next, it is necessary to use an ergonomic, universal design approach when designing facilities so that visitors feel comfortable and encounter no obstacles when visiting.

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