Journal of Artificial Intelligence and Engineering Applications

Website: https://ioinformatic.org/

June 2026. Vol. 5. No. 3; e-ISSN: 2808-4519

Design and Development of a Web-Based Tourism Information System (Case Study: Kanatang District)

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Abstract

In the modern era, advances in information technology have significantly influenced many aspects of life, including the delivery of information through digital systems. One sector that can benefit from this development is tourism, particularly in Kanatang District, East Sumba Regency. Kanatang District has various tourism potentials, including natural attractions, historical sites, cultural heritage, and traditional customs that attract visitors. However, these potentials are not yet supported by an adequate information system to promote and provide information about tourist destinations. As a result, tourists often experience difficulties in obtaining complete, fast, and accurate information regarding tourism objects in the area. In addition, data from related agencies show a decline in tourist visits in 2023, indicating limited tourism promotion and poor accessibility of tourism information in the region. To overcome these problems, this study proposes the design and development of a web-based Tourism Information System that provides information about tourist attractions, interactive maps, and supporting tourism facilities in Kanatang District. The system is developed using the Waterfall method. The purpose of this research is to provide comprehensive tourism information and make it easier for tourists to access the location and description of each tourist destination in Kanatang District.

Keywords: *Information System, Tourism Information System, Waterfall, Kanatang District*

1. Introduction

In the modern era, information technology has developed rapidly, especially in the field of information systems. Today, people's daily activities are greatly facilitated by the existence of information systems. Information Technology (IT) refers to technology that helps humans create, process, store, communicate, and distribute information. Technology also plays an important role in many aspects of life, including the tourism sector, particularly in Kanatang District, East Sumba Regency.

Kanatang District has diverse tourism attractions, including natural landscapes, cultural heritage, traditional customs, and social diversity that can be developed into tourism activities. Located in East Sumba Regency, Kanatang District possesses abundant natural and cultural resources that attract visitors. The area offers various tourist destinations, such as traditional historical villages, waterfalls, beaches, mountains, islands, and other natural attractions. In addition to its natural beauty and cultural richness, the diversity of the local community also provides unique value for tourism development.

However, in reality, Kanatang District has not fully utilized information technology to promote and provide comprehensive information about its tourism attractions. The development of the tourism sector in this area still faces several challenges, including limited access to fast and accurate tourism information for visitors. Therefore, the design and development of a web-based tourism information system in Kanatang District has become an urgent necessity.

By implementing a web-based tourism information system, it is expected that access to tourism information in Kanatang District will significantly improve. Tourists will be able to easily and quickly obtain complete information regarding natural, cultural, historical, and recreational tourism destinations available in the region. This system is expected to provide solutions to tourism information accessibility issues, increase tourist attraction, and support the local government's efforts in developing the tourism sector sustainably.

Figure 1.1 shows the annual number of tourist visitors. Based on the data, the number of tourists decreased in 2023 to 6,636 visitors. Currently, Kanatang District still requires further development in tourism promotion activities, which are not yet well coordinated, and in the presentation of tourism information, which is still inefficient. The tourism potentials in Kanatang District, including natural and cultural tourism, need to be promoted more effectively. The Waterfall model is a software development method that follows a systematic and sequential process from one stage to another, similar to the flow of a waterfall. This model proposes a structured approach to software development through stages such as system analysis, design, coding, testing, and maintenance [1]. Based on the problems described above, the author proposes research entitled "Design and Development of a Web-Based Tourism Information System in Kanatang District."

Therefore, a tourism information system is needed to help tourists manage and access various types of information, such as tourism objects and interactive maps. This system aims to make it easier for visitors to choose and locate tourist destinations in Kanatang District.

2. Previous Research

2.1. Information System

An Information System is the result of data processing in a form that is more useful and meaningful for its users, representing real events or facts that are utilized in decision-making processes. A system is also defined as an organized combination of people, hardware, software, communication networks, and data resources that collect, process, transform, and distribute information within an organization [2].
An information system refers to an organized arrangement of resources, including human resources, technology, software applications, communication facilities, and data, which collaborate to transform raw data into meaningful information. This information is utilized to support organizational operations, managerial functions, and strategic decision-making. By providing relevant, accurate, and timely information, information systems contribute to improving efficiency, coordination, and overall organizational performance [3].

2.2. Promotion

Promotion can be defined as a communication strategy used by a company or organization to convey information about products, services, or brands to the target market. This activity aims not only to inform consumers but also to persuade them to develop interest, create demand, and ultimately make purchasing decisions [4].
Promotion is also considered a marketing effort, both through media and non-media channels, intended to encourage consumers to try products, increase consumer demand, and improve product quality [5].

2.3. Tourism

Tourism is a journey undertaken by individuals or groups for a temporary period, involving movement from one place to another with the purpose of enjoying recreational activities rather than earning income at the destination visited, while fulfilling various individual or group needs [6].
Tourism is also part of human activities in which individuals visit and stay in a particular place to spend their leisure time, relax, and engage in meaningful or cultural activities. These activities can provide positive impacts on users, both physically and mentally [7].

2.4. Ikat Weaving Fabric

Ikat weaving fabric is a traditional handicraft product that has been passed down from generation to generation in East Sumba. It has become a source of pride for the local community because it contains deep cultural and traditional values. In addition, its beautiful and unique motifs are able to attract both local people and tourists [8].
From a cultural and traditional perspective, East Sumba traditional ikat weaving has various functions, including as clothing for dances performed during traditional ceremonies or celebrations, as a form of appreciation and dowry, as an offering in funeral ceremonies, as a customary fine to restore disrupted social balance, as a mythical symbol believed to provide protection from natural disturbances, disasters, or evil spirits, and as a symbol of respect for guests [9].

2.5. Waterfall

The Waterfall method is one type of development model that can be analogized to a waterfall, where each stage is carried out sequentially from top to bottom. The development of the web-based examination information system in this study uses the Waterfall model as the software development method [10].
The Waterfall model is one of the most commonly used models in the development of information systems or software. This model applies a systematic and sequential approach. The stages in this model begin with the planning phase and continue through to the maintenance phase, with each stage carried out step by step. Developers need to understand the development process and the characteristics of the Waterfall model when applying this approach [11].
The system development process in this study uses the Waterfall Method, which is considered one of the oldest software development methods. One of its advantages is its structured and adaptable nature in system development. The Waterfall Method consists of five main stages: Planning, Analysis, Design, Implementation, and Maintenance.

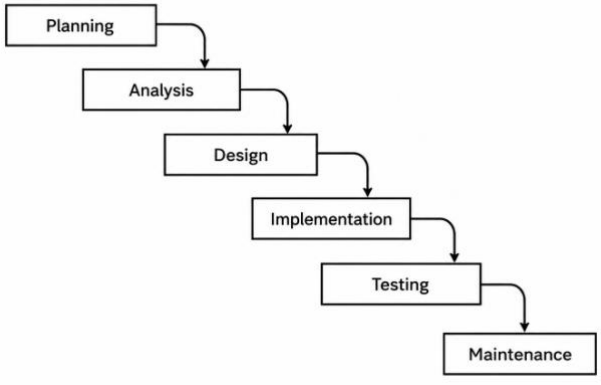

Fig. 1: Waterfall

Description:

1. Planning
   At this stage, emphasis is placed on gathering user requirements and describing the relationship concept between users and the interface. This process produces the specifications for the web-based customer relationship management system.
2. Analysis
   At this stage, an analysis of problems, requirements, and necessary data is conducted in designing the system based on the existing concepts.
3. Design
   At this stage, the results of the analysis are transformed into system designs in the form of Use Case Diagrams, Activity Diagrams, Sequence Diagrams, Class Diagrams, and User Interface designs.
4. Implementation
   This stage involves coding or developing the software based on the completed design. During this stage, developers write the source code and implement the system logic to be built.
5. Testing
   The implemented system is tested to ensure that the software functions according to the specifications. This includes functional testing, integration testing, and performance testing.
6. Maintenance
   The maintenance stage involves system upkeep, bug fixing, functionality improvements, and necessary modifications after deployment.

One of the advantages of the Waterfall model is that the system development process is well planned and easier to control. In addition, the development stages are clearly structured, and each stage is completed before moving to the next stage, thereby preventing overlap in the implementation process.

2.6. Black Box Testing

Black Box Testing is a testing technique used to identify errors in an application system by examining its functionality without considering the internal structure or the details of the code used. This includes detecting errors in system functions and identifying missing application features. In other words, Black Box Testing is a method used to evaluate the functionality of an application system. During the testing process, random input data is used to obtain accurate results. This means that if incorrect data is entered, the information system will reject it or prevent the data from being stored in the database. However, if the entered data is valid, the system will accept and store the data in the database [12].
Black Box Testing also involves identifying various categories of errors, including incorrect or missing functions, interface errors, errors in data structures and database access, performance errors, as well as initialization and termination errors [13].

3. Results And Discussion

Data collection methods are techniques used to obtain the information and data required in the Design and Development of a Web-Based Tourism Information System in Kanatang District. This research requires accurate and up-to-date data; therefore, data collection was carried out through several methods, including:

1. Observation
   The first method of collecting data and information was observation, which involved direct field observations to identify tourist attraction locations as well as their physical and environmental conditions. Observations were conducted by recording geographical coordinates and collecting visual data through photographs to provide a clearer description of the actual field conditions.
2. Interview
   Interviews were conducted to obtain the data needed for the design of the tourism information system. This method involved direct question-and-answer sessions with informants to gather information and obtain relevant research materials. In this study, interviews were conducted with the East Sumba Regency Tourism Office and the managers of tourist attractions in Kanatang District.
3. Dokumentasi
   Documentation is a data collection method that uses written sources and relevant archives. In this research, documentation techniques were used to collect data from the East Sumba Regency Tourism Office and tourism site managers in Kanatang District. The collected data included the names of tourist attractions, locations, accessibility, supporting facilities, tourism potential, and photographic documentation of tourist sites.

4. Implementastion and Testing

4.1. Implementastion

This section presents the outcomes of the research implementation conducted according to the established methodology. The implementation stage resulted in the development of a website-based tourism information system and a series of tests to assess its functionality. The system was designed to facilitate public access to tourism information in Kanatang District by providing comprehensive data regarding tourist attractions and their locations. To ensure system reliability and functionality, testing was carried out using the Black Box Testing method. The results indicated that the implemented features functioned properly and were capable of meeting user requirements as intended.

1. Home Page Interface

Fig. 2: Home Page Interface

Figure 2 presents the main interface of the Tourism Geographic Information System in Kanatang District. The homepage acts as the starting point for users to interact with the system. Several navigation menus are provided at the top of the page, namely Home, Tourism Data, Woven Fabric Data, and Login, allowing users to access different sections of the application. The page also displays the system title and serves as an entry point to the information and functionalities offered by the system.

2. Tourism Data Interface

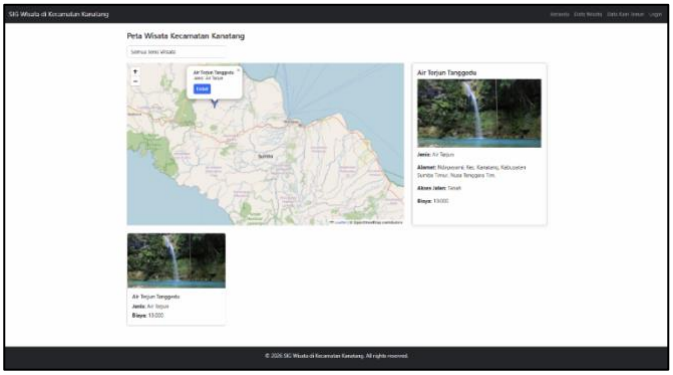

Fig. 3: Tourism Data Interface

Figure 3 shows the Tourism Data page, which can be accessed by both administrators and users without requiring login credentials. This page displays a tourism map of Kanatang District equipped with location markers for each tourist attraction. Users can select tourism categories through the available filter feature to facilitate data searching. In addition, the page provides detailed tourism information, including the name of the tourist attraction, tourism category, address, road access, entrance fee, and images of the tourist site. At the bottom of the page, a tourism list is also available, containing a summary of information for each tourist attraction.

3. Woven Fabric Data Interface

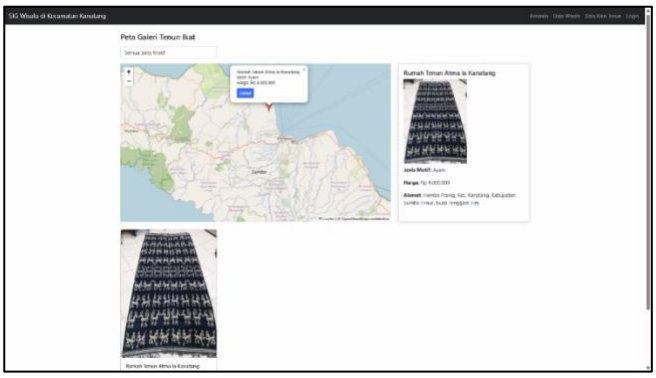

Fig. 4: Woven Fabric Data Interface

Figure 4 shows the Woven Fabric Data page, which can be accessed by both administrators and users without requiring login credentials. This page displays a gallery map of Kanatang District equipped with location markers for each gallery. Users can select woven fabric types through the available filter feature to facilitate data searching. In addition, the page provides detailed gallery information, including the gallery name, motif type, price, address, and images of the woven fabrics. At the bottom of the page, a gallery list is also available, containing a summary of information for each gallery.

4. Admin Login Interface

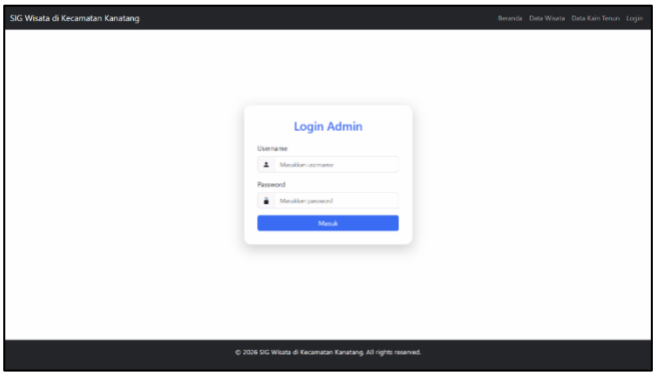

Fig. 5: Admin Login Interface

Figure 5 presents the login interface designed for system administrators. The page is intended to authenticate authorized users before granting access to the administrative features of the Tourism Geographic Information System. Administrators are required to input their registered username and password into the available fields. Successful authentication allows access to the dashboard, which contains features for managing tourism and woven fabric information. If authentication fails, the system provides a warning message indicating incorrect login credentials and requests the user to repeat the login procedure.

5. Admin Dashboard Interface

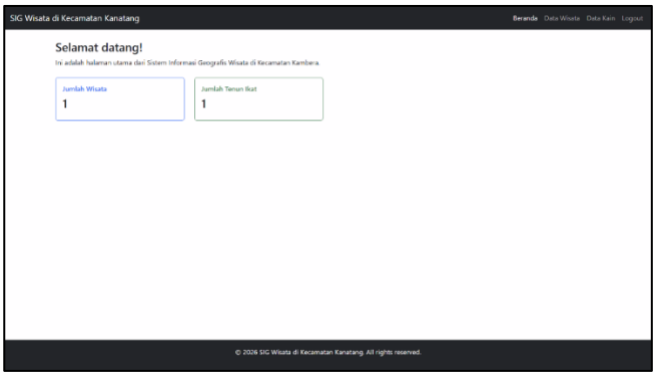

Fig. 6: Edit Congregation Data Interface

Figure 6 shows the Admin Dashboard displayed after the administrator has successfully logged into the system. At the top of the page, there is a navigation menu consisting of Home, Tourism Data, Woven Fabric Data, and Logout. The Home menu is used to return to the main Admin Dashboard page, the Tourism Data menu is used to manage tourism data, the Woven Fabric Data menu is used to manage woven fabric data, and the Logout menu allows the administrator to log out of the system. In the center of the page, the total number of tourism data records and woven fabric data records is displayed.

6. Tourism Data Interface

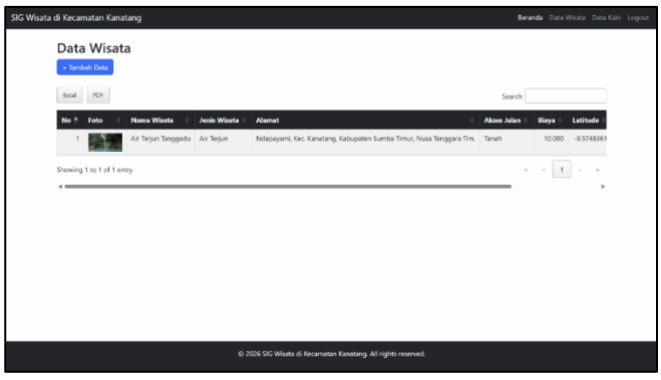

Fig. 7: Tourism Data Interface

As illustrated in Figure 7, the Tourism Data interface serves as a centralized page for viewing and managing tourism information within the application. The displayed table contains various details related to tourist attractions, including their names, types, locations, access routes, ticket prices, coordinates, and images. To support data management, administrators are provided with options to edit or delete records. In addition, the interface includes a feature for inserting new tourism entries into the system.

7. Add Tourism Data Interface

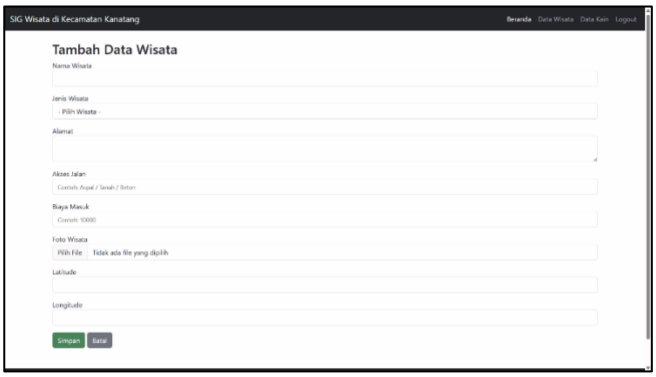

Fig. 8: Add Tourism Data Interface

As shown in Figure 8, the Add Tourism Data page serves as a data entry form for administrators to register new tourism destinations in the application. The form accommodates multiple input fields containing information about a tourist attraction, including its name, type, location, accessibility, ticket price, image, and geographic coordinates. Accurate completion of these fields is necessary to ensure proper storage of information in the database. After the data entry process is completed, the administrator can save the information, and the system will automatically make the new record available on the tourism data page.

8. Edit Tourism Data Interface

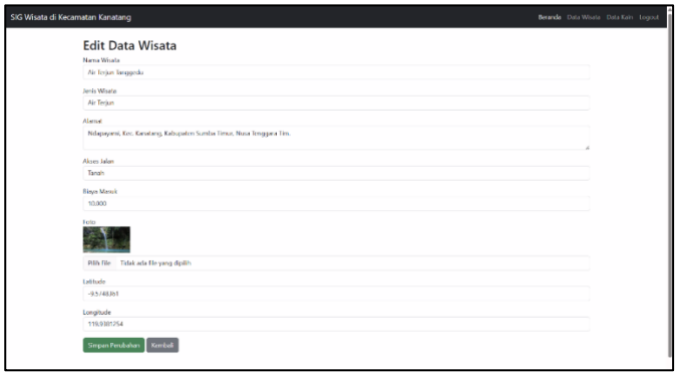

Fig. 9: Edit Tourism Data Interface

Figure 9 shows the Edit Tourism Data page, which is used by the administrator to modify or correct tourism information that is inaccurate or outdated. This page contains a form with several input fields, including the tourism name, tourism type, address, road access, entrance fee, photo, latitude, and longitude. All fields should be reviewed and completed accurately to ensure that the updated tourism data reflects the actual conditions. After the data entry or modification process is completed, the administrator can click the Edit button located at the bottom of the page to save the changes to the database. The updated data will then be displayed on the Tourism Data page.

9. Delete Tourism Data Interface

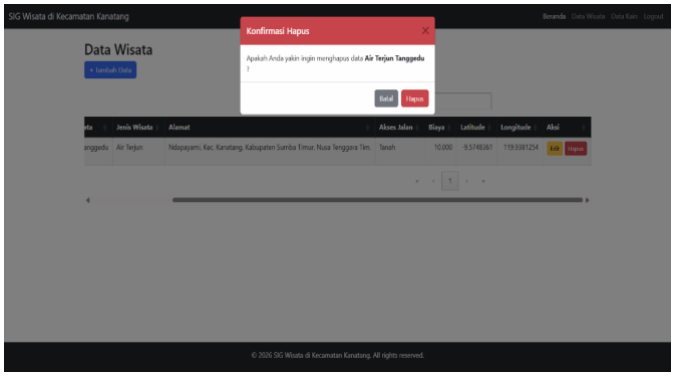

Fig. 10: Delete Tourism Data Interface

Figure 10 illustrates the Delete Tourism Data interface, which enables administrators to remove tourism records that are no longer required in the system. Prior to deleting a record, the application presents a confirmation message asking the administrator to verify the action. If the administrator confirms the deletion, the selected tourism data will be permanently removed from the database. On the other hand, if the action is canceled, the data will remain unchanged. This confirmation mechanism serves as a safeguard against unintended deletions and helps preserve the reliability, consistency, and security of the stored tourism information.

10. Woven Fabric Data Interface

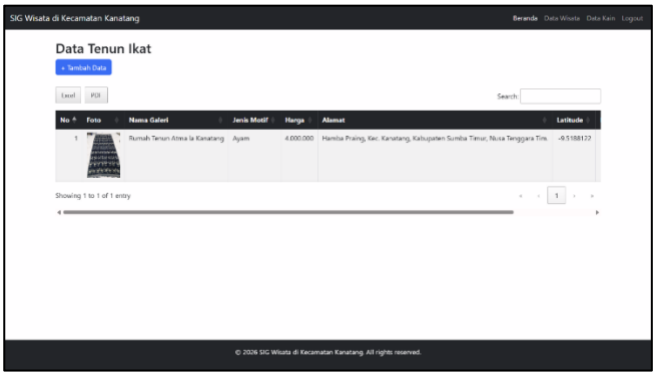

Fig. 11: Woven Fabric Data Interface

Figure 11 presents the Woven Fabric Data page, which is designed to display and manage all woven fabric records available in the system. The information is organized in a table containing several attributes, including the fabric name, motif type, price, address, geographic coordinates, and associated images. To facilitate data management, the interface provides options for editing and deleting existing records. In addition, an add-data feature is available, allowing administrators to register new woven fabric information into the database.

11. Add Woven Fabric Data Interface

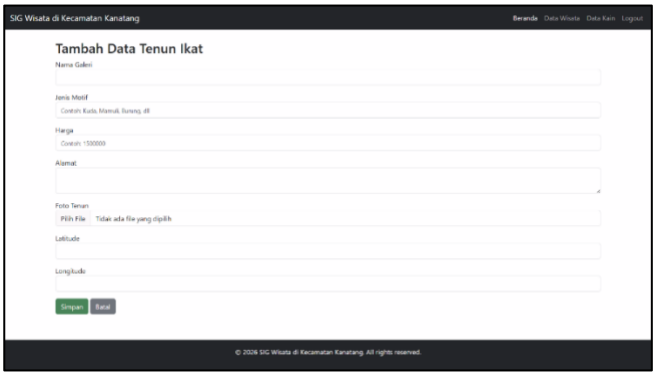

Fig. 12: Add Woven Fabric Data Interface

Figure 12 shows the Add Woven Fabric Data page, which is used by the administrator to add new woven fabric information to the system. The form consists of several input fields, including the gallery name, motif type, price, address, photo, latitude, and longitude. Each field must be completed accurately to ensure that the woven fabric data is stored correctly in the database. After all required information has been entered, the administrator can click the Save button located at the bottom of the page to store the data. The saved data will then be displayed on the Woven Fabric Data page.

12. Edit Woven Fabric Data Interface

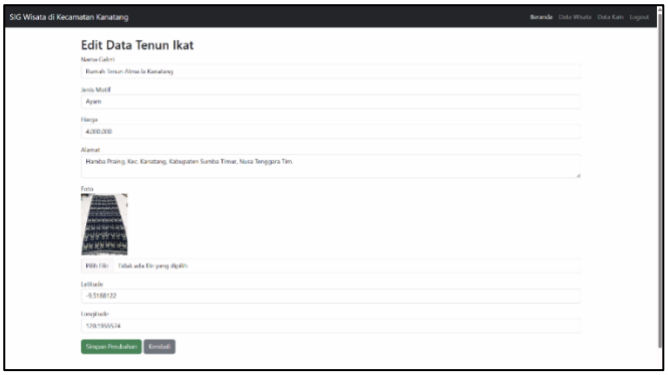

Fig. 13: Edit Woven Fabric Data Interface

Figure 13 shows the Edit Woven Fabric Data page, which is used by the administrator to modify or correct woven fabric information that is inaccurate or outdated. This page contains a form with several input fields, including the gallery name, motif type, price, address, photo, latitude, and longitude. All fields should be reviewed and completed accurately to ensure that the updated woven fabric data reflects the actual conditions. After the data entry or modification process is completed, the administrator can click the Edit button located at the bottom of the page to save the changes to the database. The updated data will then be displayed again on the Woven Fabric Data page.

13. Delete Woven Fabric Data Interface

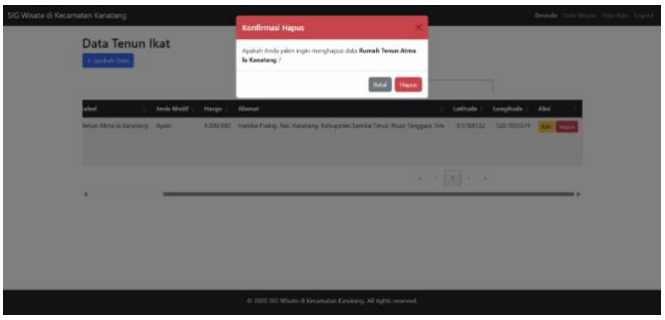

Fig. 14: Delete Woven Fabric Data Interface

Figure 14 illustrates the Delete Woven Fabric Data interface, which provides administrators with the ability to remove woven fabric records that are no longer relevant to the system. Before the deletion is finalized, the application generates a confirmation dialog to ensure that the administrator intends to proceed with the action. When the confirmation is approved, the selected record is permanently deleted from the database. However, if the action is canceled, the data remains unchanged and continues to be stored in the system. This verification mechanism is implemented to reduce the risk of unintended data loss while preserving the consistency, reliability, and security of woven fabric information.

4.2. Testing

The Website-Based Tourism Information System in Kanatang District was evaluated using the Black Box Testing method to verify the functionality of the system. The results of the Black Box Testing are presented in Table 1.

Table. 1: Testing Black Box

Tested Function	Testing Method	Expected Result	Test Result
Login	Enter a valid username and password	The system successfully logs in and displays the Admin Dashboard	[✓] Successful
Login	Enter an incorrect username or password	The system displays an error message: “Incorrect username or password”	[✓] Successful
Display Tourism Data	The administrator opens the Tourism Data page	The system displays the list of tourism data	[✓] Successful
Add Tourism Data	The administrator completes all input fields and clicks the Save button	The data is successfully added	[✓] Successful
Add Tourism Data	The administrator leaves the Tourism Data form empty	The system displays an error message: “This field is required”	[✓] Successful
Edit Tourism Data	The administrator modifies existing tourism data	The tourism information is successfully updated	[✓] Successful
Delete Tourism Data	The administrator deletes existing tourism data	The system successfully deletes the selected data	[✓] Successful
Display Woven Fabric Data	The administrator opens the Woven Fabric Data page	The system displays the member data list	[✓] Successful
Add Woven Fabric Data	The administrator completes all input fields and clicks the Save button	The data is successfully added	[✓] Successful
Add Woven Fabric Data	The administrator leaves the Woven Fabric Data form empty	The system displays an error message: “This field is required”	[✓] Successful
Edit Woven Fabric Data	The administrator modifies existing woven fabric data	The woven fabric information is successfully updated	[✓] Successful
Delete Woven Fabric Data	The administrator deletes existing woven fabric data	The system successfully deletes the selected data	[✓] Successful
Logout	The administrator clicks the Logout button	The system logs out from the admin account and returns to the login page	[✓] Successful

The evaluation results summarized in Table 1 indicate that the Web-Based Tourism Information System developed for Kanatang District successfully passed all Black Box Testing procedures. Each feature responded correctly to the test scenarios, achieving complete compliance with the expected results. This outcome confirms that the system is fully functional and suitable for supporting its intended operations.

5. Conclusion

The study confirms that the web-based tourism information system developed for Kanatang District successfully fulfills its intended objectives. By providing comprehensive tourism information through an accessible digital platform, the system assists users in obtaining accurate and relevant details about local attractions. The inclusion of an interactive map further improves navigation by helping visitors identify destination locations more effectively. Testing results indicate that every major function within the system operates according to specification. Data processing features, user login and logout mechanisms, and information management functions all achieved satisfactory performance during system validation. These findings demonstrate that the application is technically dependable and suitable for deployment. Consequently, the system has the potential to serve as an effective tool for promoting tourism destinations, improving information dissemination, and supporting the growth of tourism activities in Kanatang District.

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