



# Digital Transformation of Mentawai Islands Tourism Through a User-Centered Website Using the Waterfall Method

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## ABSTRACT

The rapid advancement of information technology has significantly accelerated digital transformation in the tourism sector by improving the accessibility and dissemination of tourism information. The Mentawai Islands possess considerable tourism potential, including marine tourism, natural attractions, and cultural heritage. However, the availability of integrated digital information remains limited, reducing the effectiveness of tourism promotion. This study aims to design and develop a web-based tourism information system for the Mentawai Islands using the Waterfall software development method with a focus on user-centered interface design. The research was conducted through five sequential phases: requirements analysis, system design, implementation, testing, and maintenance. The developed website provides comprehensive tourism information, including destination descriptions, tourism categories, image galleries, location maps, and contact information. Functional testing was performed using the Black Box Testing method to evaluate the performance of each system feature. The results indicate that the developed website successfully provides structured tourism information, enhances user experience through an intuitive interface, and improves the effectiveness of digital tourism promotion. Therefore, the proposed system can support the digital transformation of tourism management while increasing public accessibility to tourism information in the Mentawai Islands.

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## 1. INTRODUCTION

The rapid advancement of information technology has significantly transformed various sectors, including tourism. Digital platforms have become one of the most effective media for promoting tourist destinations and disseminating information to a wider audience. A web-based tourism information system enables visitors to access tourism-related information efficiently while improving communication between tourism managers and potential tourists [1].

The Mentawai Islands are one of Indonesia's leading tourism destinations, offering world-class surfing locations, beautiful beaches, tropical forests, and unique indigenous culture. Despite these tourism assets, the availability of comprehensive tourism information remains limited. Most information is still distributed through different media, making it difficult for tourists to obtain complete and reliable information before visiting the destination. Consequently, the effectiveness of tourism promotion has not reached its full potential [2], [3].

Previous studies have shown that the implementation of web-based tourism information systems can improve destination promotion and increase public access to tourism information. An attractive and responsive user interface also contributes to a better user experience by allowing visitors to navigate the system more

efficiently. Furthermore, integrating maps, image galleries, and destination descriptions into a single platform can enhance the quality of digital tourism services [4], [5].

Several software development models have been applied in developing information systems, including Agile, Prototype, Spiral, and Waterfall. Among these models, the Waterfall method remains widely used because it provides a structured and systematic development process through sequential phases, including requirements analysis, system design, implementation, testing, and maintenance. This approach is suitable for projects with clearly defined system requirements and comprehensive documentation [6], [7].

Based on these challenges, this research develops a web-based tourism information system for the Mentawai Islands using the Waterfall software development model. The proposed website provides integrated tourism information, including destination profiles, tourism categories, interactive maps, image galleries, and travel recommendations. In addition, the system emphasizes a user-centered interface to improve usability and visitor satisfaction [8], [9].

The contribution of this research lies in the development of an integrated tourism information website that supports the digital transformation of tourism services in the Mentawai Islands. The proposed system is expected to improve tourism information accessibility, strengthen digital promotion, and provide a better experience for both domestic and international tourists. Furthermore, the developed website can serve as a reference for future digital tourism development in other regions [10].

## **2. METHOD**

### **2.1 Digital Transformation**

Digital transformation refers to the integration of digital technologies into various organizational activities to improve efficiency, effectiveness, and service quality. In the tourism sector, digital transformation enables tourism managers to provide information through digital platforms that are easily accessible by visitors. The implementation of digital technology also enhances destination promotion and supports sustainable tourism development [1], [2].

### **2.2 Tourism Information System**

A Tourism Information System (TIS) is a web-based information system designed to provide comprehensive tourism information to visitors. The system integrates destination profiles, tourism categories, image galleries, location information, and other supporting services into a single platform. The implementation of a tourism information system can improve information accessibility, facilitate destination promotion, and support tourism management activities [3], [5].

### **2.3 Waterfall Model**

The Waterfall model is a sequential software development methodology in which each phase is completed before proceeding to the next phase. This method consists of five stages: requirements analysis, system design, implementation, testing, and maintenance. The Waterfall model is suitable for projects with clearly defined requirements because it provides systematic development, comprehensive documentation, and structured project management [8], [9].

### **2.4 User Interface**

User Interface (UI) is an essential component of a web-based information system because it determines how users interact with the application. A well-designed interface should be intuitive, responsive, visually appealing, and easy to navigate. Applying user-centered interface principles improves usability and enhances user satisfaction when accessing tourism information [10].

### **2.5 Data Collection Techniques**

The data collection techniques used in this study include: (a) Observation: Observation was conducted to identify existing problems in the dissemination of tourism information and to analyze the information required by visitors regarding tourism destinations in the Mentawai Islands. (b) Literature Study: A literature study was carried out by reviewing books, scientific journals, conference proceedings, and other relevant publications related to digital transformation, tourism information systems, website development, user interface design, and the Waterfall software development model.

## 2.6 Research Stages

The research was conducted through the following stages: (a) Problem Identification, (b) Literature Review, (c) Requirement Analysis, (d) System Design, (e) System Implementation, (f) System Testing, (g) System Maintenance, and (h) Conclusion.

## 2.7 System Development

The proposed system was developed as a web-based tourism information system using the Waterfall software development model. The application was implemented using PHP as the server-side programming language, MySQL as the database management system, and HTML, CSS, JavaScript, and Bootstrap to develop a responsive user interface.

The developed website provides several features, including tourism destination information, tourism categories, image galleries, contact information, and an administrative dashboard for managing website content. Functional testing was conducted using the Black Box Testing method to ensure that all system features operated according to the specified requirements before deployment.

## 3. RESULTS AND DISCUSSION

The tourism information website for the Mentawai Islands was successfully developed based on the system requirements identified during the analysis phase. The system was implemented using PHP, MySQL, HTML, CSS, JavaScript, and Bootstrap. The website provides information on tourist destinations, tourism categories, image galleries, contact information, and an administrative dashboard for managing tourism content. Functional testing showed that all features operated according to the specified requirements.

### 3.1 Homepage Interface

The homepage serves as the main interface for visitors to access tourism information. It presents the website profile, featured tourism destinations, navigation menu, and other supporting information. The homepage was designed with a responsive and user-friendly interface to improve accessibility across various devices.

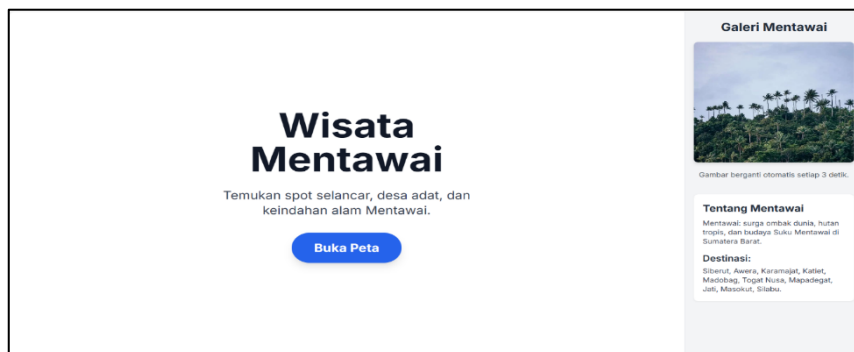


Figure 1. Homepage of the Mentawai Tourism Website

The homepage enables visitors to obtain general information about tourism destinations in the Mentawai Islands. The navigation menu provides quick access to tourism categories, destination details, galleries, and contact information.

### 3.2 Tourism Destination Page

The tourism destination page displays detailed information regarding tourist attractions available in the Mentawai Islands. Each destination includes a description, photographs, and supporting information to help visitors obtain complete tourism information.

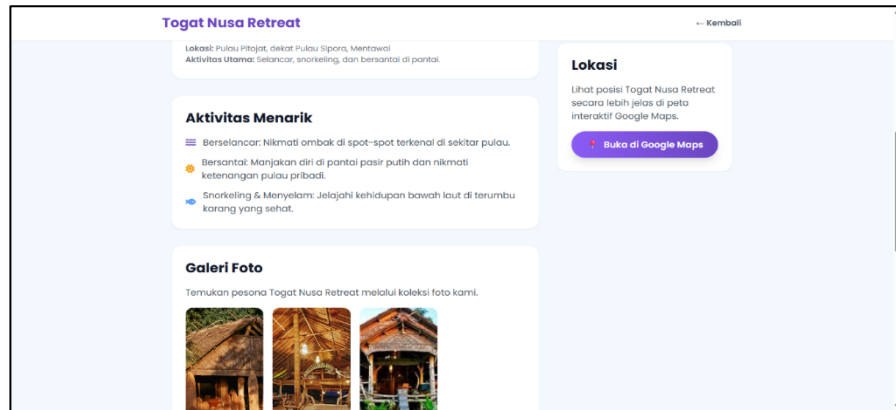


Figure 2. Tourism Destination Page

The implementation of this feature allows users to explore available tourist destinations efficiently through a structured information layout.

### 3.3 Tourism Gallery

The gallery page provides visual information about tourism attractions by displaying photographs of destinations available in the Mentawai Islands. This feature enhances the attractiveness of the website and supports digital tourism promotion.

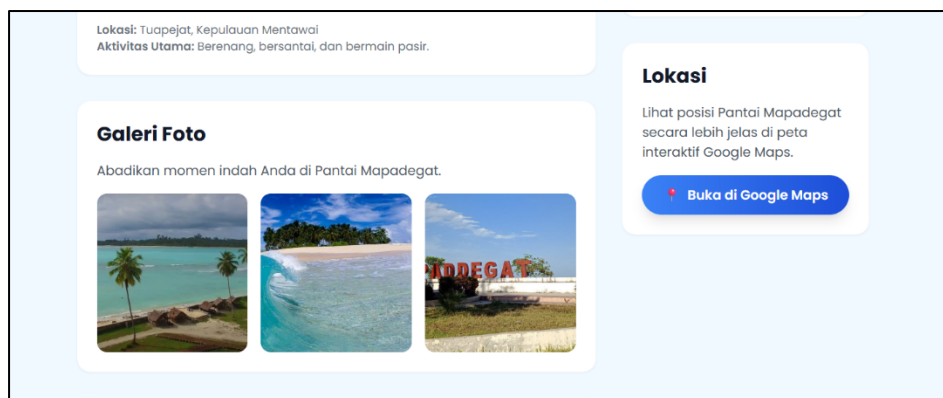


Figure 3. Tourism Gallery

The gallery enables visitors to preview tourism destinations before planning their trips.

### 3.4 Route Feature Testing

The route feature was tested to ensure that users could obtain navigation to the selected tourist destination. Before selecting the “View Route” button, the system only displayed the destination location on the map. After the button was selected, the system successfully generated the travel route using Leaflet Routing Machine integrated with OpenStreetMap (OSM).

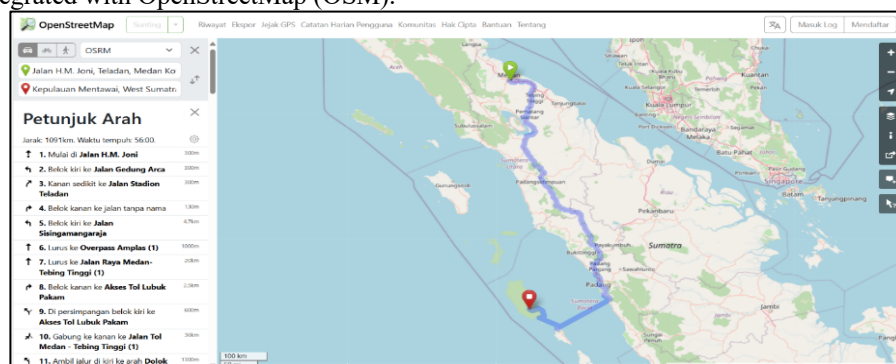


Figure 4. Route Feature Testing

Based on the testing results, the route feature functioned properly by displaying the navigation path from the user's location to the selected tourist destination. This feature helps visitors access tourism destinations more easily and improves the overall usability of the website.

### 3.5 Black Box Testing

Table 1. Black Box Testing

| No. | Tested Feature           | Test Scenario                            | Test Data                            | Expected Result                                                                                                | Test Result |
|-----|--------------------------|------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------|
| 1   | Homepage                 | Display the homepage                     | Access the website through localhost | The homepage is displayed with the navigation menu, banner, and main tourism information.                      | Passed      |
| 2   | Tourism Destination Menu | Select a tourism destination             | Click <b>"Desa Madobag"</b>          | The system displays detailed destination information, including description, images, location, and facilities. | Passed      |
| 3   | Destination Search       | Use the interactive map                  | Click a destination marker           | The system displays the selected tourism destination information.                                              | Passed      |
| 4   | Route Feature            | Click <b>"View Route"</b>                | Redirect to Google Maps              | The system redirects users to Google Maps through the integrated API to display the travel route.              | Passed      |
| 5   | Location Feature         | Click <b>"View Location"</b>             | Redirect to Google Maps              | The system redirects users to Google Maps through the integrated API to display the destination location.      | Passed      |
| 6   | Tourism Gallery          | Open the gallery page                    | Click <b>"Gallery"</b>               | The system displays destination images in a grid layout with zoom functionality.                               | Passed      |
| 7   | Website Responsiveness   | Access the website using a mobile device | Open the website on a smartphone     | The website automatically adjusts the layout according to the screen size without affecting usability.         | Passed      |

## 4. CONCLUSIONS

This study successfully developed a web-based tourism information system for the Mentawai Islands using the Waterfall software development model. The website provides tourism information, destination categories, galleries, location information, and route navigation to support digital tourism promotion. The Black Box Testing results indicate that all system features functioned properly according to the specified requirements. Therefore, the developed system is expected to improve tourism information accessibility and enhance visitors' experience in obtaining tourism information. Future research may enhance the system by adding features such as online booking, tourist reviews, and real-time tourism information. Developing a mobile application and integrating Geographic Information Systems (GIS) are also recommended to improve accessibility and user experience.

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