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Accessible User Interface Design of Smart Tourism Platform for Disabilities

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Abstract: *Hotels have an obligation to provide certain facilities for guests with special needs. However, the existence of facilities for guests with disabilities still needs to be reviewed, therefore more attention is needed so that guests with disabilities can carry out activities in the hotel area comfortably. People with physical disabilities such as wheelchair users need special facilities to improve their mobility. In addition to accessible facilities, the problem that often occurs is the acquisition of information. People with disabilities also have the right to get information about accessible tourism. Accessible tourism information must also be easily and clearly obtained by persons with disabilities. Therefore, an interface for a smart tourist platform should be designed to provide accessibility and mobility information for persons with disabilities. The design for this platform uses an inclusive design method so that the platform can better reach various types of people with disabilities, especially wheelchair users. The platform is also tested by means of usability testing for persons with disabilities.*

Keywords: *hotel, accessible tourism, disabilities, inclusive design.*

Introduction

The tourism sector in Indonesia is an important asset for the country, because the tourism sector is one of the sectors that contributes the largest foreign exchange earnings in Indonesia. The tourism sector is also related to the accommodation sector, such as hospitality. The hospitality industry which is one of the tourism facilities must also pay attention to aspects of guest satisfaction. Guest satisfaction for the hospitality industry is something that must be achieved so that guests feel respected and valued (Mistriani et al., 2021). Facilities are important things that must be in a hotel to be able to serve guests, including guests with disabilities. Hotels have an obligation to provide special facilities for guests with special needs. However, the existence of facilities for guests with disabilities still needs to be reviewed, so more attention is needed to be able to carry out activities in the hotel area comfortably (Rosdianti et al., 2018). For example, providing ramps or ramps that are needed by wheelchair users as an alternative to stairs at hotel entrances. Based on data from the

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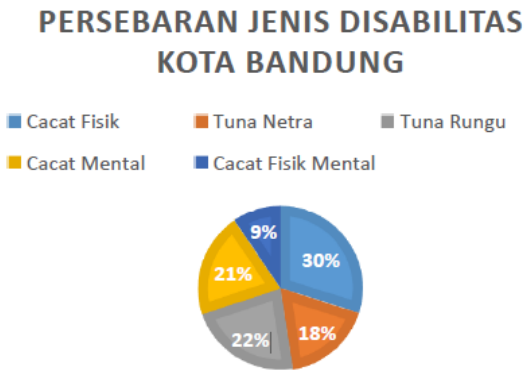
Department of Population and Civil Registration of the city of Bandung, the most types of people with disabilities are people with physical disabilities who reach 441 people.

Figure 1
Distribution of types of disability in Bandung



People with disabilities are people who have limitations in carrying out various activities in general. People with physical disabilities such as wheelchair users need more access or attention to be able to carry out activities like the society in general. Meanwhile, accessibility is not only needed by normal people, but also for people with disabilities, the elderly, young children, and for people who have temporary or chronic illnesses (Emrouzeh et al., 2017). In addition to accessible facilities, another obstacle experienced by persons with disabilities is obtaining information (Afiati & Puspitasari Rochman, 2021).

The lack of providing information about tourist attractions and what facilities are offered for persons with disabilities is also a problem that is often encountered in the field (Jati, 2019). People with disabilities are one of the groups that have obstacles in obtaining information through the website (Magnus Prestianta et al., 2018). The existing hospitality websites only display general information such as price, location, room availability and general facilities so that tourists with disabilities still need to find information regarding what special facilities are offered for guests with disabilities. Such differences can become an obstacle for persons with disabilities to obtain information when the design is designed for non-disabled people (Gronseth, 2018). There must be a specific information provider platform to provide accessibility information on hotels and tourist attractions.

Literature Review

The importance of accessibility is to ensure that persons with disabilities can be independent and participate in all community life (Syafi'ie, 2014). Accessibility is aimed at ensuring that there are no barriers to serving someone by creating accommodations for a product or service (Mourichon, 2020). Along with the times, accessibility is not only applied to buildings or public transportation but has also begun to be applied to digital products such as websites. Web accessibility means that a website is designed and developed so that people with disabilities can use it. Web accessibility is an important aspect for developers to create quality websites and do not exclude people in their use of people (W3C, 2021). Disability is a term

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that defines a disorder or limitation in activities. The disturbance in question is a disturbance in the function of the body so that it hinders the individual in carrying out activities (Mahardika, 2020). WCAG is published to be used as a reference in creating accessible content for persons with disabilities. With WCAG (Web Content Accessibility Guidelines), a web can facilitate people with disabilities to be able to communicate by removing the barriers that exist in real life (Carlbring, 2020). These guidelines facilitate the use of web content by various persons with disabilities including individuals who have limited mobility or activities. The implementation of WCAG 2.1 has four main principles including:

- Perceivable
  This principle requires that information and user interface components be visible to users in a way that they can.
- Operable
  The interface and navigation components that are designed must be easy to operate.
- Understandable
  The information provided must be easy for users to understand
- Robust
  The content on the website must be strong and understandable by a variety of users.

User interface refers to the overall appearance of graphics, text, and information that is presented to the user in a program (Tirtadarma et al., 2018). User interface can also be interpreted as a visual representation of a system that interacts directly with users. User interface on a website is a way to be able to provide information to users. The goal is that users can effectively and easily operate a system on the website. People cannot be separated from computers and the internet in their daily lives, with that people also often seek information from various websites.

Inclusive design can also be said to be a product design that is accessible and can be used by everyone without special adaptation. This method does not always design a product to meet general needs, but it can also focus on selecting a specific target (Nugraha Mahendrasta et al., 2020).

Figure 2

Inclusive Design Method

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- Manage

  The manage phase shows what needs to be done to design a solution or answer to the needs that will be identified in the explore phase so that the purpose of making the design can be clearly defined.
- Explore

  This phase is a phase that aims to gain a deeper understanding of the requirements needed in a design. This stage is important because it will ensure that the product designed can meet the appropriate needs. At this stage, the designer will generate a persona, a user journey map, and also define user needs.
- Create

  This phase is about creating solutions to meet the needs and criteria identified in the Explore phase. So that this phase can be said to be a phase of transforming ideas into a design concept as a form of a solution.

- Evaluate

  This phase is the stage of testing or evaluating the design concept that has been designed. How well the concept is designed so that it meets user needs is something that must be answered in this phase. This phase proves whether the needs have been met or not.

System Usability Scale (SUS) is a method to test the usability level of a system using a Likert scale on the use of the system. Generally, SUS contains ten statements given to respondents with answer choices in the form of a scale of 1-5. Respondents were asked to answer based on the respondent's agreement with the statements provided (Salamah, 2019). SUS has become a globally used questionnaire to conduct usability assessments. SUS has a certain calculation method and range in assessing a system, including:

- For odd numbered questions, the score given by the respondent is deducted by one point.
- As for the even-numbered questions, the score is obtained by subtracting five points from the score given by the respondent.
- After that, add up the odd and even values of each respondent and then multiply by 2.5.
- To get the final result, add up all the results of the user ratings that have been multiplied by 2.5. Then, the result is divided by the total number of respondents.

Table 1
SUS Questionnaire

No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		1	2	3	4	5
1	I think that i would like to use this system frequently.					

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2	I found the system unnecessarily complex	
3	I thought the system was easy to use.	
4	I think that I would need the support of a technical person to be able to user this system.	
5	I found the various functions in this system were well integrated.	
6	I thought there was too much inconsistency in this system.	
7	I would imagine that most people would learn to use this system very quickly.	
8	I found the system very awkward to use.	
9	I felt very confident using the system.	
10	I needed to learn a lot of things before I could get going with this system.	

Table 2
SUS Acceptability Levels

No	Acceptability Level	Range
1	Not Acceptable	0-50
2	Marginal	51-70
3	Acceptable	70-100

Methodology

The research is divided into 3 phases, namely the preliminary stage, the implementation of the inclusive design method, and the conclusion stage.

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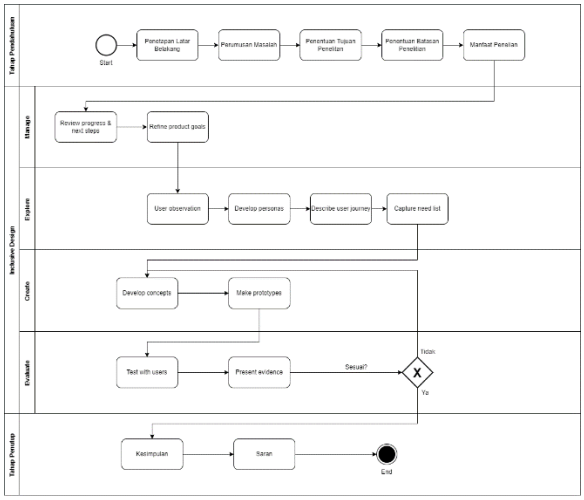
Figure 3
Research Methodology



In the preliminary stage, the researcher identifies the problem, which begins with determining the background of the problem by conducting an assessment survey of the existing hospitality information system from the point of view of wheelchair users so that researchers can find out the source of the user's problems on the research topic. Based on the results of the survey, the researchers set the research objective to find solutions to the problems experienced by wheelchair users while using the hospitality information system so that researchers could also set problem boundaries for the research topic.

The next stage is the application of the inclusive design method, the researcher applies the inclusive design method to reach a more specific target, namely wheelchair users. This method allows researchers to be able to involve as many target users as possible. In this study, researchers went through 4 stages including manage, explore, create, and evaluate.

At the manage stage, the researcher determines what activities will be carried out in the design process. There are 2 activities in this phase including research planning and setting research objectives.

Furthermore, at the explore stage the author will develop an understanding of the needs that must be met by the application and at this stage the author will involve users for a deeper understanding. The researcher conducted interviews with several persons with disabilities, especially wheelchair users in order to understand the needs of wheelchair users when using or interacting with a website.

The create stage focuses on creating solutions that meet the needs and criteria of users that have been identified in the Explore stage. At this stage the researcher makes a design concept that aims to determine the components used in the implementation of the user interface to get consistent results. At this stage, the researcher also creates a wireframe as an initial prototype design to implement the components that have been determined.

The last stage of the inclusive design method is evaluate stage where the researcher conducts an examination of the design that has been designed as a solution to the problems experienced by users.

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The last step the researcher did was to determine the conclusion in the form of a summary and the results obtained by the author during the research. Researchers also provide suggestions related to research so that it can be developed in further research.

Findings & Discussion

After conducting interviews with several people, the researcher found several problems experienced by people with disabilities including:

- The information on the hotel website is incomplete and not specific
- Need a survey to find out the level of accessibility of the place they want to visit
- Sometimes the displayed text is still too small

Next, the researcher concludes the user needs that will be implemented in the user interface design contained in the Table 3.

Table 3

User requirements

No.	Requirements
1.	Users can search for accessible hotels that are closest to the user's location
2.	Users can see the location of the hotel through the maps feature.
3.	Users can share recommendations or discussions with other users.
4.	Users need information or markers that the hotel is accessible.
5.	Users need information on what facilities are offered at the hotel
6.	Users need pictures/videos so that users can see the accessibility level of the hotel

After collecting problems and defining user needs, the researcher tries to create a concept by designing a low fidelity design in the form of a wireframe as a reference in designing the final product. Based on the wireframe, the researcher then designed a design guide containing color palettes, icons, and typography. This design guide is intended so that the resulting design can be consistent. In making the design instructions, the researcher considered the use of colors and text sizes that could be accepted by wheelchair users who also have visual impairments. After the prototype has been designed, the researcher conducted usability testing for 6 users. Researchers provide several tasks that must be done by the user. The Table 4 shows the tasks tested.

Table 4

Testing tasks

No.	Page	Task
1.	Login and Register	Register an account by entering your name, e-mail address and password. Then go to the website with that account
2.	Homepage	Read recommended city information and search the map to see tourist destinations
3.	Destination Page	Go to the destination page and search for a desired city
4.	Hotel	View hotel listings and search for hotels

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5.	Hotel Details	Understand hotel facilities information and look for the TripAdvisor button to be able to transact
6.	About Us	Understanding website related information

Figure 4
Login page

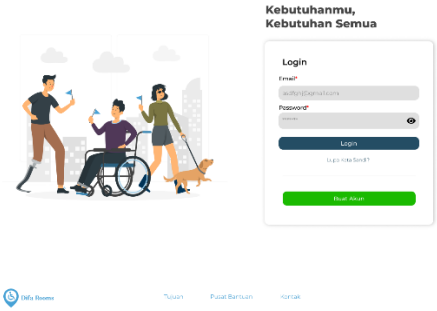


Figure 5
Homepage

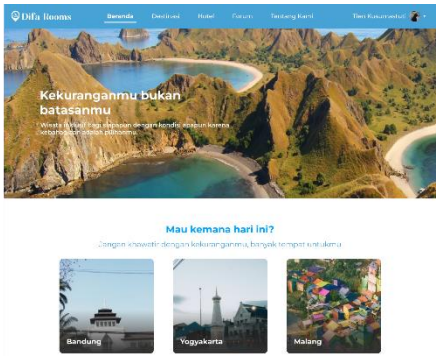
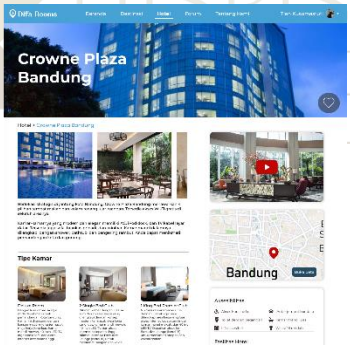


Figure 6
Hotel page



After doing some of the texts that have been given, the user is given a post-study questionnaire, SUS, as an assessment method to measure how useful the designed prototype is. Table 5 shows rating score given by the user.

Table 5
SUS scores from users

Users	Score									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
R01	4	4	5	1	4	2	4	1	4	2
R02	4	4	5	4	4	1	4	2	4	4
R03	4	4	5	5	4	2	4	2	5	4
R04	5	4	5	5	5	1	5	1	5	2
R05	3	3	3	3	5	4	3	4	4	4

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R06	5	2	4	3	4	1	4	2	3	3

After getting an assessment from the user, the researcher calculated the value based on the method of calculating the SUS method which can be seen in Table 6 below.

Table 6
SUS calculation results

Users	Skor										Hasil
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	(x 2.5)
R01	4	4	5	1	4	2	4	1	4	2	77,5
R02	4	4	5	4	4	1	4	2	4	4	65
R03	4	4	5	5	4	2	4	2	5	4	62,5
R04	5	4	5	5	5	1	5	1	5	2	70
R05	3	3	3	3	5	4	3	4	4	4	52,5
R06	5	2	4	3	4	1	4	2	3	3	72,5
										Total	410

Based on the results of calculations in table 6, the website application got a score of 82, where based on table 2 the score was in the "Acceptable" range. So it can be concluded that according to respondents the website application is fairly easy to use and useful for them.

Based on the results of research that has been done by the researchers on the design of the user interface and user experience on the website application, the researchers conclude that the website application has met the criteria for user needs obtained based on the results of interviews. Users explain that what they need is bold text size, specific information, and images related to hotel facilities. The use of the inclusive design method also allows the design results to be accessed by both wheelchair users and their companions because of the inclusive design. The implementation of WCAG 2.1 also supports authors in creating accessible websites and maximum user experience for users. User testing was also carried out using the SUS questionnaires so that the authors got responses from users regarding the prototype.

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