WEBSITE-BASED BADUY TOURISM INFORMATION SYSTEM USING THE SOFTWARE DEVELOPMENT LIFE CYCLE METHOD

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Abstract - Baduy cultural tourism has great potential, but limited information and a manual ticket booking system result in long queues and inadequate tourism services. This study aims to develop a Web-based Baduy Tour Ticket Booking Information System using the Software Development Life Cycle method for tourist ticket reservations using the waterfall method approach. System development includes needs analysis, system design, implementation, testing, and maintenance. The assessment of the system is carried out through functional testing and black-box testing methods to ensure the legality and confidentiality of the application. The development of this system utilises Laravel as its full-stack framework, which includes Javascript, PHP, blade and CSS with Bootstrap. The test results showed that the system was able to save reservation time by up to 60% compared to the manual method, and from the 50 users surveyed, the customer satisfaction rate was 85%. Thus, the development of the Tourism Information System provides a more effective and efficient solution to help Buduy's cultural tourism.

Keywords - Baduy Tourism, online ticket booking, web application, SLDC, tourism information system

INTRODUCTION

The development of digital technology has had a major impact on various sectors, including the tourism sector. The use of Information and Communication Technology (ICT) is very helpful in the efficiency of managing tourist destinations, ticket booking systems, and digital promotions[1] . In Emperelease, previous research has proven that the use of optimized digital platforms in the tourism industry greatly helps a more efficient transaction process, more optimal promotion, and increases tourist satisfaction [2] . However, existing research focuses more on the application of technology in tourist destinations in Indonesia such as Bali and Yogyakarta, while culture-based tourist destinations such as Baduy still lack an integrated digital system that is appropriate.

The Baduy Tourism Area in Kanekes Village, Lebak Regency, West Java is a tourist area that has a unique nature and culture[3] . The attraction of tourists who want to visit is because there are two community groups, namely the Baduy Dalam who still maintain their customs strictly, while the Baduy Luar who have adapted to the outside culture even though they still maintain traditional values[4]. However, tourism management in Lebak Regency, especially Baduy tourism, still has many obstacles, one of which is the tour ticket booking system and travel is done manually. This method can cause long queues, difficulties in regulating the number of tourists, and a lack of information for tourists who want to visit Baduy.

A number of previous studies have discussed the development of web-based information systems for the tourism sector. According to research conducted by Arfan U, and Pekei Y[5], the percentage of use of the online ticket booking system can provide benefits of up to 50% in improving operational efficiency and shrinking tourist waiting time. Research conducted by Aprilia et al [6] explained that digital systems provide a better quality of services to users. Until this report was made, specific studies on implementing the Baduy public information system were still very limited. Due to the gap

in the research, a web-based ticket booking system needs to be developed according to the demand required by both visitors and managers. To answer this problem, this study proposes the development of a web-based Baduy Tour Ticket Booking Information System with the Software SDLC method within the framework of Waterfall. The resulting system is then carried out in the testing stage or testing the facilities of the system. This method is chosen as well as the development of a system that requires a structured development process with clear phases, from the analysis of user and stakeholder needs, the design of user-friendly and efficient interfaces, to the implementation and testing of the system to ensure its quality and functionality [7]. From this approach, this research seeks to produce a system that can simplify the ticket booking process, make the promotion of Baduy Tourism more widely reachable, and increase the operational efficiency of tourism managers so that tourist services become more comfortable and ultimately contribute to the preservation of local culture.

II. SIGNIFICANCE OF THE STUDY

The development of a web-based Baduy tourism information system has a significant impact on the efficiency, effectiveness, and user experience in the process of accessing tourism services [8]. At this time, the Baduy travel departure ticket and tourist entrance ticket booking system is still manual, causing long queues, inefficient tourist information data, and the inability of destinations to convey information in real time. In response to this problem, this research provides a concrete solution that adopts a systematic and structured software development method. The Waterfall method was chosen to develop the Baduy tourism information system because it is able to ensure that every part of the system construction is carried out sequentially and documented[9]. Therefore, the system that has been identified and can be implemented appropriately. starting from system needs analysis, design, implementation, submission and maintenance. This method is designed to address the main issues related to the manual booking system with a digital solution that is more efficient, accurate and easily accessible to tourists Thus, the impact of this study is an increase in operational efficiency by tour managers and ease of access to information and ticket bookings by tourists in the services provided. With the software being structured using Laravel as its main framework and MySQL as the database as well as Bootstrap for the user interface, this research not only gets software improvements in terms of functionality but also helps users have a better experience. This provides direct benefits for tourists in the form of reduced waiting times, ease of navigation in the system, and accuracy of information regarding the availability of tour and travel tickets [10].

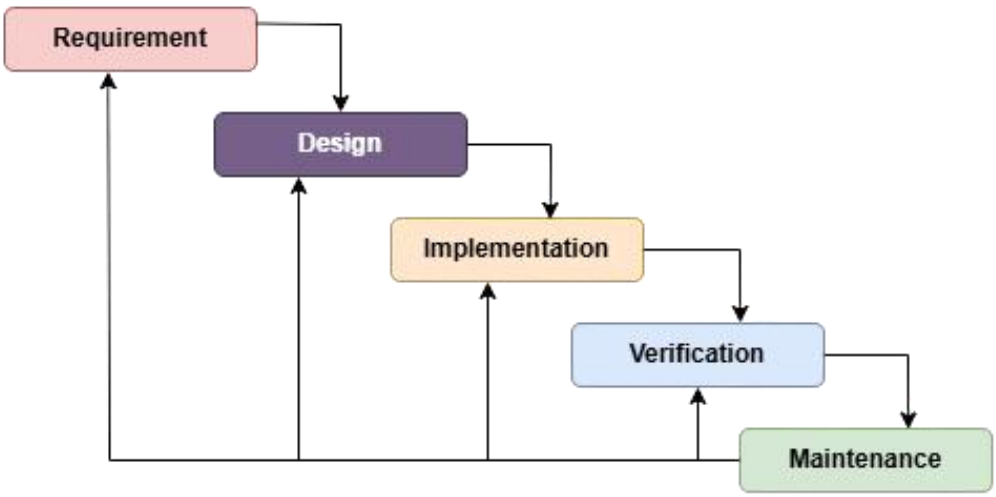

Figure 1. Types of Waterfall [11]

In addition, adopting the Waterfall method in this study contributes by showing how this approach can be applied effectively in the development of web-based information systems for the tourism sector. The Waterfall method also strengthens the literature regarding the efficiency of software development in small to medium-scale projects [12]. With this research, it is hoped that it can make it easier for tourists to find out information on baduy tourism and travel tickets to tourism. There are five stages in the *waterfall method*, namely Requirements Analysis and Definition, System and Software Design, Unit Implementation and Testing, System Integration and Testing, and Operation and Maintenance. Broadly speaking, the initial sequence of the waterfall method is requirements, design, implementation, verification, and maintenance[13] For more details, you can see the specifications using the waterfall method as follows:

1. **Requirements Analysis**
   This stage aims to identify and document the requirements of the system, both from the perspective of users and tourism managers. The analysis was carried out through interviews and licensing with the Banten provincial tourism office, and data collection through documents of visitors who came to Baduy tourism.
2. **System and Software Design**
   At this stage, the design of the system architecture is carried out which includes the design structure of the user interface (User Interface/UI). The UI/UX design was made by considering the usability for tourists and managers of the Baduy tourism information system. So that tourists can easily access information, and make reservations for tour and travel tickets.
3. **Unit Implementation and Testing**
   Implementation here is a process of coding or programming a system based on the results of the system design. The technology used is related to programming languages such as utilizing Laravel as its full-stack framework, in which there are additional Java scripts, blades and CSS with Bootstrap. The database uses MySQL which is used to manage the data.
4. **System Integration and Testing**
   There are 3 phases of testing, namely Unit Testing, System Testing, and Acceptance Testing. Unit Testing (testing carried out with the program code). System Testing (testing carried out by the system after all the modules have been combined into one). Acceptance Testing (testing conducted by customers to ensure all customer needs have been met).
5. **Operation and Maintenance**
   Maintenance If the system has been implemented, maintenance will be an important stage, which includes bug fixes to review system requirements. Changes were also made to match the latest requirements. Checking and ensuring the system's data delivery procedures are running as planned and without interruption. Maintenance also adds new features that will be implemented in the future.

This research not only contributes in the form of the implementation of more advanced technology in the tourism sector but also has the potential to promote Baduy culture to be better known by foreign countries and increase the number of tourist visits to Baduy. So that it can produce more professional and structured services. Therefore, the web-based Baduy tourism information system is highly believed to be the optimal solution in the future to facilitate the development of the tourism sector in a digital version in Indonesia.

III. RESULTS AND DISCUSSION

A. Use Case Diagram

A use case diagram is a model used to describe the functions that exist in a system and its interaction with the use of the system [14] . Use cases are used to describe the various actors who will interact with the system to be created. *A use case diagram* is used to illustrate the relationship between one or more systems to be created, thus providing an understanding for us to know what functions exist in an information system and who are the users of those functions. Use case diagrams are used to model the behaviour of information systems and also the depiction mechanisms used to engage or shape user needs and how these functions can meet user needs. In this Baduy Tourism Information System, there are two main roles, namely Super Admin and Customer. Super Admin is the party responsible for managing data to determine tour ticket prices, and managing cooperation with various travellers, while the Customer, is a user who can view travel information, book tickets, and access various features provided on the website.

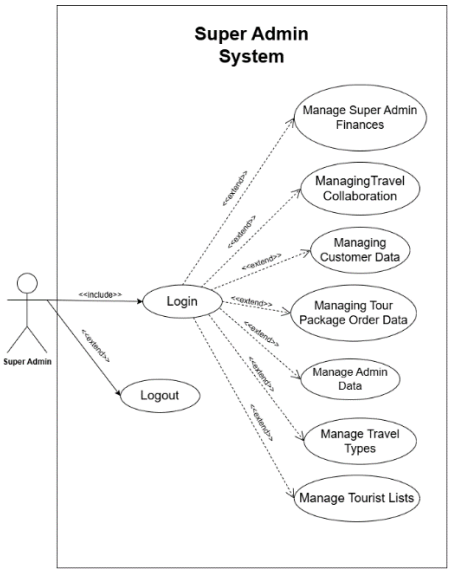

Figure 2. Super Admin Use Case Diagram

Super Admin interactions are shown in Figure 2. The first way is to log in. After successfully logging in, there will be a redirect to the Super Admin dashboard. In this dashboard, the Super Admin has the authority to determine what you want to do, what activities you want to do and the following things that can be done are managing tour package booking data, travel cooperation data, and customer data. Figure 2 shows the Super Admin Interaction that manages the tour ticket booking system.

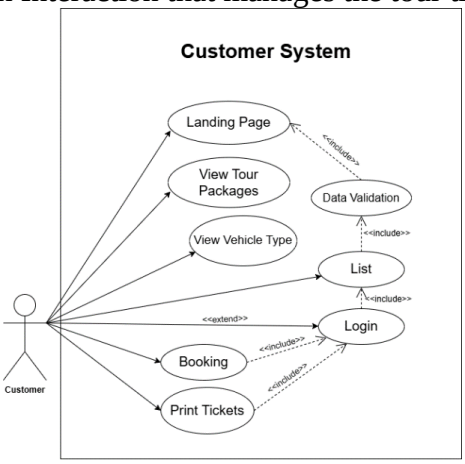

Figure 3. Use Case Diagram Customer

Figure 3 illustrates the interaction made by the Customer. In the picture, Customers can see this page, Customers can see the page about Baduy tourism, and explore the Baduy tourism information page. Viewing and reading testimonials from web users, Customers can also contact the contact if there is anything that needs to be asked, then Customers can order Baduy tour tickets after going through several processes in booking tour tickets, Customers can make payments. Figure 3 shows how the Customer interacts with the system to meet his needs in booking Baduy tour tickets.

B. Activity Diagram

Activity Diagrams are diagrams in *Unified Modeling Language* (UML) that are often used to illustrate workflows or activities on a system or process [15]. The activity diagram in this article explains the flow of customer activity with a system to book tour or travel tickets, as well as admins with a system to manage bookings from customers. To make it easier for users to understand the flow of the system, both customers and admins. Here is the activity diagram Figure 5 of the Super Admin.

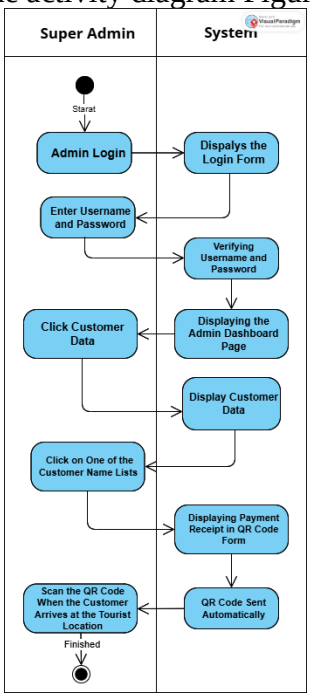

Figure 4. Admin Super Diagram Activity

In Figure 4, the Super Admin Activity Diagram starts with a login activity where the user enters a username and password. Then the login leads to the Admin dashboard. In the admin dashboard, super admins can perform various management tasks. One of them is that the super admin can check the data of users who have booked tickets and received a payment QR code, the QR code will be scanned when the customer has entered the tourist location.

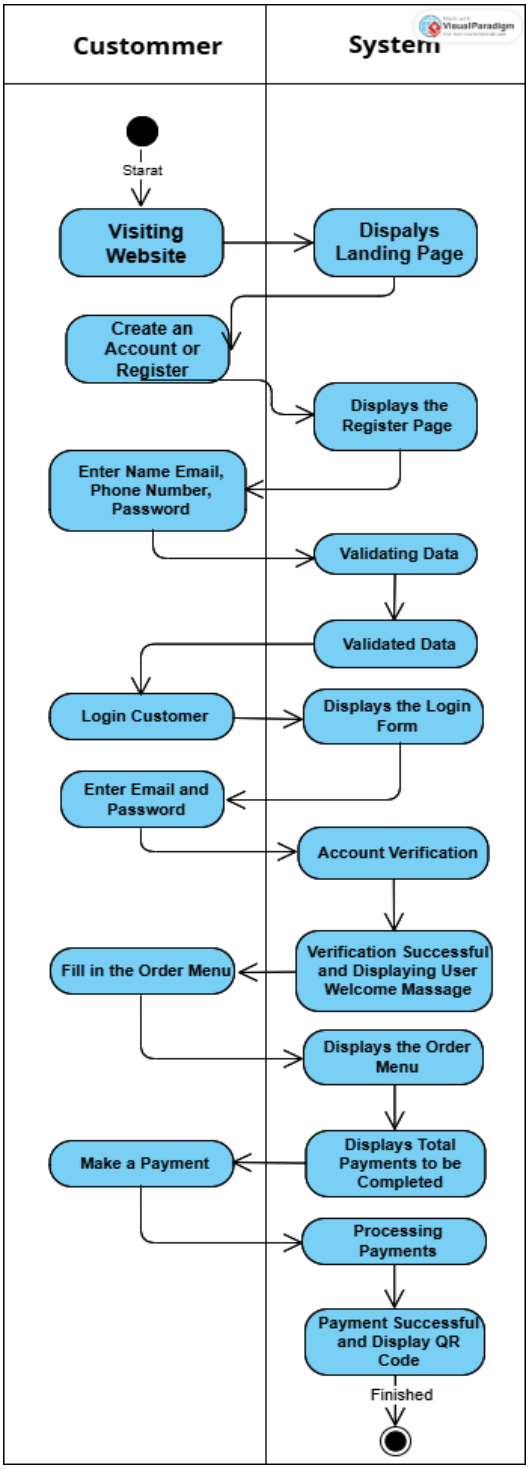

Figure 5. Activity Diagram Customer

As seen in Figure 5, on the Customer Attitude Chart on the table, customers visit the Baduy tour ticket booking website and customers can see various information about the tickets. If the customer is going to order a ticket, the first step the customer takes is to register by filling in the required data. After that, customers must first verify their email to activate their account. If the verification is successful, then customers can log in to the system and start looking for tour tickets, customers can also book the desired trip. The next step is for the customer to order a ticket, and then proceed with the payment process. If the payment is valid or successful, then the ticket will be processed, then the proof of payment can be printed and the customer will get a proof of booking via email in the form of a QR Code. If the payment is invalid, then the customer must repeat the booking and payment process.

C. System Results and Display

1. Home

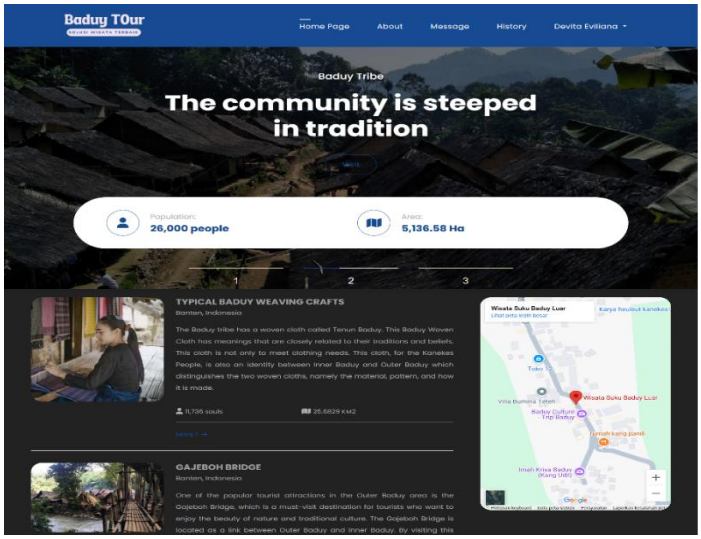

Figure 6. Home

Figure 6 shows the main page of the "Baduy TOur" website that serves as a ticket booking. The site features a culturally themed background navigation menu, important details about the Baduy people, and an interactive map that provides an engaging and user-friendly experience for users.

2. Tour Package Selection Page

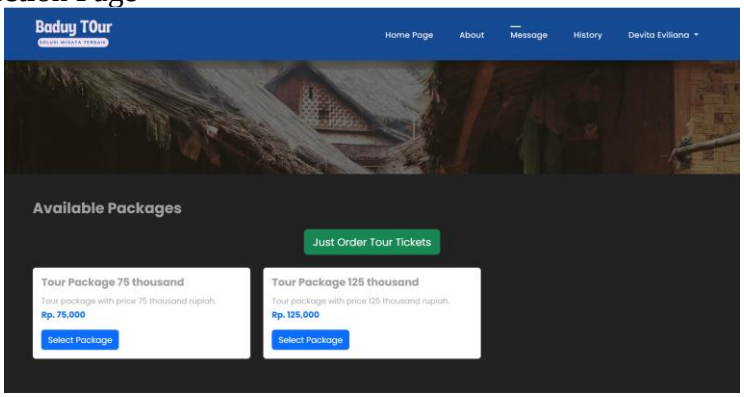

Figure 7. Tour Package Selection Page

Figure 7 shows the "Tour Package Selection Page" where users can choose from the available tour packages. There are two optional packages for this tour with different facilities.

3. Vehicle Options Page

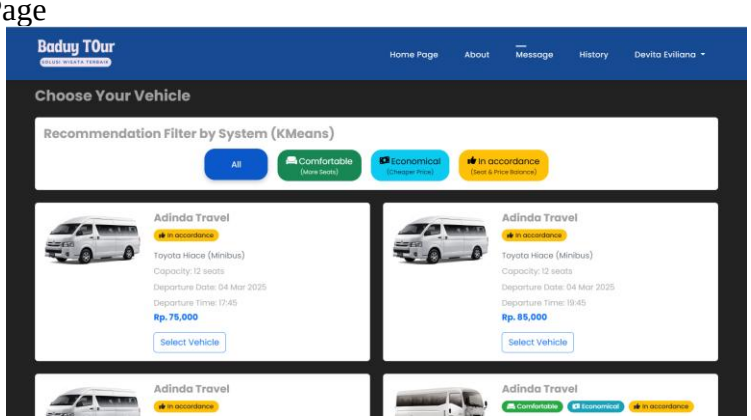

Figure 8. Vehicle Selection Using the K-Means Method

Figure 8 shows the "Vehicle Selection Page" where users can select transportation options for their trip. This page has a filter system using k-Means clustering that allows users to select vehicles based on convenience, price, and suitability.

4. Order Details Page

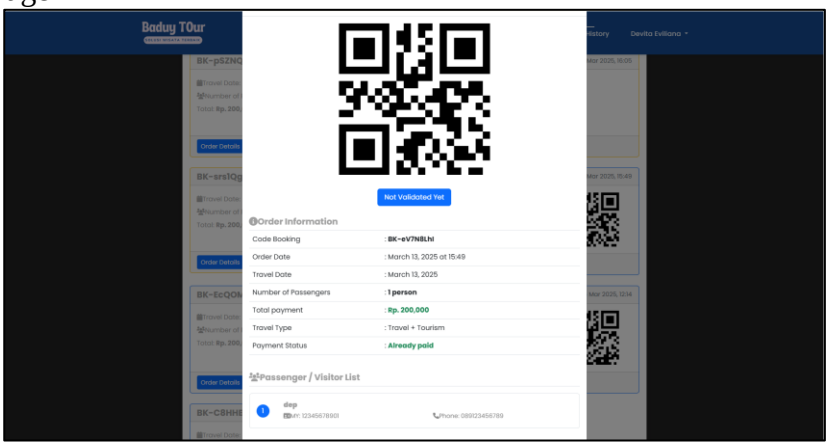

Figure 9. Order Details Page

Figure 9 shows the "Order Details Page" displaying a QR code for payment verification. Below the QR code, there is a booking information section, which includes the booking code, booking date, travel date, number of passengers, total payment, payment type, and payment status.

5. Super Admin Page

Figure 10. Super Admin Page

Figure 10 shows the "Super Admin Page" which allows Super Admins to efficiently monitor and manage tourism operations. This page provides an overview of ticket sales and customer revenue data.

6. Travel Admin Page

Figure 11. Admin Travel Page

Figure 11 shows the "Admin Journey Page" which helps the Admin Journey efficiently track and manage journey-related operations. This page is useful for Travel Admins to manage travel vehicles, trip data, vouchers, order validation, and history tracking.

C. System comparison

The comparison of this Baduy tourism information system with similar systems that already exist is very clear, the difference can be seen starting from the UI design, then this website provides services in the form of booking tour tickets and travel tickets, also this website provides services for managers such as super admin for tourism and travel admin for travel.

D. Testing System

The technique used in this test is to use a black box. The testing process is carried out based on pre-defined test scenarios, where the main focus is on whether the system performance results are successful or not. The results of the black box test of the developed system can be seen in the following table.

Table 1
Black Box Testing System

Test Description	Expected Results	Result Test
Customer Registration	You will be taken to the registration page where there will be a form of name, email, phone number, password, and password confirmation.	Succeed
Enter an email that has been registered in System	There will be a notification that the email has been registered	Succeed
Test Login System		
Customer Login	This will go to the dashboard page and there is a homepage, about, messages, and history.	Succeed
Entering the wrong Email or Password	An email notification or password that you entered is incorrect.	Succeed
Login Super Admin	You will enter the dashboard page, Baduy tourism management, Travel partnerships, consumer data, discount vouchers, content system management, order reports, and financial reports.	Succeed
Entering the wrong Email or Password	An email notification or password that you entered is incorrect.	Succeed
Login Travel Admin	You will be taken to the vehicle management dashboard page, Travel data, discount vouchers, booking reports, and reports finance.	Succeed
Entering the wrong Email or Password	An email notification or password that you entered is incorrect.	Succeed
Customer Navbar Test		
Click the Home Button	It will display information about the Baduy tribe, Baduy tourism, and other uniqueness about the Baduy tribe.	Succeed
Click the About button	This will display information about the contact.	Succeed
Click the Message button	If you are not logged in, the system will redirect you to the login page and after successfully logging in, then the system will display the tour and travel ticket booking page.	Succeed
Click on the History button	If you are not logged in, the system will immediately redirect you to the login page and after successfully logging in, the system will	Succeed

	display information about your ticket booking history, both tour and travel tickets.	
Test message pages		
Choose a Plan	The system will direct to choose a tour or travel package, if you have chosen a package the system will direct to choose a vehicle and then choose a seat from travel, if you have chosen a seat then you are required to fill in the personal data listed on the form.	Succeed
Entering an Incorrectly Formatted Account Vector Number	The system will display an error message in real-tieme.	Succeed
Testing the Super Admin System		
Click the Add Tour Package Button	This will display a tour package addition form containing the package name, description, and base price, if it has been filled in completely, a notification will appear "the tour package has been successfully added".	Succeed
Click the Edit Baduy Tour Package Button	It will display a form to edit the tour package again, if all forms have been filled in, a notification "tour package successfully updated" will appear.	Succeed
If one of the forms is not filled out	A warning appears to fill out the unfilled form.	Succeed
Click the Delete Baduy Tour Package Button	A notification will appear "Are you sure you want to delete this data" then click "ok" then the tour package will be deleted.	Failed
Click the Add Travel Company button	It will display several forms that must be filled out, if it has been filled out, a notification will appear "Travel company and admin successfully added".	Succeed
If one of the forms is not filled out	A warning appears to fill out the unfilled form.	Succeed
Click the Add Consumer button	This will display several forms that must be filled out, if they have been filled out, a notification "Consumer has been successfully added" will appear.	Succeed
If one of the forms is not filled out	A warning appears to fill out the unfilled form.	Succeed
Click the Add Discount Button	It will display several forms that must be filled out, if it has been filled out, a notification "Discount successfully added" will appear.	Succeed
If one of the forms is not filled out	A warning appears to fill out the unfilled form.	Failed
Click the Home Button	This will display the home edit page where later the edits will appear on the customer's home page.	Succeed
Click the About button	This will display an edit about page that later edits will appear in the About customer page view.	Succeed
Click the Validation Button Order	This will display a validation page where admins can select a booking code or scan a QR.	Succeed
Click the Register Button	The system displays an order list page with payment status.	Succeed

Order		
Click on the History button Order	This will display the validated order history.	Succeed
Click the Financial Report Button	It will display detailed financial reports from each month which can later be exported to excel.	Succeed
Travel Admin System Test		
Click the Add Vehicle Button	This will display several forms that must be filled out, if it has been filled out, a notification "Vehicle successfully added" will appear.	Succeed
If one of the forms is not filled out	A warning appears to fill out the unfilled form.	Succeed
Click the Add Trip Package Price button	It will display several forms that must be filled out, if it has been filled out, a notification will appear "Package price successfully added".	Succeed
If one of the forms is not filled out	A warning appears to fill out the unfilled form.	Succeed
Click the Add Discount Button	It will display several forms that must be filled out, if it has been filled out, a notification "Discount successfully added" will appear.	Succeed
If one of the forms is not filled out	A warning appears to fill out the unfilled form.	Failed
Click the Validation Button Order	This will display a validation page where admins can select a booking code or scan a QR.	Succeed
Click the Register Button Order	The system displays an order list page with payment status.	Succeed
Click on the History button Order	This will display the validated order history.	Succeed
Click the Financial Report Button	It will display detailed financial reports from each month which can later be exported to excel.	Succeed

IV. CONCLUSION

From the discussion above, some conclusions that can be obtained include: With this website, tourists are easier to visit and get to know the culture in Baduy. In terms of inadequate data collection, lack of information and inability to enable tourism that is not widely known to the public, these information systems provide solutions to some of these problems. In this system, tourists get more complete and accurate information, so that their tourist destinations will be more meaningful. With a website that facilitates transportation access to Baduy tourism, it provides more structured and easy-to-reach information, so that tourists will find it easier to come to Baduy tourism and provide comfort for tourists. This not only increases comfort for tourists, but also helps tourism management to optimize management activities in Baduy tourism and in this condition makes it more effective and efficient so that the management of the number of visits will be more controlled. Overall, this system contributes to improving the tourist experience and supporting a more modern and efficient management of Baduy tourism.

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