

Development and Evaluation of an Agile-Based Interactive Tourism Website Using the Scrum Framework for Tourism Promotion in Simeulue Regency

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ABSTRACT

Tourism is a strategic sector that supports regional economic growth, making digital media increasingly important for tourism promotion in the information technology era. Simeulue Regency has significant natural and marine tourism potential but still requires an effective digital promotion platform to improve the accessibility and dissemination of tourism information. This study aims to develop and evaluate an interactive tourism website for promoting Simeulue Regency. The system was developed using the Agile methodology with the Scrum framework through iterative sprint cycles to enable continuous feature refinement based on user requirements. The developed website integrates tourism destination information, interactive mapping, and dynamic content management to improve tourism information accessibility. System evaluation was conducted through black-box testing and user evaluation to assess the functionality and usability of the developed website. The user evaluation achieved an overall usability score of 88.44%, categorized as Very Good, indicating that the developed website provides a positive user experience. These findings indicate that the developed Simeulue tourism website is a feasible digital tourism promotion platform that enhances the accessibility and dissemination of tourism information.

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I. Introduction

Tourism is a strategic sector that contributes significantly to regional economic growth through job creation, community income improvement, and cultural preservation. In the digital era, information technology plays an important role in supporting tourism promotion and information dissemination. Websites have become one of the most effective digital media for delivering tourism information widely, quickly, and accessibly to potential visitors [1]. A website-based tourism information system was also proven to improve public access to destination information and support regional tourism promotion through structured digital platforms [2].

Aceh Province has strong tourism potential supported by natural, marine, and cultural attractions. Official tourism portals have been developed to promote regional destinations; however, not all regencies are represented optimally in digital platforms. Simeulue Regency, as an island region with unique marine tourism, beaches, and local culture, still lacks structured and comprehensive digital tourism information. Limited digital visibility may reduce tourist awareness and affect visit rates. Therefore, improving digital-based tourism information for Simeulue is necessary to support broader tourism promotion.



Previous studies show that web-based tourism information systems help integrate destination data and increase tourist interest [3]. Interactive technologies also enhance tourist engagement and experience in exploring destinations [4]. In addition, user-centered digital tourism applications have been proven to improve usability, visual attractiveness, and navigation effectiveness [5]. Digital interactive media have also been shown to improve the effectiveness of tourism promotion by presenting information in a more attractive, accessible, and engaging manner [6]. Furthermore, the implementation of GIS-based interactive maps in tourism information systems has been proven to support spatial understanding and facilitate tourists in planning their visits more efficiently [7]. Web-based systems with structured design and comprehensive evaluation have been shown to improve processing accuracy, transparency, and user satisfaction [8]. Moreover, previous web-based research demonstrates that digital systems can enhance data processing efficiency and support structured decision-making processes through the integration of digital platforms [9]. Previous studies also indicate that web-based information systems can provide real-time data access and support institutions in delivering accurate and timely information to the public [10].

Despite these developments, most existing tourism information systems primarily focus on general destination information and are not specifically designed to address the characteristics of particular regional destinations. In the context of Simeulue Regency, digital tourism promotion is still limited and there is no dedicated official web-based platform that provides structured and comprehensive tourism information for the region. This condition reduces the visibility of Simeulue's tourism potential and limits public access to reliable destination information. Therefore, there is a need to develop an interactive tourism website that integrates structured information, interactive features, and flexible content management tailored to support tourism promotion in Simeulue Regency.

Therefore, this study aims to develop an interactive tourism website for promoting tourism in Simeulue Regency using the Agile methodology with the Scrum framework. The proposed system integrates destination information, interactive features, and dynamic content management to support digital tourism promotion and improve public access to tourism information. The development approach also enables iterative system refinement to ensure that the platform remains adaptable to future tourism information updates and regional promotional needs.

II. Method

A. Research Design

This study employed a qualitative descriptive research approach focusing on the analysis of system requirements and the development process of an interactive tourism website for Simeulue Regency. The qualitative approach was selected because the research emphasizes understanding user needs, system requirements, and the development process rather than statistical analysis. The research is categorized as software engineering research aimed at designing and implementing a functional web-based tourism information system. The research process consisted of several stages: requirement identification, requirement analysis, system design, system implementation, and system evaluation.

System requirement analysis was conducted to identify functional and non-functional requirements of the tourism website. Functional requirements include features such as tourism destination information, interactive maps, galleries, and search functionality. Non-functional requirements include system usability, accessibility, and performance to ensure that the website can effectively support tourism promotion and information dissemination.

The system development process adopted the Agile methodology using the Scrum framework, which supports adaptive planning, iterative development, and continuous improvement throughout the project lifecycle [11]. Scrum was selected because it allows flexible feature development, accommodates changing requirements, and enables incremental delivery of system functionality compared with traditional development models such as the Waterfall approach.

B. Data Collection Techniques

Data collection was conducted through observation, interviews, and literature study to ensure comprehensive understanding of tourism information needs and system requirements. Observations were carried out at several tourism destinations in Simeulue Regency to collect visual documentation, geographic location data, and general conditions of tourist attractions. This observation helped identify information components that should be included in the tourism information system.

Structured interviews were conducted with staff from the Department of Culture and Tourism of Simeulue Regency, particularly within the tourism promotion division. The interviews aimed to identify system requirements, expected features, and content management needs. The information gathered from interviews was used to define functional system requirements and to create the initial product backlog for system development.

In addition, a literature study was performed by reviewing relevant national and international journals, previous research, and official documents related to web-based tourism information systems. This method was used to strengthen the theoretical foundation and ensure the proposed system aligns with existing research trends [12].

C. System Development Method

The system was developed using the Scrum framework within the Agile methodology due to its flexibility and suitability for web-based system development. Compared with traditional development models such as the Waterfall model, Scrum provides an iterative and incremental development process that allows continuous system improvement and adaptation to changing requirements. The development process consisted of several stages including product backlog identification, sprint planning, sprint development, sprint review, and sprint retrospective.

The product backlog was compiled based on user requirements obtained from observations and interviews with tourism stakeholders. Each requirement was translated into specific development tasks such as destination information management and interactive map integration.

Sprint planning was conducted to prioritize features that would be implemented within a fixed time frame of two to three weeks for each sprint. The development process consisted of five sprints over approximately three months. Each sprint produced a functional system increment that could be evaluated by stakeholders.

During the sprint review phase, representatives from the Department of Culture and Tourism of Simeulue Regency were involved as stakeholders to evaluate the implemented features. They provided feedback regarding system functionality, usability, and information completeness. This feedback was used to refine the product backlog and guide improvements in subsequent sprints.

Due to the individual nature of the research project, daily scrum activities were conducted in the form of personal development notes to monitor development progress, identify obstacles, and document development activities.

The system was implemented using several web development technologies including HTML, CSS, and JavaScript for the frontend interface, PHP for backend development, and MySQL as the database management system. Visual Studio Code was used as the development environment to support coding and debugging processes.

This iterative development approach enables effective system implementation and supports incremental feature delivery in web-based tourism information systems, as demonstrated in previous studies applying the Scrum method [13].

D. System Modeling and Architecture

System behavior was modeled using a use case diagram to illustrate interactions between system actors and system functionalities. The system involves two main actors: tourists and administrators.

Tourists act as general users who access tourism information through the website. They can browse tourism destinations, view destination details, access interactive maps, explore image galleries, and search for specific tourism locations. Administrators manage tourism-related content through an authenticated login system. Administrative functions include adding new destinations, updating tourism information, managing image galleries, and organizing tourism categories. Figure 1 illustrates the use case diagram of the tourism website system based on the identified actors and their interactions.

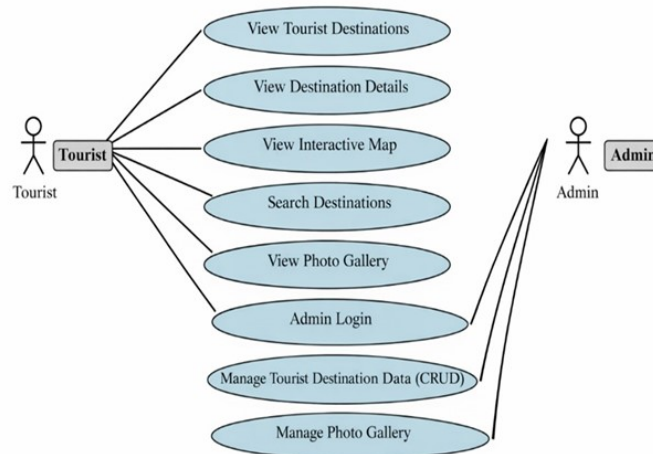


Fig. 1. Use Case Diagram of the Tourism Website System Architecture

The system architecture follows a three-tier architecture consisting of the frontend layer, backend layer, and database layer. This architectural model separates the presentation layer, application logic, and data storage components to improve system maintainability, scalability, and performance.

The frontend layer provides the user interface that allows users to interact with the system through web browsers. This layer is responsible for presenting tourism information, images, and interactive features in a user-friendly format. The backend layer manages application logic, user authentication, and communication between the user interface and the database. It processes user requests, retrieves data from the database, and delivers the requested information to the frontend interface. The database layer stores tourism-related data including destination names, categories, descriptions, geographic locations, and multimedia content. The database enables dynamic content management so that administrators can update tourism information without modifying the system structure.

The interaction flow begins when users access the website interface through the frontend. User requests are then processed by the backend application, which retrieves relevant data from the database. The processed data is returned to the frontend and displayed to users in the form of tourism information pages, maps, and multimedia content.

This three-tier architecture was selected because it enables efficient management of tourism information, supports dynamic content updates by administrators, and improves the scalability of the system as the number of tourism destinations and users increases. The overall system architecture is illustrated in Figure 2.

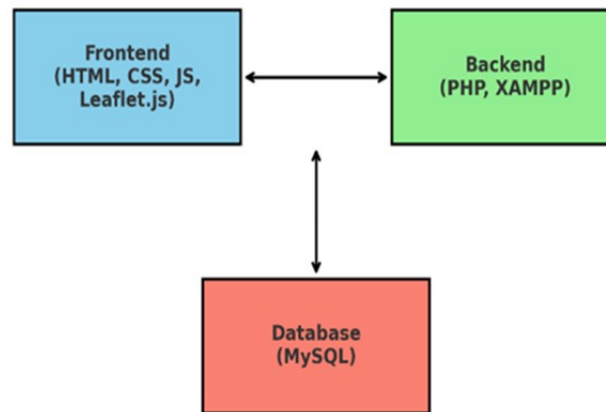


Fig. 2. Architecture of the Tourism Website System

E. System Evaluation

The developed Simeulue tourism website was evaluated through functional testing and user evaluation to ensure that the system operated correctly and met user expectations. Functional testing was conducted using the black-box testing method, which verifies whether each system function operates according to the specified requirements without requiring knowledge of the system's internal implementation. The testing covered both visitor and administrator functionalities, including navigation, destination information, interactive maps, login, and content management features.

In addition to functional testing, a user evaluation was conducted involving 10 respondents after they interacted with the developed Simeulue tourism website. The evaluation employed a four-point Likert scale questionnaire consisting of eight statements that assessed aspects such as ease of use, navigation, information accessibility, interface organization, and overall usability. The collected responses were analyzed descriptively to identify users' perceptions of the developed Simeulue tourism website.

III. Results and Discussion

A. System Development Results

The system development process resulted in an interactive tourism website designed to support the promotion of tourism destinations in Simeulue Regency. The system was developed using the Agile Scrum framework through five iterative sprints, where each sprint produced functional increments aligned with the defined product backlog. This approach enabled the system to be developed in a gradual, adaptive, and user-oriented manner.

Each sprint focused on different development objectives, ranging from basic interface design to overall system testing. The outcomes of each sprint were evaluated before proceeding to the next sprint, allowing continuous improvement of system quality. A summary of the system development results based on the Agile Scrum sprint stages is presented in Table 1.

Table 1. Summary of System Development Results Based on Agile Scrum Sprints

Sprint	Duration	Developed Feature Focus	Results Achieved
Sprint 1	2 weeks	Development of main pages (Homepage, Blog, Explore Simeulue, Transportation, Accommodation, and Services)	Basic website interface was successfully developed, including navigation structure and a simple tourism destination list
Sprint 2	2 weeks	Tourism destination list, destination detail pages, and photo gallery	Destination listing features, detail pages, and interactive photo gallery were successfully implemented
Sprint 3	2 weeks	Interactive tourism map (Leaflet.js) and search feature	Interactive tourism map with location markers and destination search feature was successfully developed
Sprint 4	3 weeks	Admin system (login and tourism data CRUD)	Admin module was successfully implemented, enabling administrators to log in and manage tourism data (create, update, and delete)
Sprint 5	2 weeks	System testing (black-box testing) and bug fixing	The system was successfully tested using the black-box method, bugs were fixed, and the system was declared ready for use

Based on these development results, it can be concluded that the Agile Scrum method is effective for developing an interactive tourism website. All core features planned in the product backlog were successfully implemented, and the resulting system is ready to be used as a digital tourism promotion platform for Simeulue Regency.

B. Implementation of Interactive Tourism Features

The implementation of interactive tourism features on the Simeulue tourism website focuses on providing accessible and engaging destination information for users. The main features implemented include the homepage, an interactive tourism map, and a tourism destination listing page.

1. Homepage

The homepage serves as the main entry point of the website, providing general tourism information about Simeulue Regency and access to all main features through a structured navigation menu. This page is designed to give users an overview of available tourism content and guide them to explore destinations efficiently.

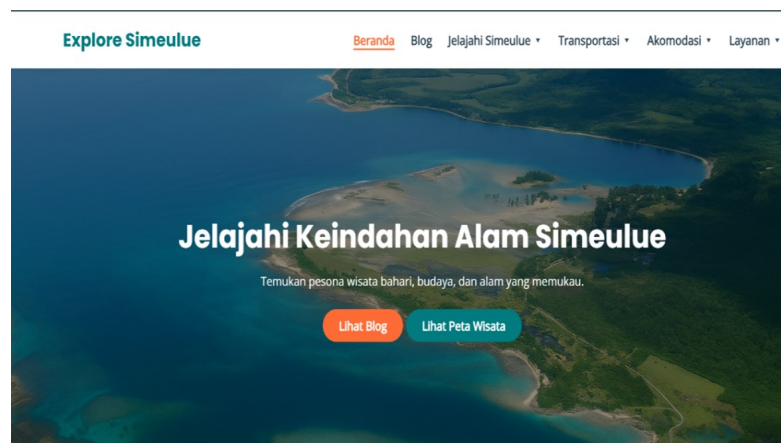


Fig. 3. Homepage of the Simeulue Tourism Website

2. Interactive Tourism Map

The interactive tourism map was developed using Leaflet.js to visualize the spatial distribution of tourism destinations. Each destination is represented by a location marker, allowing users to easily identify the geographical positions of tourist attractions and explore destinations based on their locations.

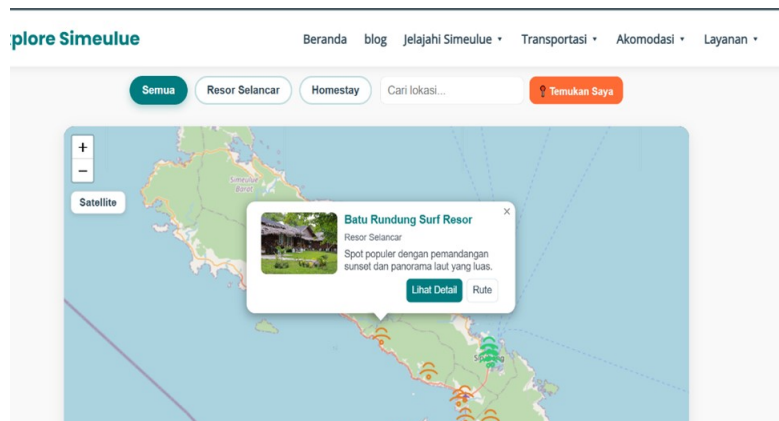


Fig. 4. Interactive Tourism Map of Simeulue Regency

3. Tourism Destination Listing Page

The tourism destination listing page presents tourism information in a structured and dynamic format. Users can browse a list of available destinations and access detailed information for each destination, supporting efficient information retrieval and enhancing the overall user experience.

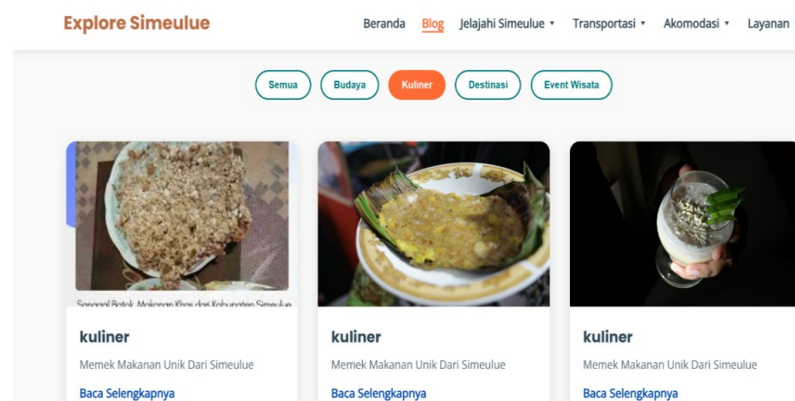


Fig. 5. List of Tourism Destinations Page

C. Content Management and Administrator Functionality

The developed system is equipped with a backend module that enables administrators to manage tourism content dynamically. This module supports system sustainability and ensures long-term use of the website as a digital tourism promotion platform for Simeulue Regency.

1. Admin Login Page

The admin login page provides secure access to the system for authorized administrators. This authentication mechanism ensures that only permitted users can access the content management features of the website.

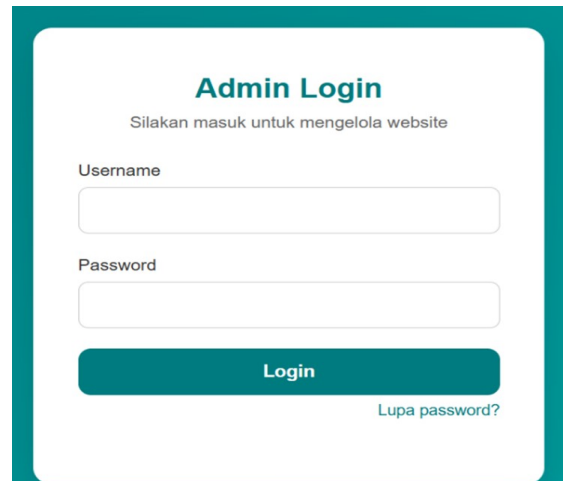
The image shows a web form titled "Admin Login". Below the title is a subtitle "Silakan masuk untuk mengelola website". There are two input fields: "Username" and "Password". Below the "Password" field is a teal "Login" button. To the right of the button is a link "Lupa password?". The entire form is enclosed in a teal border.

Fig. 6. Admin Login Page

2. Admin Dashboard Interface

The admin dashboard serves as the main control panel for administrators to manage tourism content. Through this interface, administrators can access management menus and monitor available tourism articles efficiently.

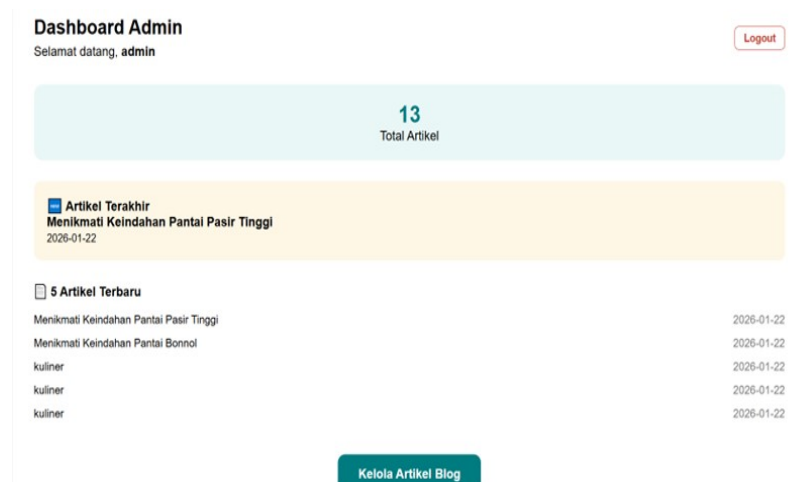
The image shows the "Dashboard Admin" interface. At the top left, it says "Dashboard Admin" and "Selamat datang, admin". At the top right is a "Logout" button. Below this is a light blue box with the number "13" and the text "Total Artikel". Below that is a yellow box with the title "Artikel Terakhir Menikmati Keindahan Pantai Pasir Tinggi" and the date "2026-01-22". Below that is a section titled "5 Artikel Terbaru" with a list of articles: "Menikmati Keindahan Pantai Pasir Tinggi", "Menikmati Keindahan Pantai Bonnol", "kuliner", "kuliner", and "kuliner". To the right of the list are dates: "2026-01-22", "2026-01-22", "2026-01-22", "2026-01-22", and "2026-01-22". At the bottom is a teal button labeled "Kelola Artikel Blog".

Fig. 7. Admin Dashboard Interface

The implementation of these administrator features confirms the effectiveness of the three-tier system architecture, which separates the frontend, backend logic, and database layers. This architectural design improves system flexibility, scalability, and maintainability, particularly for tourism information systems that require frequent and frequent content updates.

D. System Testing Results

System testing was conducted using the *black-box testing* method to evaluate the functional correctness of the system without examining its internal code structure. This testing aimed to ensure that all system features operate in accordance with user requirements and predefined specifications. The testing process was carried out on two sides, namely the visitor (user) side and the administrator side. The results of system testing for both visitor and administrator functionalities are presented in Table 2 and Table 3.

Table 2. Black-Box Testing Results for Visitor Functions

No	Test Scenario	Expected Result	Test Result	Status
1	Access homepage and main navigation	Pages display according to selected menu	Page displayed successfully	Passed
2	Access blog (article list)	Article list is displayed	Articles displayed according to data	Passed
3	Access article detail page	Article detail page is displayed	Article details displayed	Passed
4	Access <i>Explore Simeulue</i> menu	Resort list is displayed	Resort data displayed	Passed
5	Access resort detail page	Resort detail page is displayed	Resort details displayed	Passed
6	Access tourism map	Map and markers are displayed	Map displayed normally	Passed
7	Filter map by category	Markers match selected category	Markers change according to filter	Passed
8	Access accommodation menu	Homestay list is displayed	Homestay data displayed	Passed
9	Access homestay detail page	Homestay detail page is displayed	Homestay details displayed	Passed
10	Cross-feature navigation	Successfully navigate to selected page	Navigation works correctly	Passed
11	Access sea and air transportation information	Transportation information is displayed	Data displayed normally	Passed
12	Access services menu	Service information is displayed	Service data displayed	Passed

Based on the black-box testing results on the visitor side, all primary features functioned properly. No functional errors were identified in the tested features, indicating that the system is capable of delivering interactive, well-structured, and easily accessible tourism information to users.

Table 3. Black-Box Testing Results for Administrator Functions

No	Test Scenario	Expected Result	Test Result	Status
1	Admin login (valid & invalid)	Successful login / error message displayed	System responds according to input	Passed
2	Access dashboard	Dashboard is displayed	Dashboard displayed normally	Passed
3	Access article management	Article list is displayed	Page displayed normally	Passed
4	Article list display	Data with edit and delete buttons shown	Data displayed completely	Passed
5	Add article	Data saved successfully	Article saved	Passed
6	Image upload	Image successfully stored	Image displayed correctly	Passed
7	Form validation	Validation message displayed	Validation works properly	Passed
8	Edit article	Data updated	Changes saved	Passed
9	Delete article	Data deleted	Data deleted successfully	Passed

10	Admin access control	Access denied for unauthorized users	Redirected to login page	Passed
11	Logout	Session terminated	Logout successful	Passed
12	Database connection	Operations run without errors	System stable	Passed

The administrator-side testing results indicate that all content management functionalities operated correctly, including authentication, form validation, article management, image uploading, access control, and logout processes.

The black-box testing results indicate that all defined test scenarios were successfully executed. A total of 24 functional test scenarios were evaluated, covering both visitor and administrator functionalities, and all scenarios achieved a 100% success rate. These results confirm that the developed system fulfills its functional requirements and operates according to the predefined system specifications.

E. User Evaluation

To further evaluate the developed Simeulue tourism website, a user evaluation involving 10 respondents was conducted after they interacted with the website. The respondents completed a questionnaire consisting of eight evaluation aspects using a four-point Likert scale to assess the usability of the developed website.

Table 4. User Evaluation Results of the Developed Simeulue Tourism Website (n = 10)

No	Evaluation Aspect	Maximum Score	Obtained Score
1	The navigation menu is easy to understand and use.	40	39
2	Tourism destination information is easy to find.	40	38
3	Tourism information is easy to understand.	40	36
4	The interactive tourism map helps identify tourism destination locations.	40	34
5	The website interface is neat and well organized.	40	34
6	Navigation between pages is easy to perform.	40	35
7	The website helps users obtain tourism information efficiently.	40	32
8	Overall, the developed Simeulue tourism website is easy to use.	40	35
Total		320	283

Overall usability evaluation score: 88.44% (Very Good category).

Each evaluation aspect had a maximum score of 40, resulting in a total maximum score of 320. The developed Simeulue tourism website obtained a total score of 283, corresponding to an overall usability evaluation score of 88.44%, categorized as Very Good. These findings indicate that the website provides clear navigation, accessible tourism information, and a well-organized interface, supporting its implementation as an effective digital tourism promotion platform for Simeulue Regency.

F. Discussion

The results of this study demonstrate that the developed Simeulue tourism website successfully supports digital tourism promotion and improves tourism information accessibility. Using the Agile methodology with the Scrum framework, the system was developed iteratively through five sprint cycles, enabling continuous feature refinement based on stakeholder feedback and contributing to the stability and completeness of the final system.

The integration of tourism destination listings, interactive map visualization, and dynamic content management enhances the accessibility of tourism information. The Leaflet.js-based interactive map enables users to visualize tourism destinations spatially, helping them better understand destination locations and plan their visits more effectively.

Compared with previous studies, the proposed system offers several improvements. While Lengkong et al. [3] presented tourism information through a static web interface and Ferdio and Saputro [7] implemented GIS-based tourism mapping without dynamic content management, the developed Simeulue tourism website integrates interactive geographic visualization with a backend content management module. This integration enables administrators to update tourism information dynamically, improving system sustainability and maintaining up-to-date tourism content.

The Scrum framework also provides greater flexibility through iterative sprint cycles, enabling continuous feature validation and refinement to ensure that the developed system aligns with user requirements. Similar findings have been reported in previous studies, indicating that Scrum improves adaptability and software quality in web-based applications[13].

The evaluation results further confirm the effectiveness of the developed Simeulue tourism website. Black-box testing verified that all visitor and administrator functionalities operated according to the predefined system requirements. In addition, the user evaluation involving 10 respondents achieved an overall usability score of 88.44%, categorized as Very Good, indicating that the website provides clear navigation, accessible tourism information, and a positive user experience.

However, this study has several limitations. Although the developed Simeulue tourism website was evaluated through functional testing and user evaluation, the usability assessment involved only 10 respondents. Future research should include more participants and standardized usability evaluation methods, such as the System Usability Scale (SUS) or User Experience Questionnaire (UEQ), to obtain a more comprehensive assessment. Furthermore, the current system does not yet support advanced features such as online booking, user account management, or real-time navigation integration, which could be considered in future development.

Overall, the developed Simeulue tourism website is technically feasible, functionally reliable, and well accepted by users as a digital tourism promotion platform for Simeulue Regency. Its integration of interactive mapping, dynamic content management, and the Scrum framework contributes to improving the accessibility and effectiveness of tourism information dissemination.

IV. Conclusion

This study successfully developed an interactive tourism website for Simeulue Regency using the Agile methodology implemented through the Scrum framework. The developed system integrates interactive tourism mapping, structured tourism information, and dynamic content management to support digital tourism promotion and improve access to tourism information in Simeulue regency.

Using the Scrum framework, the system was developed iteratively through five sprint cycles, resulting in continuous refinement of system features based on identified requirements. System evaluation through black-box testing confirmed that all visitor and administrator functionalities of

the developed Simeulue tourism website operated according to the specified requirements. In addition, user evaluation indicated that the website provides good usability and a positive user experience.

Overall, the developed Simeulue tourism website is technically feasible and can serve as an effective digital tourism promotion platform for Simeulue Regency. Future research may further enhance the system by incorporating advanced features such as online booking services, user account management, real-time navigation integration, and more comprehensive usability evaluation using standardized assessment methods.

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