

Design of Website-Based Bugis Waterpark Adventure Tourism Information System Using Agile Method: BugisGo

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ABSTRACT

Bugis Waterpark Adventure in Makassar faces challenges in promotional outreach and information accessibility due to the absence of a professionally designed web-based information system. This research aims to design and develop a web-based tourist information system, BugisGo, to improve accessibility and visitor experience. The system was developed using the Agile method, which involves the stages of system planning, requirements analysis, system design, implementation, and iterative testing. BugisGo successfully implemented key features such as online ticket booking, payment system, and visitor feedback. Black-box and white-box testing showed that the system functions properly and securely. The Agile development process allows for flexibility and continuous improvement based on user feedback, increasing visitor satisfaction and operational efficiency. The BugisGo system successfully improved accessibility and visitor experience, but further research is needed for performance testing under high load conditions and mobile application integration.

INTRODUCTION

The tourism sector is a very important sector for economic growth both nationally and regionally [1]. In the growing digital era, transformation and digital are key elements in driving the competitiveness of the tourism sector [2]. One form of implementation is the development of a digital information system that can be easily accessed by prospective tourists [3]. With the digital information system, each tourist destination has a great opportunity to strengthen its image and increase the affordability of its information widely.

Bugis Waterpark Adventure, as one of the largest water tourism destinations in Makassar City, has great potential in attracting visitors [4]. Despite the availability of online ticketing services [5], this destination still faces a major obstacle in the form of the absence of an official website-based information system that is professionally designed and structured [6]. This limits the range of promotion and accessibility of information for potential visitors.

To overcome these challenges, the purpose of this study is to design and develop a website-based tourist information system called BugisGo. This system aims to make it easier for potential visitors to access accurate and up-to-date information about facilities, ticket prices, operating hours, and available promos. The web-based approach was chosen because it has a wide reach, high accessibility, and ease of integration with interactive features such as online ticket booking and others [7].

There has been a lot of research on web-based tourist information systems, with various methods and approaches used. Priyambodo et al. (2022) developed a tourist information system in Kopeng using the Waterfall method, aiming to facilitate the community in accessing tourist information in the area [8]. Meanwhile, research by Anggreni DjohaR et al. (2024) in Ternate City used Agile and QR-Code methods to improve the ease of access to tourist information, and showed the effectiveness of Agile in producing a user-friendly system [9]. However, both studies are still limited to the development of tourist information systems that do not integrate interactive features such as ticket booking and online payments, and have not provided personalization of the visitor experience. This research is different because it develops a website-based tourist information system for the local destination Bugis Waterpark Adventure with an adaptive Agile approach, and integrates interactive features to improve efficiency and visitor experience.

Therefore, the objective of this research is to develop a personalized and interactive web-based tourist information system for Bugis Waterpark Adventure. This research aims to apply an adaptive and iterative Agile approach in system development, focusing on online ticketing and payment features to improve efficiency and visitor experience. Thus, this research is expected to fill the gap that exists in previous studies that have not integrated interactive and personalized

features in tourist information systems.

METHODOLOGY

The website development method in this study uses the Agile method, which is a phased approach to software development that emphasizes teamwork and continuous planning. Agile focuses on efficiency through minimum viable products (MVP), and creating dynamic and adaptive processes [10]. Tools used in this development include Visual Studio Code for code development, MySQL for database management, and Figma for user interface design. Visual Studio Code was chosen because it is a lightweight code editor and has many extensions that support the development of various programming languages, especially PHP and JavaScript. MySQL was used because of its ability to handle large amounts of data with an organized structure, as well as its ease of integration with other web platforms. Figma allows the development team to design the user interface collaboratively and produce a responsive design that fits the user's needs.

Large projects are divided into smaller parts within a certain period called iterations or sprints. Each sprint has a clear focus and goal, so developers can produce functional outputs in a shorter timeframe. By involving end users in every phase of development, the team can immediately obtain valuable feedback to improve product quality. This leads to increased user satisfaction as the end result is more in line with their needs [11]. Agile methods allow the team to iteratively adjust and improve the system based on the feedback obtained, which is especially important in the development of user-oriented systems such as the BugisGo website. In the development of this website, the method.

Agile is divided into five main stages that are interrelated with each other, namely system planning, requirements analysis, system design, implementation, and testing. Each stage is iterative and focuses on collaboration between developers and stakeholders to ensure optimal results. With an emphasis on direct user involvement in each sprint, this method provides the flexibility to make changes according to evolving needs and dynamics, resulting in a system that is more adaptive and responsive to market and technological changes.

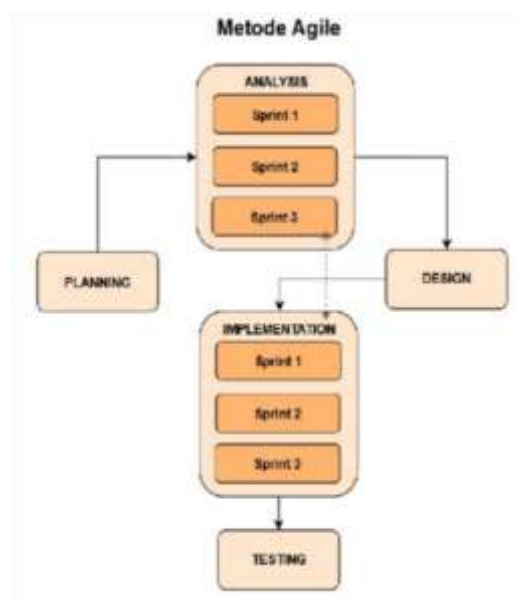


Figure 1. Agile Methodology

1. Planning System

In the planning stage of website development using Agile methodology, two crucial aspects to focus on are system requests and feasibility studies, the process starts with system requests which involve collecting and documenting system requirements based on client requests which will later be analyzed using feasibility studies consisting of economic, organizational and technical feasibility studies.

2. Analysis

The next stage is analysis, the main focus is on analyzing functional and non-functional requirements. Functional requirements describe the specific functions to be performed by the system, while non-functional requirements relate to operational criteria such as security, performance, and usability [12]. In this stage, analysis is often visualized using UML diagrams, such as use case diagrams that show user interactions with the system, and activity diagrams that describe the flow of processes in the system as well as other diagrams that will be defined in the next stage.

3. Design

The third stage is design, which includes creating a User Interface (UI) design with the aim of providing a functional visualization of the website. This design allows developers and stakeholders to get a concrete picture of the appearance

and user interaction with the website, which is then continued with the preparation of class diagrams and sequence diagrams [13].

4. Implementation

The last stage is implementation after analyzing the needs based on the request system and designing the user interface page and others, the next stage is to implement the results of the previous stage where the implementation stage is divided into 2 namely coding and testing:

A. Encoding

The coding stage, where the pre-designed design is realized into working program codes using the required framework and programming language consisting of backend programming in charge of taking care of programming logic and front end in charge of managing the display [14].

B. Testing

The testing phase with the aim of verifying that the application functions as expected and meets the established quality standards. This stage includes White Box testing as a general system test and Black Box testing through end users.

RESULT & DISCUSSION

The development results in the form of a Bugis Waterpark BugisGo tourist information system website, which will be used by users consisting of visitors and admins. The development of this BugisGo application uses the Agile development method which has 4 stages, namely: system planning, needs analysis, design and finally implementation which consists of coding and testing. The explanation of the results of the Agile development stages is as follows:

1. System Planning Results

The planning stage begins with observation and in-depth literature studies with clients to collect system requirements in the form of system request documentation. The results of this system request show the need for a platform that is able to manage a good and friendly system for its users [15]. Furthermore, the results of the identification of needs in the form of a system request will be analyzed using a feasibility study with the aim of knowing whether the system to be developed can be carried out in accordance with existing sources [16].

Table 1.
Planning System

Feasibility Study of BugisGo Information System
I hereby make a feasibility study of the BugisGo information system
Technical Feasibility
The BugisGo Information System is considered technically feasible despite some risks. The high risk relates to the Marketing Division's lack of experience and the IT Division's limitations in the development of recreational park systems. The medium risk relates to the understanding of technology, where the IT Division is quite familiar with the framework used, while the Marketing Division is not familiar with web and mobile technology. The risk of project size was low because it was done by 5 out of 8 developers in two months. System compatibility is also a low risk as the current system utilizes open standards that support
Economic Feasibility
A cost-benefit analysis has been conducted. The information system to be built is expected to improve operational efficiency and boost revenue through better management, as well as improve visitor experience which in turn can attract more visitors to Bugis Waterpark Adventure.
Organizational Feasibility
Organizationally, the risk is very high. The purpose of developing a Waterpark Management System is to improve visitor management efficiency, speed up ticket transactions and customer service, and present analysis reports.

2. Analysis Results

At the analysis stage, the functional and non-functional requirements of the system were defined in detail. Functional requirements include key features such as online ticket purchase, and payment available, while non-functional requirements relate to data security, application performance, and usability which in detail can be seen in table 2 and table 3.

Table 2.
Non-Functional Requirement

ID	Parameter	Requirement
NFR-1	Availability	The system must be accessible 24 hours a day, 7 days a week without interruption, including routine off-peak maintenance.
NFR-2	Reliability	The system should have a 99% reliability rate, with no more than 1% downtime a year.
NFR-3	Ergonomy	The user interface should be friendly and intuitive, allowing visitors and managers to navigate the application with ease.
NFR-4	Portability	The system must be able to operate on a variety of devices and operating systems, including Chrome, Firefox, Safari browsers on desktops and smart phones.
NFR-5	Response time	System response time should be less than 3 seconds for almost all user interactions, including ticket booking and information access.
NFR-6	Safety	All transactions and user data should be encrypted using appropriate security protocols (e.g. SSL/TLS). In addition, the system should protect personal data and have strong authentication mechanisms for managers and cashiers.

Table 3.
Functional Requirement

ID	Functional Requirements	Explanation
BG-01	Register and Login Feature	This feature allows users to create an account and log into the system with secure credentials. With a registered account, users can access exclusive services such as ticket booking and viewing transaction history.
BG-02	Ticket Booking Feature	Users can select the type of ticket, number of visitors, and date of visit online. The system will display real-time ticket availability and confirm the booking after successful payment.
BG-03	Payment Feature	The system supports various payment methods such as e-wallet, credit card, and bank transfer to facilitate transactions. Once the payment is confirmed, digital tickets will be sent to the user's account and registered email.
BG-04	Booking History Feature	Users can view a list of tickets that have been booked, including visit date details and payment status. This feature also allows users to re-download digital tickets if needed.
BG-05	Review and Rating Feature	After visiting, users can leave a review and rating for Bugis Waterpark Adventure. These reviews help improve the service and provide additional information for other potential visitors.

Apart from defining functional and non-functional requirements, this analysis process is often represented through UML (Unified Modeling Language) diagrams, which allow a clear visualization of the interaction between the system and the user, which at this stage of analysis consists of Use case diagrams that illustrate the various ways users interact with the system [17], and activity diagrams that show the workflow or process in the system [18], ensuring that both types of requirements are effectively integrated to achieve the objectives of the system which in detail can be seen in Figure 2, and Figure 3.

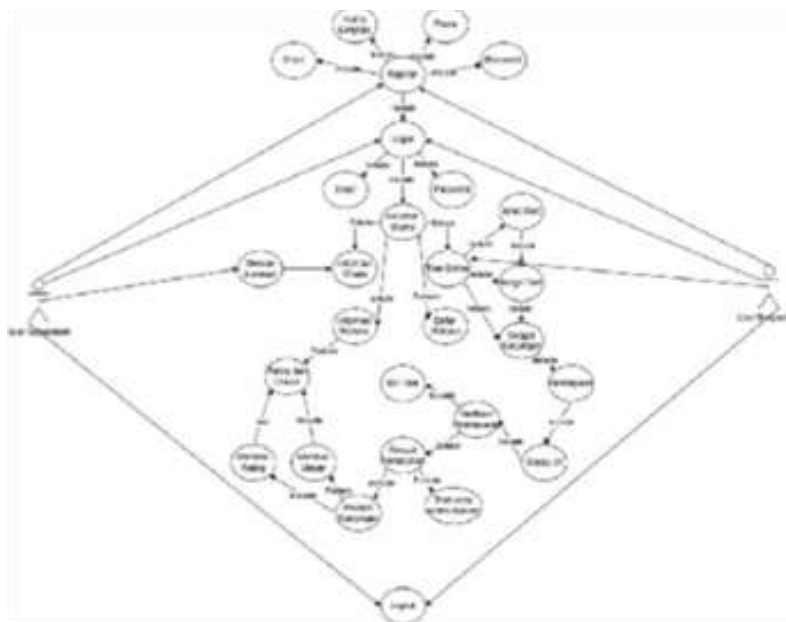


Figure 2. Use Case Diagram

- A. Registration Use Case: This use case allows users to create a new account by filling in personal data such as full name, email, phone number, and password. After successfully registering, users can use their account to access the application.
- B. Login Use Case: This use case allows the user to log into the application by using the registered email and password. After successful login, users can access various features in the application.
- C. Tourist Information Use Case: This use case allows users to access information related to tourist attractions available in the application. Users can view location details and other information.
- D. Ticket Purchase Use Case: This use case allows users to purchase tickets online.
- E. Order History Use Case: This use case allows users to view the history of previously purchased tickets.
- F. Use Case Rating and Review: This use case allows users to rate and review each ride that has been visited.

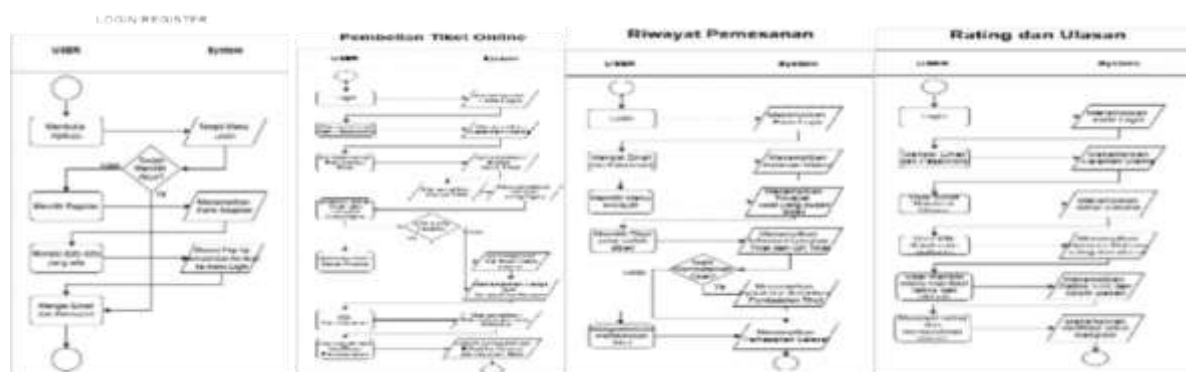


Figure 3. Activity Diagram

3. Design Results

The design stage is useful for ensuring that the system structure and interaction flow between components run according to user needs, thereby facilitating the application development process in an efficient and structured manner [19]. The results of the design stage of this research are in the form of a Class and Sequence Diagram UI design that has been adjusted to the references provided and the necessary adjustments according to the features of the Bugis Waterpark "BugisGo" tourist application.

A. Use Case and Class Diagram Design

For the visual design of the program, the Unified Modeling Language (UML) is used as a framework or modeling language for object-oriented programming, UML modeling helps simplify complex problems to make them easier to understand and learn [20]. At this stage, modeling includes creating a class diagram that is used to define the class structure that will be used in the application, including important attributes and methods, as well as the relationship between classes

[21] which can be seen in Figure 4.



Figure 4. Class diagram

Sequence diagrams are used to describe interactions between objects over time for certain processes, providing a clear guide to the flow of execution of operations in the application based on each use case [22] in detail can be seen in Figure 5.

B. User Interface (UI) Design



Figure 5. User Interface (UI)

Furthermore, there is a UI design design that is made based on the functionality that has been defined above using the Figma design application based on a style guide to maintain design consistency and make it easier for developers to create the system [23], with some icons taken from Google and Figma's free collection that can be used freely by anyone, after submitting the design results there are 3 changes that can be seen in the sprint section. The completed UI design can be seen in the following design feature image:

a. First sprint

In the first sprint there is a login or authentication page form feature, authentication here contains features with email and password parameters and also a registration feature that contains a form for users who want to register their account. Furthermore, there is also a visitor dashboard feature which is the initial display of this website for user visitors, which after the user successfully enters on this page there is information on popular rides, and profiles that are currently logged in.

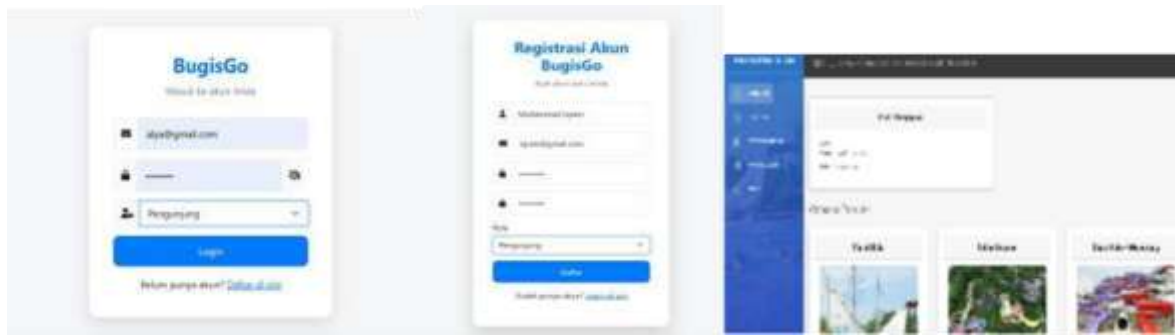


Figure 6. Login Form, Register Form and Visitor Dashboard

b. Second Sprint

In the second sprint, there were 3 main features developed, namely the ticket message feature, transaction history, and review rating. This feature is a feature found in the visitor user that allows visitors to order tickets to visit Bugis Waterpark online and make payments online. The transaction history feature also allows users to view ticket purchase results for and download tickets that have been ordered online. As well as the review rating feature allows visitors to provide ratings and reviews of existing rides at Bugis Waterpark according to visitor experience.



Figure 7. Book Tickets, Transaction History, Ratings and Reviews

c. Third Sprint

In the third sprint, the development focus was on features for admins and managers. Admins have access to a dashboard to monitor total visitors, users, rides, and tickets sold, as well as user, ticket, and ride management features-including add, edit, and delete data. Admins can also view ticket purchase history reports. Meanwhile, the manager has a dashboard to monitor visitors and transactions, view ticket purchase reports, and access reviews to evaluate visitor satisfaction at Bugis Waterpark.

a) Admin

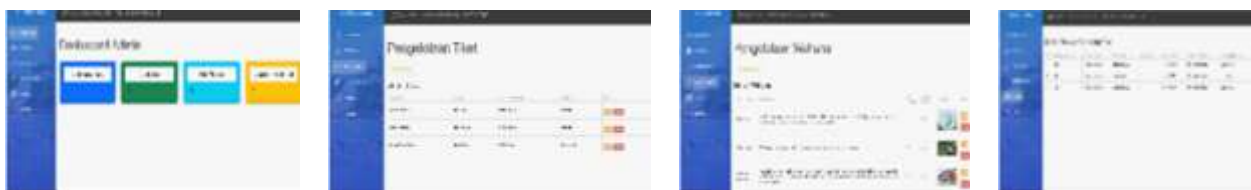


Figure 8. Admin Dashboard, Ticket Management, Ride Management and Ticket Purchase History List Report

b) Manager



Figure 9. Manager Dashboard, Ticket Purchase List Report, and Review Rating List

4. Implementation Results

Based on the results of the analysis and design above, several changes have been obtained which have become 3 sprints and have been implemented in coding and tested so as to produce a bugis waterpark tourist information system "BugisGo" which more details can be seen in the following 2 sections:

A. Coding Results

The result of the coding stage in this research includes the complete code that implements the bugis waterpark tourist information system. During the coding process, the researcher used Visual Studio Code as the main development environment due to its extensive support for the php programming language, which was used as the main programming language in the development of this application.

MySQL is used as the backend database system, chosen for its ability for easy integration and high scalability, making it easy to manage data in real time. In addition, mysql offers various security features that ensure the integrity and security of user data.

Visual Studio Code provides various extensions and features that allow developers to test user interactions with the system, check the responsiveness of the interface, and ensure all web elements work properly before the site is officially launched. This testing process includes simulating various usage scenarios so that all website features run optimally, the results of which can be as follows

Table 4.
Sprint Results

Coding	Result Display
First Sprint	
Login 	
Register 	
Visitor Dashboard 	
Second Sprint	
Ticket Reservation 	

Transaction History		
Ratings and Reviews		
Third Sprint		
Admin		
Dashboard		
User Manager		
Ticket Manager		
Ride Manager		
Ticket Purchase History List		

	
Manager	
Dashboard 	
Ticket Purchase History List 	
Visitor Review Rating 	

B. Testing Results

Application testing is done through Black Box testing which involves end users testing the functionality of the system without knowing the code behind it. This helps in identifying problems from the user's perspective with test cases that can be seen in the following table 5.

Table 5.
Black box testing results

Kode Uji	Test Case	Expected Results	Results Obtained	Status
BG-1	Login with empty username or password and empty role	Information Message "Please fill out this field"	"Email" Error Message	Successful
BG-2	Login with correct username, wrong password, and wrong role	"Email" Error Message	"Email" Error Message	Success
BG-3	Login with correct username, correct password, and empty role	Information Message "Please select an item in the list"	Information Message "Please select an item in the list"	Success
BG-4	Login with correct username, correct password, and wrong role	Information Message "User not found"	Successful login and redirection to dashboard	Success
BG-5	Login with correct username, correct password, and correct role	Successful login and redirection to dashboard	Displaying ticket order pop-up	Success
BG-6	Choose ticket type	Displays the date of visit and ticket price according to the selected ticket type	Successful	Success
BG-7	Make a payment	Displays Midtrans-based payment pop-up	Success	Success
BG-8	Downloading ordered tickets	Downloading the ordered ticket and stored on the user's device	Success	Success
BG-9	Add a review with empty rides, empty ratings, and empty comments	Information Message "Please select an item in the list"	Success	Success
BG-10	Add a review with a filled ride, empty rating, and empty comment	Information message "Please select a rating"	Success	Success
BG-11	Add reviews with filled rides, filled ratings, and empty or filled comments	Sending reviews and displaying reviews in your review	Success	Success
BG-12	Log out	Return to login menu	Success	Success
BG-13	Add a user with a blank username, email, password	Information message "Please select an item in the list"	User is added to the user list	Success
BG-14	Add user with user name, email, password filled in	User is added in the user list	Success	Success
BG-15	Edit a user with a blank name, email, or password	Information message "Please select an item in the list"	User identity changed	Success
BG-16	Editing a user with a filled name, email, or password	User identity changed	Information message	Success
BG-17	Delete a user	"Are you sure you want to delete this user?"	Information message	Success
BG-18	Add ticket with empty ticket name, price, or operating hours	Information message "Please select an item in the list"	Information message	Success
BG-19	Add a ticket with the ticket name, price, or operating hours filled in	Ticket added to the ticket list	Ticket added to the ticket list	Success
BG-20	Edit a ticket with an empty ticket name, price, or operating hours	Information message "Please select an item in the list"	Information message	Success

BG-21	Edit a ticket with a ticket name, price, or time of operation filled in	Ticket identity changed	Information message	Success
BG-22	Delete a ticket	"Are you sure you want to delete this ticket?"	Information Message	Success
BG-23	Add a ride with a blank ride name, description, age, rating, or image	Information message "Please select an item in the list"	Information Message	Success
BG-24	Edit a ride with the ride name, description, age, rating, or image filled in	Change ride information	Information message	Success
BG-25	Delete a ride	"Are you sure you want to delete the ride?"	Information Message	Success

The following bar graph shows the results of Black Box testing of 25 system features:

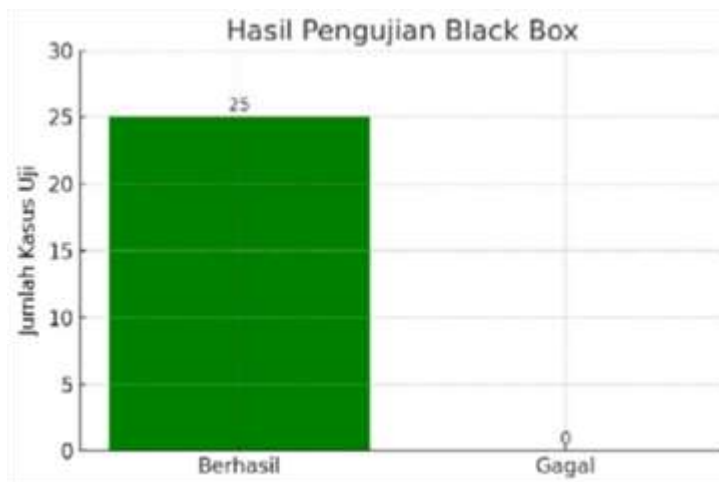


Figure 10: Graph of BlackBox Testing Results

From a total of 25 test cases, 25 cases (100%) showed results that met expectations and were marked with a "Successful" status. No functional errors were found in the system during testing.

Table 6.
WhiteBox Testing Results

SC	Route	Method	Description
WB-1	pesan_tiket.php	POST	Order a new ticket with POST form data
WB-2	pesan_tiket.php?id=xxx	GET	Retrieve ticket data based on ID sent via URL
WB-3	pesan_tiket.php?id=xxx	PUT	Update ticket data based on ID
WB-4	pesan_tiket.php?id=xxx	DELETE	Deleting tickets based on ID
WB-5	process_checkout.php	POST	Processing ticket payment checkout with transaction data
WB-6	process_checkout.php?orderId=xxx	GET	Get checkout payment status based on orderId, update status
WB-7	updatePaymentStatus.php	POST	Ticket payment (after confirmation of payment)

The BugisGo website was successfully developed with 25 main features divided into three use cases and tested using the blackbox method. In the first sprint, the system included login authentication, user registration, and a visitor dashboard that provided an online ticket booking feature [24]. This feature supports transaction efficiency by allowing users to purchase, view, and download digital tickets without having to re-pay. Thus, the early stages of BugisGo's development have fulfilled the security and ease of access aspects that are fundamental to tourist information systems.

In the second sprint, the research added a review feature that allows users to provide ratings and feedback on rides. This feature is in line with the findings of Arifin [25] who stated that the integration of visitor feedback can improve service quality while building the trust of potential tourists. In addition, online reviews also serve as social references that influence visiting decisions. Therefore, the review feature in BugisGo not only supports managers in service evaluation, but also strengthens the image of tourist destinations.

System development continued in the third sprint focusing on admin and manager features. Admins are given the authority to monitor users, tickets, rides, and manage transaction reports, while managers can access a special dashboard to monitor transaction data and visitor reviews. This authority sharing model is in accordance with web-based system management practices that emphasize operational efficiency and data transparency [16]. Thus, the results of the third sprint reinforce BugisGo's role as an information system that not only serves visitors, but also supports the effectiveness of internal management.

The whitebox testing results show that all core functions, including ticket booking, data retrieval, update, deletion, as well as checkout and payment status update processes, run as designed. The whitebox testing approach allows developers to verify program logic on each execution path, as recommended by Nugroho [14] in web-based software development practices. In addition, this method ensures the system's reliability in handling various HTTP requests, ranging from form POSTs to URL parameters. With consistent results, BugisGo is proven to meet the technical quality standards required to optimally support digital tourism services.

CONCLUSION

This research successfully developed a web-based Bugis Waterpark tourist information system called BugisGo using the Agile method, which provides 25 features from three use cases and is proven to function optimally through blackbox and whitebox testing, thereby improving service efficiency and visitor experience. However, this study has limitations because it only tests aspects of functionality without involving long-term trials related to system performance under high load conditions or integration with mobile devices. Therefore, future research is recommended to develop Android or iOS application versions, conduct performance tests with more complex user load scenarios, and add social media integration features and notification systems to make the system more responsive to the needs of modern tourists.

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