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Design and Construction of a Village Tourism Monitoring and Evaluation System Web Based

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Abstract

Development of village tourism in the Special Region of Yogyakarta requires structured and sustainable management, particularly in monitoring and evaluation as a basis for stakeholder decision-making. Current challenges include unintegrated tourism village data, manual evaluation processes, and limited public access to tourism information and services. This study aims to design and develop a web-based monitoring and evaluation system that integrates registration, data management, monitoring, scoring, and information presentation in a centralized platform. The system is developed using the Extreme Programming method, which includes planning, design, coding, and testing stages, with functional testing conducted through Black Box Testing. The technologies used include React JS for the interface, Express JS for the backend, Supabase as the database, and Google Cloud Storage for data storage. The results indicate that all main system features function according to requirements, supporting more effective monitoring and evaluation processes, improving data accuracy, and enhancing accessibility of information for both the public and local government. Furthermore, this system has the potential to serve as a foundation for regional tourism data integration and to support sustainable tourism village development policies, while also contributing practically to improving integrated digital public information services at the national level.

Keywords: *Extreme programming; Monitoring and evaluation; System information; Tourism village*

1. Introduction

Tourism is one of the strategic sectors in the national economic development of Indonesia. This sector not only contributes to foreign exchange earnings, but also plays an important role in driving local economic growth, creating employment, and improving community welfare in various regions [1]. In this context, the development of tourism villages has become one of the priority policies of Indonesian tourism, particularly in efforts to equalize tourism economic benefits to the rural level.

The Special Region of Yogyakarta (DIY) is one of the leading tourism destinations in Indonesia with great potential for tourism village development [2], [3]. Tourism villages play an important role as drivers of the tourism and local economic sectors through the Community Based Tourism (CBT) framework, which places the community as the main actor in tourist management and development [4]. Therefore, structured and sustainable management of tourism villages has become an important need for regional governments and tourism stakeholders.

Although the quantity and potential of tourism villages in DIY continue to develop, their management still faces various problems, especially in monitoring and evaluation aspects. Tourism village data managed by managers and the government is often not yet well integrated, making it difficult to monitor the development of tourism villages [5]. This condition impacts the limitations of accurate and structured information to support the decision-making process by the tourism department. This is similar to the obstacles faced by other tourism villages, where manual systems cause a lack of effectiveness in tourism management services.

In addition, the tourism village evaluation process is still largely done manually and does not yet have a standard mechanism. An unstructured evaluation makes it difficult for tourism service stakeholders to conduct assessments and classify tourism villages into pioneering, developing, advancing, or independent categories. In fact, the tourism village scoring and classification process is an important component in determining the direction of tourism village development and development policies [6].

Another problem is the limited access to tourism village information for the community and tourists. Information about tourism villages, such as descriptions, facilities, tourism packages and tourist attractions, is still scattered and not managed in one centralized system [7]. This causes the information received by the public to not always be complete and up to date, so the potential of tourism villages has not been optimally utilized. Promotional media that is still conventional in nature, such as brochures, also has a limited range and is difficult to update quickly [8], [9].

Based on these problems, a web-based tourism village monitoring and evaluation system is needed that is capable of integrating the registration process, data management, monitoring, and evaluation of tourism villages in a centralized manner [10]. Web-based information

systems are selected because they are able to provide easy, flexible, and accessible information that can be used by various stakeholders in accordance with their roles [8], [10].
This study aims to design and build a web-based tourism village monitoring and evaluation system that supports the registration process for tourism villages, verification by admin, monitoring and scoring by the tourism department, as well as providing tourism village information to the public. The developed system is expected to help improve the effectiveness of tourism village management, support a more structured evaluation process, and provide accurate and easily accessible tourism village information. In addition, this system is expected to facilitate coordination between tourism village managers and regional governments in monitoring and decision-making related to tourism village development.

2. Literature Review

2.1. Information System

An information system is a system used to process data into useful information to support operational processes, management, and decision-making within an organization. An information system consists of hardware, software, databases, procedures, and users that are integrated to produce accurate and timely information. With an information system, data processing can be carried out more effectively, efficiently, and structured according to user needs [11].

2.2. React JS

React JS is a JavaScript library used to build user interfaces in web applications. React JS is widely used because it implements a component-based concept, breaking down the website's appearance into small, reusable components and assembling them into a unified interface. Based on these characteristics, React JS can be used to build interactive, flexible, and efficient information systems on the front end.

2.3. Express JS

Express JS is a JavaScript-based framework that runs on Node.js and is used to build web applications and backend services. This framework provides routing mechanisms, request and response management, and middleware support that facilitate structured application development. Express JS is lightweight and flexible, enabling it to support the development of efficient and easily developed RESTful APIs. Due to these characteristics, Express JS is widely used in information systems development because it can improve performance, scalability, and manage application logic on the server side.

2.4. Supabase

Supabase is a PostgreSQL-based database service used for data storage in information systems. PostgreSQL supports structured data management, relationships between tables, and maintaining the consistency and integrity of data required in information systems. By utilizing Supabase as a database and Express JS as an API provider, information systems can be developed efficiently, centrally, and easily maintained [12].

2.5. Google Cloud Storage

Google Cloud Storage is a cloud-based storage service used to store image files in information systems. This service supports highly available object storage and a controlled access management mechanism to ensure image data security. By utilizing Google Cloud Storage as an image storage medium, information systems can manage files centrally, efficiently, and scalably according to application needs [13].

2.6. Extreme Programming (XP)

Extreme Programming, or XP for short, is a software development method. This method focuses on improving software quality and adapting to changing user needs that frequently occur during the system development process [14].
In the Extreme Programming method, there are several stages of system development, namely: In the Extreme Programming method, there are several stages of system development, namely:

1. Planning
   This stage involves gathering system requirements (user stories) based on user needs and determining feature development priorities.
2. Design
   This stage focuses on designing a simple system to facilitate the development process and changes in subsequent stages.
3. Coding
   This stage involves implementing the system based on the design, using pair programming practices and continuous code integration.
4. Testing
   This stage involves testing each function of the developed system to ensure it operates as expected.

3. Research Methods

In this research, there are stages carried out during the research implementation process, which are described as follows:

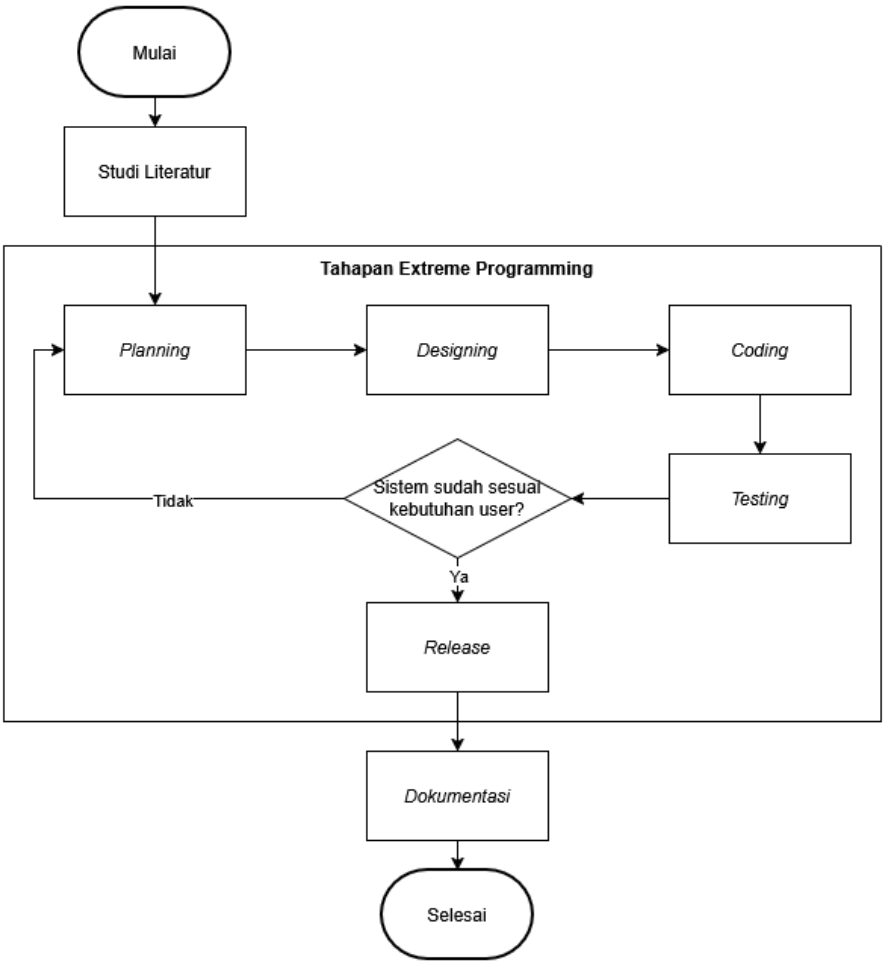

Fig.1: Research Stage Flowchart

3.1. Planning

At the planning stage, meetings were conducted with tourism activists to obtain a description of the desired system and gather the necessary information. The results of this stage were used to compile user stories as a representation of user needs based on expected functions from the system. In addition, the functional needs that had been identified were then modeled into a use case diagram to describe the interaction between actors and the system in a structured manner.

3.2. Designing

The designing stage aims to transform the system needs that had been defined at the planning stage, in the form of user stories and use case diagrams, into a prototype that can be seen and characterized interactively. The design process was carried out using Figma tools to visualize the system flow and interactions between users. The design results generate two main interfaces tailored to the user roles, namely for travelers as well as a dashboard page for tourism village managers and tourism department parties.

3.3. Coding

The coding stage is a crucial phase in website development. At this stage, the information system is implemented starting from the back-end side in accordance with the user stories and use case diagrams that have been compiled. Next, the process continues with building the main page interface and dashboard based on the prototype design that has been made previously.

3.4. Testing

The testing stage is carried out to ensure the quality and functionality of the system before it is implemented. The method used is Black Box Testing, which focuses on testing system functionality without needing to look at the program code within it. The result of this stage becomes the main measuring tool in determining website eligibility before it is declared ready for use.

4. Result and Discussion

4.1. Planning

The planning stage in this study was carried out by adopting the Extreme Programming (XP) approach, which emphasizes understanding user needs through user stories. User stories were arranged based on the results of socialization and discussions with tourism activists who have experience in tourism village management in the Special Region of Yogyakarta, with guidance from lecturers of the Informatics Department of Sunan Kalijaga State Islamic University as activity advisors.
The planning process began with problem identification in tourism village management and evaluation, such as data integration limitations, an unstructured evaluation process, and difficulties in monitoring tourism village development. Based on these problems, system needs were formulated in the form of user stories representing the point of view of each system actor, namely tourism village manager, system admin, tourism department, and general public.
User stories were used as the basis for determining the scope of system development as well as a reference in the design and system implementation stages. User stories can be seen in Table 1.

Table 1: User Stories Village Tourism Monitoring and Evaluation System

No	US Code	Description	Estimate (days)
1	US-01	As tourism village manager, users can register an account to access the system	2
2	US-02	As tourism village manager, users can submit tourism village registration along with administrative data	3
3	US-03	As tourism village manager, users can manage tourism village data covering descriptions, facilities, tourism packages, attractions, and tour locations	5
4	US-04	As system admin, user can verify and change tourism village registration status	2
5	US-05	As system admin, user can manage user data in the system	2
6	US-06	As tourism department, users can monitor registered tourism village data	3
7	US-07	As tourism department, users can score tourism villages based on evaluation indicators	3
8	US-08	As tourism department, users can determine the classification of tourism villages into pioneering, developing, advancing, or independent categories	2
9	US-09	As tourism department, users can deactivate tourism villages that are no longer active or abandoned	1
10	US-10	As general public, users can view the list and detailed information of tourism villages	2
11	US-11	As general public, users can search for tourism villages based on location and tour category	2

4.2. Design

The system design stage was carried out based on the user stories that had been arranged in the planning stage. This design aims to translate user needs into a structured system design as a reference at the implementation stage.

1. Software Requirements Specification (SRS)
   The compilation of Software Requirements Specification (SRS) is carried out to define system needs clearly and documented. SRS in this research covers functional and non-functional needs of the system.Functional needs describe the main services and functions that must be provided by the system. The functional needs of the tourism village monitoring and evaluation system include: the system provides an account registration feature for tourism village managers; the system allows tourism village managers to submit tourism village registrations along with administrative data; the system provides a tourism village content management feature covering descriptions, facilities, tourism packages, attractions, and tour locations; the system allows admins to perform verification and changes to tourism village registration status; the system provides monitoring and scoring features for tourism villages by the tourism department; the system allows the determination of tourism village classification into pioneering, developing, advancing, and independent categories; and the system provides search and recommendation features for tourism villages for the general public.Non-functional requirements describe the quality limitations and characteristics of the system. Non-functional requirements in this system include: the system is web-based and can be accessed through a browser; the system has an easy-to-use interface (user friendly); the system is capable of managing tourism village data in a centralized manner; the system supports cloud-based data and media storage; and the system has an access rights management mechanism according to user roles
2. Use Case Diagram
   A use case diagram is used to describe interactions between actors and the system and to visualize system behavior overall. Actors involved in this system include tourism village manager, system admin, tourism department, and general public. The use case diagram of the web-based tourism village monitoring and evaluation system can be seen in Figure 2, which shows the connection between each actor and the main feature functions provided by the system.

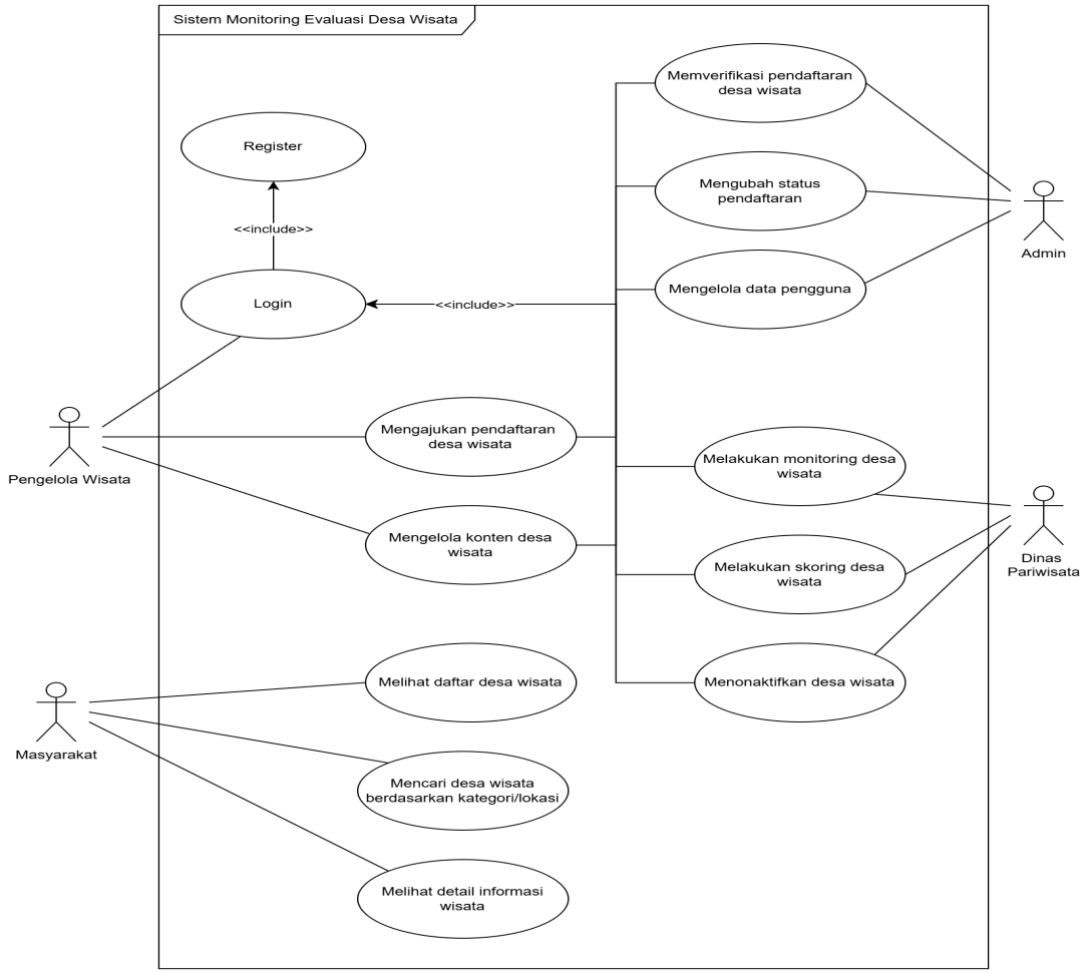

Fig.2: Use Case Diagram Village Tourism Monitoring and Evaluation System

1. Design Interface (UI/UX)
   User interface design was carried out to provide an initial description of the appearance and flow of system use based on the role of each user. Interface design was arranged in the form of an interactive prototype using Figma. Interface design for tourism village managers covers the registration submission page and tourism village data management page, which can be seen in Figure 3.

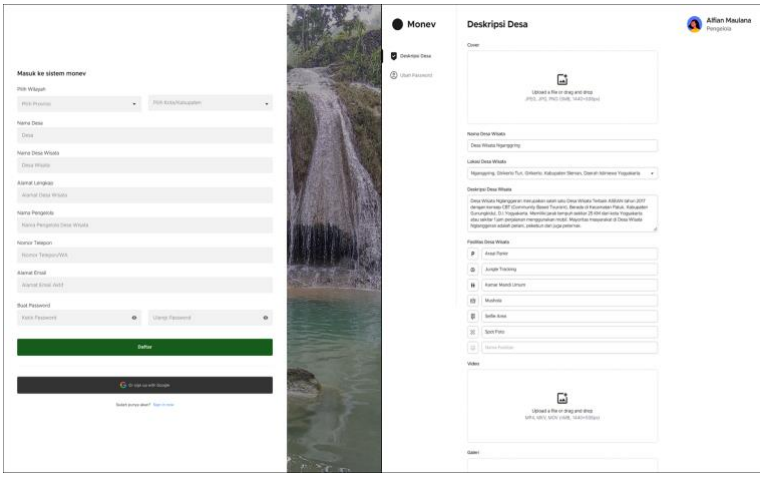

Fig.3: Interface Tourism Village Manager

The interface for system admins covers the tourism village registration verification page with registration status management which includes accepted, processed, rejected, and completed. An example appearance of the admin interface is shown in Figure 4.

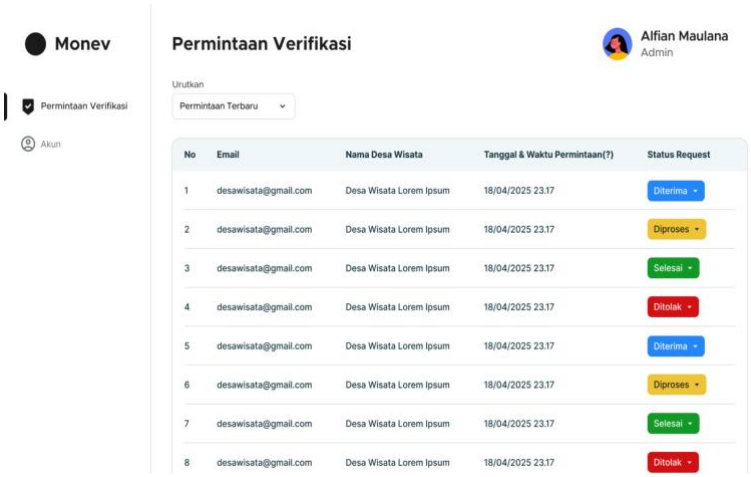

Fig.4: System Admin Interface

Furthermore, the interface design for tourism department covers the tourism village scoring page and management of active and inactive tourism village status. The interface view can be seen in Figure 5.

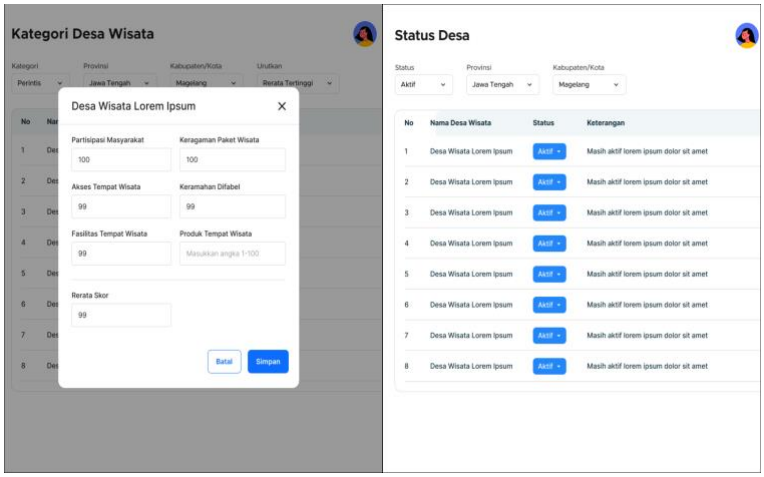

Fig.5: Tourism Office Interface

Meanwhile, the interface for the general public covers the page for searching and detailed information of tourism villages that features complete tourism information. An example appearance of the tourism village detail information page is shown in Figure 6.

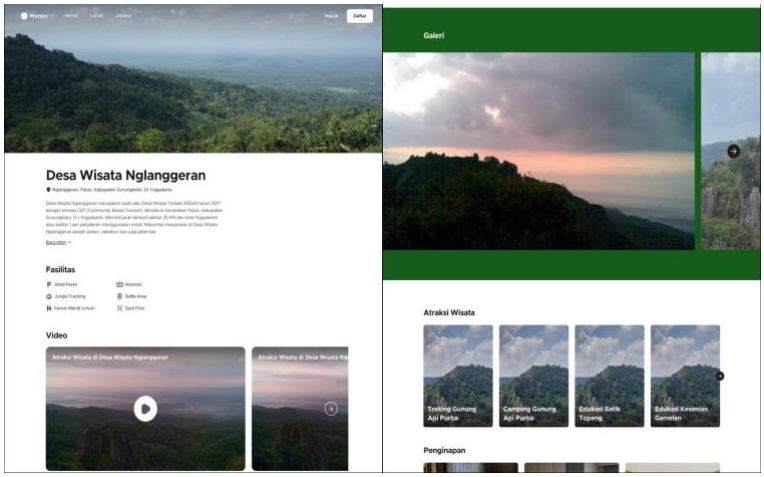

Fig.6: Tourism Village Information Detail Interface

4.3. Coding

The coding stage is the stage of system implementation based on the designs that had been made at the previous stage. At this stage, the web-based tourism village monitoring and evaluation system was developed using React JS for the frontend side, Express JS for the backend side, Supabase as the database, and Google Cloud Storage for image media storage. System implementation results can be seen in Figure 7, which displays an example appearance of the system that has been developed.

Fig.7: Implementation Village Tourism Monitoring and Evaluation System Web Based

4.4. Testing

The system testing stage was carried out to ensure that all functions in the web-based tourism village monitoring and evaluation system run in accordance with the needs that had been determined. The testing method used is Black Box Testing, which focuses on testing system functionality without noticing the internal structure of program code.
Testing was conducted by testing every main system function based on usage scenarios from each actor, namely tourism village manager, system admin, tourism department, and general public. Test results show that all main system features can run well and provide output as expected. A summary of the test results can be seen in Table 2.

Table 2: Test Results Black Box Village Tourism Monitoring and Evaluation System

No	Testing Scenario	Expected Results	Test Results
1	Registration of tourism village manager account	Account successfully registered in the system	Succeed
2	Submission of tourism village registration	Registration data stored correctly	Succeed
3	Upload and manage tourism village data	Tourism village data successfully saved and displayed	Succeed
4	Verification of tourism village registration by admin	Registration status can be changed	Succeed
5	Change of tourism village status	Status accepted, rejected, processed, or finished stored	Succeed
6	Tourism village data monitoring by tourism department	Tourism village data appears according to condition	Succeed
7	Scoring of tourism village	Scoring value stored correctly	Succeed
8	Determination of tourism village classification	Tourism village category stored	Succeed
9	Deactivation of tourism village	Tourism village not displayed to public	Succeed
10	Displays a list of tourism villages	List of tourism villages appears on the system	Succeed
11	Search tourism village based on location/category	Search results appear according to keywords	Succeed
12	Display detailed information of tourism village	Tourism village information appears complete	Succeed

Based on the test results that have been carried out, all main system features can run well and are in accordance with the functional needs that have been determined. Thus, the web-based tourism village monitoring and evaluation system that has been developed is declared worthy of use and can support the management and evaluation process of tourism villages in a more structured and effective manner.

5. Conclusion

Based on the results of the research that has been carried out, it can be concluded that the development of a website-based monitoring and evaluation system using the Extreme Programming method was successfully implemented well. This system provides main feature support for the tourism village registration process, verification by admin, monitoring and scoring by the tourism department, as well as presentation of tourism village information to the general public. Test results using Black Box Testing show that all system functions run in accordance with the functional needs that have been determined. Thus, this system can help improve the effectiveness of tourism village management, support a more structured evaluation process, and provide accurate and easily accessible tourism village information to the public.
For further development, it is recommended to add more comprehensive data analytics and visualization features in order to provide statistical descriptions of tourism village development more in-depth. In addition, integration with social media platforms can be added to expand the reach of tourism village promotion. Further research can also be conducted to measure the impact of system implementation on improving tourist visits and local economic development in tourism villages.

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