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Development of an Information System for Coastal Tourism Industry Management in Jepara Regency

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Abstract

Based on the identified problems, the availability of tourism information remains suboptimal due to the rapid development of coastal tourist attractions and the increasing number of visitors. In addition, the information provided by the government through social media and official websites does not yet comprehensively present detailed and integrated information related to coastal tourism. Therefore, this study proposes the development of a system to assist visitors in selecting coastal tourist destinations according to their preferences. The system is implemented through web-based mapping of the coastal tourism industry in Jepara Regency using the Waterfall method. The proposed web-based coastal tourism industry information system provides comprehensive information on coastal tourist destinations and the related tourism industries, including visitor statistics, beach locations, entrance fees, accommodations, dining and leisure facilities, tourist attractions, as well as local micro, small, and medium enterprises (MSMEs) and their products located within the coastal areas. This system is expected to deliver accurate and complete information to potential tourists planning to visit coastal destinations in Jepara Regency.

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1. Introduction

Tourism refers to the activities of people traveling to and staying in places outside their usual environment for a continuous period of less than one year, for leisure, business, or other purposes [1]. The tourism industry has become one of the largest industries worldwide and continues to demonstrate steady growth each year. This growth is further accelerated by rapid globalization, which has increased connectivity among sectors, countries, and individuals across the globe. Advances in information technology have also significantly influenced the dynamics of globalization, including the development of tourism, recreation, and entertainment industries [2]. Tourism has become a prominent trend in modern society, as contemporary life encompasses diverse aspects that position travel as one of the essential human needs. Busy schedules and monotonous routines encourage individuals to seek ways to relieve work-related stress. In the modern era, where life pressures are increasingly intense, people are more vulnerable to mental fatigue and depression, thereby requiring time for mental refreshment and physical rejuvenation through tourism activities [3].

Indonesia is a country endowed with diverse tourism destinations. One such region is Jepara Regency, which offers a wide range of tourist attractions, including coastal tourism, water-based tourism, culinary tourism, cultural heritage tourism, mountain tourism, and rural tourism. Each tourist destination in Jepara possesses unique characteristics and attractions that distinguish it from others [4]. Despite the abundance of tourism potential in Jepara Regency, the role of technology remains essential in optimizing the dissemination of information to facilitate access for prospective tourists. Technological support is also needed to assist tourists in obtaining comprehensive information about coastal tourism in Jepara, including the unique features of each beach, so that destinations can be selected according to visitors' preferences and priorities [5]. Jepara Regency is located in the northern part of Central Java Province, covering a land area of 1,004.13 km^2 (approximately 100,413.189 hectares), which is administratively divided into 11 urban villages, 184 rural villages, and 16 districts. In addition, Jepara has a vast marine area covering approximately 2,112.836 km^2. Based on these geographical conditions, Jepara Regency is dominated by coastal tourism destinations, including Pantai Seribu Ranting, Pantai Bulak Baru, Pantai Tanggul Tlare, Pantai Semat, Pantai Mbah Sirah, Pantai Teluk Awur, Pantai Kartini Jepara, Pantai Bandengan, Pantai Kampung Prahu, Pantai Mororejo Jubel, Pantai Pungkruk, Pantai Blebak, Pantai Ujung Piring, Pantai Pailus, Pantai Empurancak, and Pantai Bondo. In addition to coastal tourism, Jepara also offers water tourism, culinary tourism, cultural heritage tourism, mountain tourism, and rural tourism [6].

The use of websites as a medium for tourism promotion, as stated in can generate positive impacts on society, such as expanding opportunities for the tourism industry and encouraging environmental and cultural preservation [7][8][9]. Previous research titled "Android-Based Geographic Information System for Tourism in Tegal City and Regency" emphasized the importance of implementing mobile-based geographic information systems to improve public access to tourism information. The study concluded that the developed system effectively assisted tourists in understanding the locations of tourist attractions in Tegal City and Regency through Android-based applications [10]. Another related study, entitled "Web-Based Tourism Information System at Asta Gangga Park", aimed to design a system that facilitates tourism managers in processing data and assists tourists in accessing tourism information using the Waterfall method. The results indicated that the proposed web-based tourism information system successfully improved public understanding of various tourism destinations and contributed to increased tourist visits [11]. Previous studies have primarily focused on providing

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general tourism information systems, either through mobile-based GIS applications [10] or web-based platforms for specific parks [11]. However, these systems were limited in scope, as they did not comprehensively integrate coastal tourism data with supporting industries such as accommodations, culinary services, and local MSMEs. Moreover, most prior works emphasized location mapping and basic information delivery, without addressing the need for detailed comparative features that allow tourists to select destinations based on preferences such as facilities, entrance fees. In contrast, this study contributes by developing a web-based coastal tourism information system specifically tailored to Jepara Regency, which not only provides geographical and descriptive data of beaches but also integrates supporting tourism industries. This integration is expected to enhance decision-making for tourists, empower local MSMEs through digital promotion, and strengthen Jepara's coastal tourism ecosystem as a whole. Based on the aforementioned issues, this study proposes the development of a web-based coastal tourism industry information system in Jepara Regency using the Waterfall method. The Waterfall model consists of five stages: requirements analysis, system design, implementation, integration and testing, and operation and maintenance. The requirements stage focuses on identifying user needs and software constraints. The design stage provides a comprehensive blueprint of the system prior to coding.

The implementation stage involves software development through coding. The integration and testing stage ensures that the system functions in accordance with the initial design and is free from errors. Finally, the operation and maintenance stage involves system deployment, usage by users and administrators, and ongoing maintenance, including error correction, system updates, and service enhancements. Through the proposed system, comprehensive information regarding coastal tourism and its supporting tourism industries will be provided, including visitor statistics, beach locations, entrance fees, accommodations, dining and leisure facilities, tourist attractions, as well as local micro, small, and medium enterprises (MSMEs) and their products [12]. This system is expected to serve as an effective information platform for prospective tourists planning to visit coastal destinations in Jepara Regency.

2. Methods

2.1 Data Collection Method

In order to construct an effective information system, accurate and relevant data are required as inputs to be processed and transformed into meaningful information for users. Within the context of the web-based coastal tourism industry information system in Jepara Regency, the system requires several types of data and information to support its functionality. These include data related to coastal tourism destinations, such as beach profiles and locations, visitor statistics, accommodation facilities, restaurants, and MSMEs operating within each coastal area. In addition, user data are required to manage system access and interactions. The system is also expected to provide essential information outputs, particularly comprehensive data related to coastal tourism in Jepara Regency and geographic information system (GIS)-based data [13]. The integration of GIS data enables spatial visualization of tourism locations, allowing users to better understand the distribution and accessibility of coastal destinations. Through the fulfillment of these data and information requirements, the proposed system is designed to support decision-making for tourists and to enhance the overall dissemination of coastal tourism information in Jepara Regency.

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2.2 Waterfall Method

The coastal tourism industry information system in Jepara Regency is developed as a web-based application using the Waterfall method to provide comprehensive information on coastal tourism destinations and the supporting tourism industries. The system is designed to present detailed and structured information, including visitor statistics, beach locations, entrance fees, accommodation facilities, dining and leisure areas, tourism attractions, as well as micro, small, and medium enterprises (MSMEs) and their local products located within coastal areas. By integrating this information into a single platform, the system aims to deliver accurate, accessible, and reliable information to prospective tourists planning to visit coastal destinations in Jepara Regency.

a. Requirements Analysis Phase
   The requirements analysis phase is conducted to understand the existing conditions of coastal tourism information management in Jepara Regency and to identify the problems faced by stakeholders. At this stage, an analysis of the current information dissemination process is carried out to determine system limitations and user needs. The analysis focuses on identifying the types of data required, such as beach profiles, visitor statistics, accommodation facilities, restaurants, tourism attractions, MSMEs, and geographic information. This phase aims to define functional and non-functional requirements so that the proposed web-based coastal tourism industry information system can effectively address existing issues and provide accurate, comprehensive, and user-oriented tourism information.
b. System Design Phase
   In the system design phase, the results of the requirements analysis are translated into a structured system blueprint. This phase involves designing the system architecture and modeling system processes using Unified Modeling Language (UML) diagrams, including use case diagrams, activity diagrams, and class diagrams [14]. In addition, user interface mockups are created to visualize the layout and interaction flow of the web-based system. The design phase ensures that the system structure, data flow, and user interactions are clearly defined prior to the implementation process, thereby reducing potential errors during development and ensuring alignment with user requirements.
c. Implementation Phase
   The implementation phase involves the actual development of the web-based coastal tourism information system based on the previously defined system design. At this stage, the system is developed using web programming technologies, including PHP as the server-side scripting language and MySQL as the database management system [15]. The implementation process focuses on translating the design models into functional system components while ensuring system security, performance, and data integrity. Each module is developed in accordance with the established design to ensure that the system functions as intended [16].
d. Integration and Testing Phase
   The integration and testing phase is conducted to ensure that all system components function properly when combined into a complete system [17]. During this phase, each module is integrated and tested to verify its compatibility and performance. System testing is carried out by comparing system outputs with the defined requirements to identify potential errors, bugs, or inconsistencies. This phase aims to ensure that the system meets user expectations, operates

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reliably, and provides accurate tourism information before being deployed for public use [18].

e. Operation and Maintenance Phase
The operation and maintenance phase is the final stage of the Waterfall method, where the system is deployed and made accessible to users through web hosting services [19]. The system is operated by the general public as users and managed by administrators from the local tourism authority. In this phase, ongoing maintenance activities are performed, including error correction, system updates, data management, and service improvements. This phase ensures the long-term sustainability of the system and its ability to adapt to changes in tourism data and user needs over time [20].

3. Results and Discussion

3.1. Use Case Diagram

A use case system is a visual representation that illustrates the roles of actors involved in a system and the interactions between users and system functionalities. This representation helps to clearly define system boundaries, user responsibilities, and the processes supported by the system. The use case diagram of the web-based coastal tourism industry information system in Jepara Regency is presented in Figure 1, which depicts the main actors and their interactions within the system.

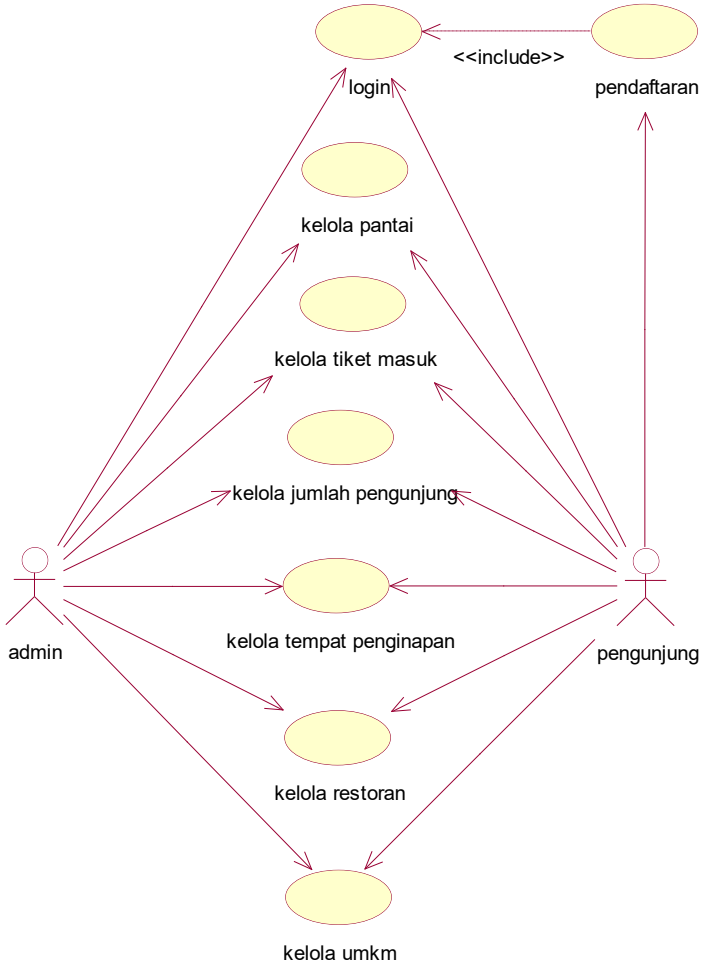

Figure 1. Use Case Diagram for the Tourism Industry Information System

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3.2. Sequence Diagram

A sequence diagram is a UML behavioral diagram that visualizes interactions between actors and system components over time, emphasizing the order of messages exchanged to complete a specific scenario. In this study, the sequence diagram models the workflow for managing beach tourism destination data in the Jepara Regency coastal tourism information system. It illustrates how the administrator accesses the beach management form, inputs and stores data, performs searches, updates or deletes records, and views detailed information, along with the system's responses to each request. The Beach Management Sequence Diagram is shown in Figure 2.

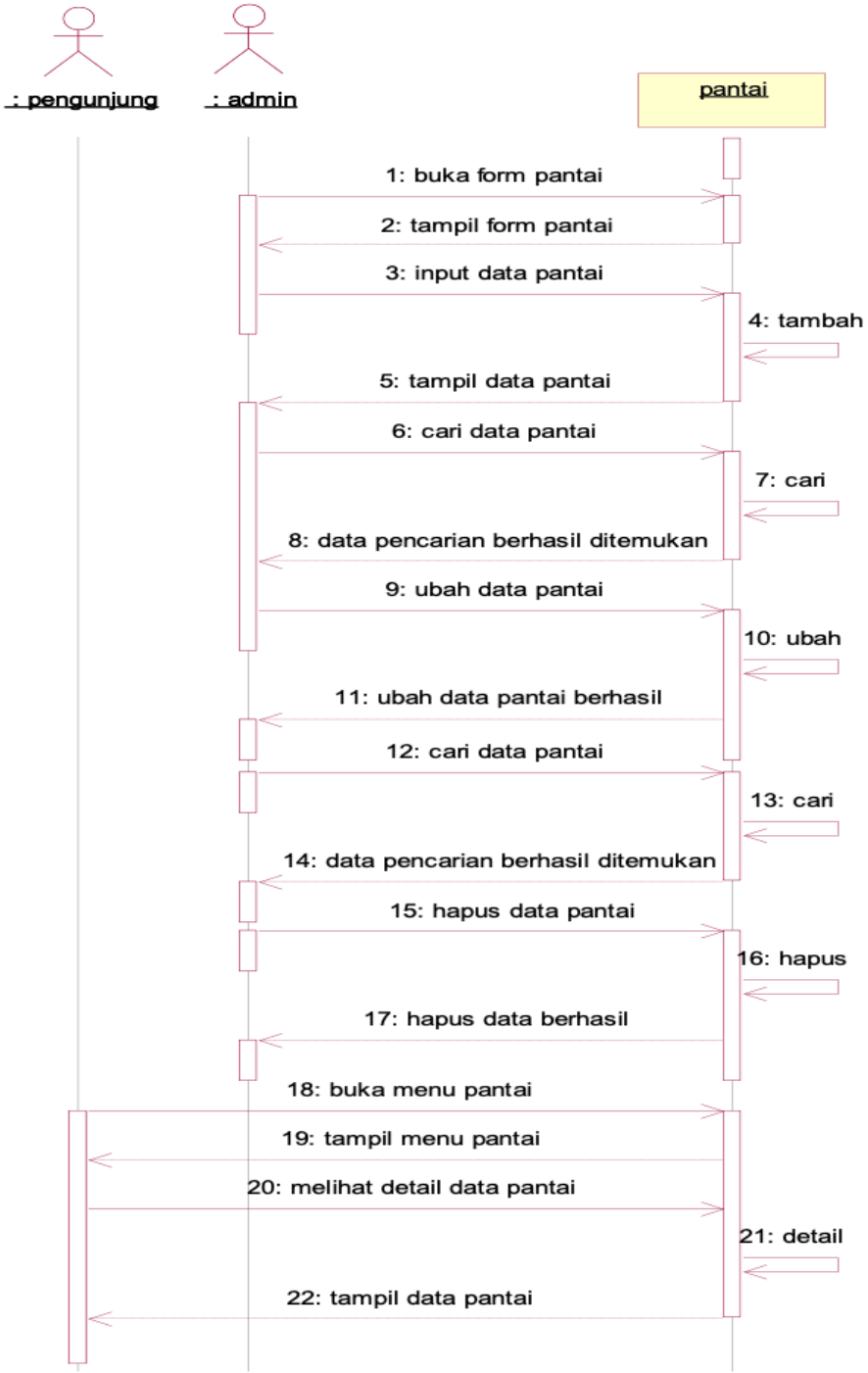

Figure 2. Beach Management Sequence Diagram

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3.3. Class Diagram

A class diagram is a visual tool used to represent the classes within a system or software application being developed. It provides a comprehensive overview of the system structure and the relationships among its components. Presented below is a class diagram that illustrates the structure of the coastal tourism system in Jepara Regency. The results obtained from the class analysis are organized into a class diagram to clearly demonstrate how each component is connected and related within the system, as shown in Figure 3.

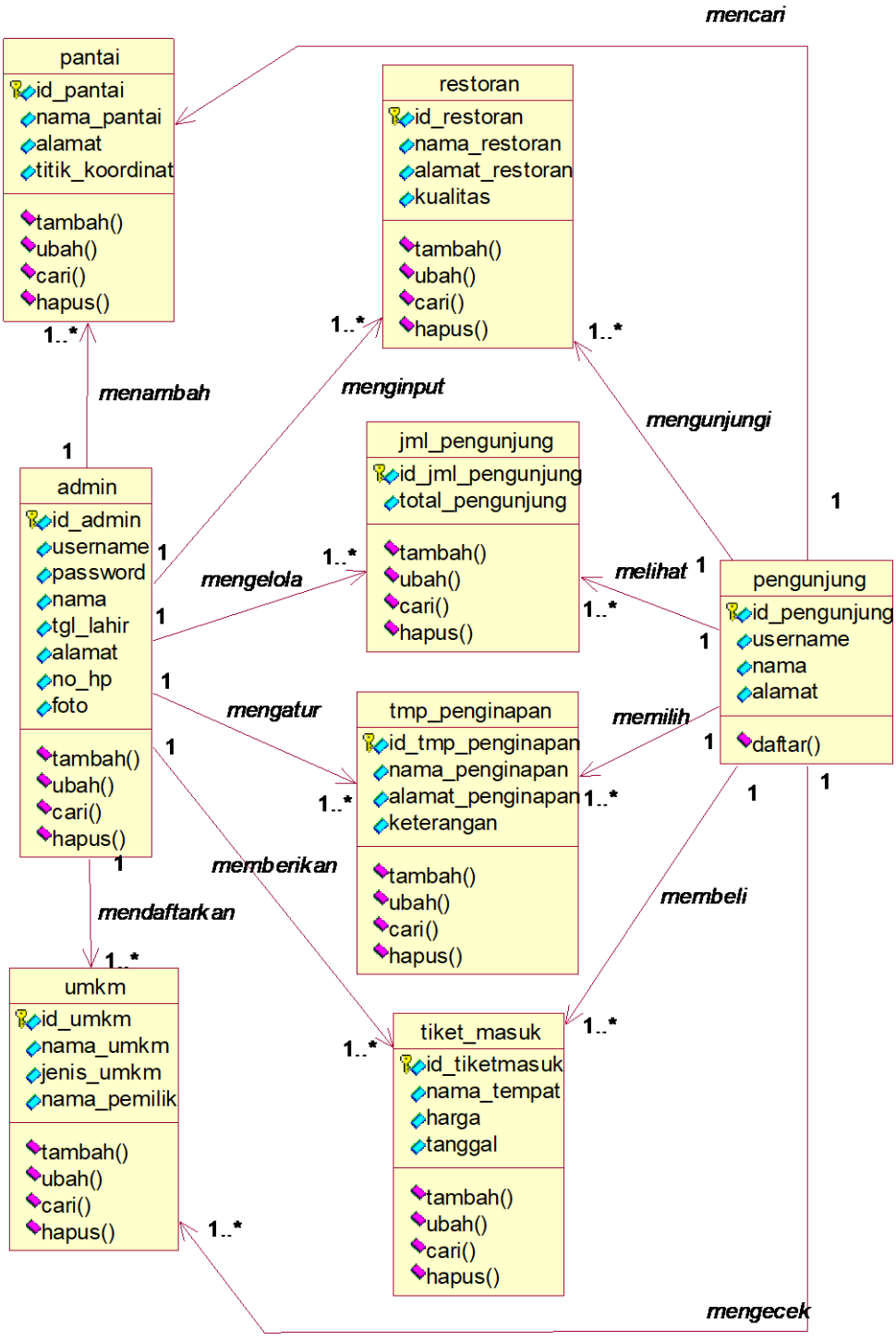

Figure 3. Class Diagram of the Coastal Tourism Industry Information System

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3.4. System Implementation

The system implementation refers to the interface of the developed system. The web-based tourism information system for Jepara Regency consists of several main interfaces, including the Login Form Interface, Registration Form Interface, Main Interface of Jepara Tourism Mapping, Admin Dashboard Page, and the Manage Travel Data Page. These interfaces are designed to support user interaction and system administration, enabling efficient access, data management, and presentation of tourism information.

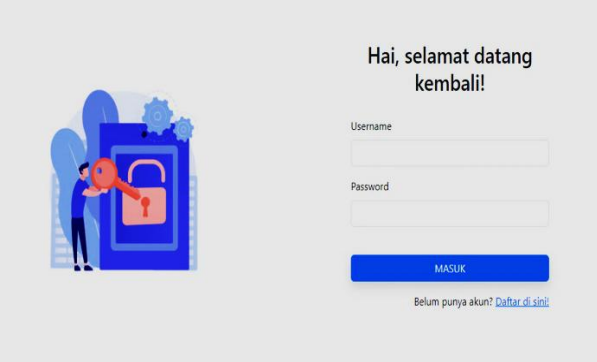

Figure 5. Login Form Interface

Figure 6. Registration Form Interface

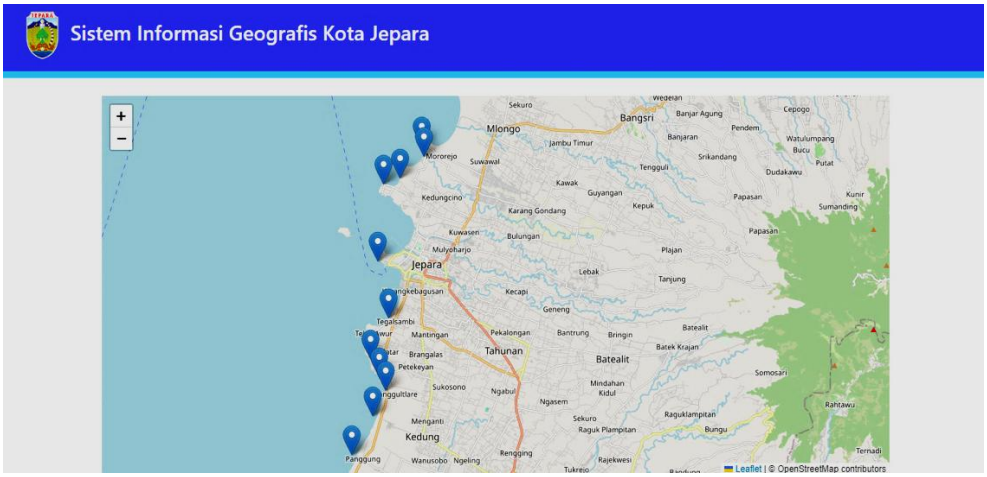

Figure 7. Main Interface of Jepara Tourism Mapping

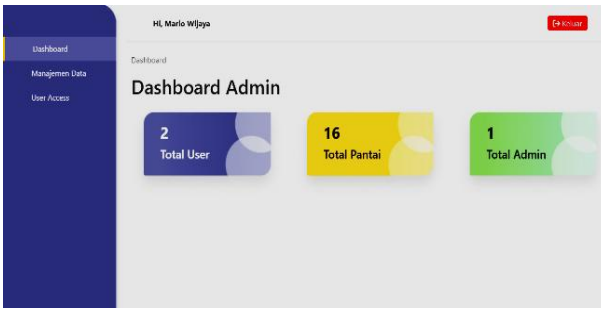

Figure 8. Admin Dashboard Page

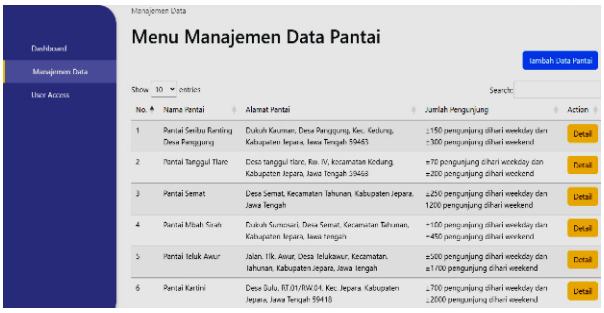

Figure 9. Manage Travel Data Page

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3.5. Testing

Based on the black box testing results presented in Table 1, it can be concluded that the web-based coastal tourism information system in Jepara Regency functions as expected. All test scenarios, including user management and beach data management, produced results that were consistent with the defined system requirements. The system successfully processed valid input data and stored them correctly in the database, while invalid or incomplete inputs were handled appropriately by displaying relevant error messages. These results indicate that the system is able to support core functionalities reliably and is suitable for operational use.

Table 1. Black Box Test Results of the Jepara Regency Coastal Tourism Information System

No.	Use Case	Scenario Name	Data Input	Expected	Actual	Status
1	Manage user	Save data successfully	Username: Mario Password: mario	User data is saved to the database	Data successfully saved to the database	Valid
2	Manage user	Failed to log in	Username: Rio Password: rio	The system displays an error message	Error message displayed	Valid
3	Manage user	Data cannot be saved	Username: Empty Password: Empty	The system displays a warning about incomplete data	Warning message displayed	Valid
4	Manage beach	Save data successfully	Name: Semat Beach Address: Semat Village Number of Visitors: 250	The beach data is saved to the database	Data successfully saved to the database	Valid
5	Manage beach	Failed to log in	Nama: Empty Alamat: Empty Jumlah Pengunjung: Empty	The system displays an error message	Error message displayed	Valid

4. Conclusion

Based on the results of the study, system analysis, and design process, it can be concluded that the developed system operates as intended and functions in accordance with the initial planning. However, several challenges were encountered during the research process. One of the main obstacles was the limited management of several coastal tourism sites, which resulted in difficulties in obtaining accurate visitor data. In addition, the considerable distance between beaches across different districts posed challenges in collecting comprehensive tourism-related information from each location. The analysis of visitor data indicates that several coastal tourism destinations record the highest number of visitors, particularly Semat Beach and Teluk Awur Beach in Tahunan

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District; Kartini Beach, Bandengan Beach, and Kampung Prau Beach in Jepara District; Blebak Beach in Mlonggo District; and Bondo Beach in Bangsri District. These beaches demonstrate relatively high levels of tourist activity compared to other coastal destinations in Jepara Regency. Furthermore, the same group of beaches was identified as having the most complete tourism facilities. These facilities include accessibility and transportation, accommodations, restaurants, recreational amenities, and the presence of local micro, small, and medium enterprises (MSMEs). The availability of comprehensive facilities contributes significantly to visitor convenience and plays an important role in increasing tourist interest. Based on the evaluation of visitor numbers and facility availability, several coastal areas in Kedung District were identified as having strong potential for further development to enhance the local economy and create new employment opportunities. Currently, beaches in this district receive minimal maintenance, with most preservation efforts carried out independently by local communities. This condition has resulted in relatively low visitor numbers. Notable examples include Pantai Seribu Ranting in Panggung Village and Pantai Tanggul Tlare. With proper management and development, these coastal tourism destinations have the potential to attract more visitors and contribute more effectively to regional economic growth. In addition, the application of the Waterfall method throughout the development stages ensured that user requirements were systematically identified, the system design was clearly structured, and implementation was carried out in a controlled manner. This methodological approach contributed to the reliability of the system and facilitated future maintenance and scalability. As a result, the web-based coastal tourism information system not only provides comprehensive data on destinations and supporting industries but also serves as a practical tool for tourists in planning visits and for local stakeholders in promoting Jepara's coastal tourism ecosystem.

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6. Author's Note

The authors hereby declare that there is no conflict of interest related to the publication of this article. In addition, the authors confirm that this manuscript is original, has not been published elsewhere, and is free from any form of plagiarism.

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