

Design and Development of a Website-Based Reservation Information System at the Backyard Villa

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ABSTRACT

The Backyard Villa is a medium-scale lodging business that relies on manual booking methods like text messages and phone calls. This approach leads to various issues, including delayed confirmations, data duplication or loss, and limited access to information for prospective guests. These inefficiencies negatively impact the operational effectiveness and overall service quality. This study aims to design and implement a web-based reservation information system to enhance service performance and competitiveness in the digital era. The system was developed using the waterfall method, which includes requirement analysis, system design, implementation, and testing phases. The system defines two main types of users—guests and admins with different access rights and features. System functionality testing was conducted on 28 scenarios, covering the booking process, villa data management, and reporting. The test results demonstrated a 100% success rate. The system not only simplifies the reservation process for customers through self-service but also supports the management in handling booking data, customer information, and operational reports more efficiently. The implementation of this system is expected to significantly improve the operational efficiency and service quality of The Backyard Villa by automating manual tasks, reducing errors, and providing a better user experience for both guests and management.

Keywords:

Information System;
Online Reservation;
The Backyard Villa;
Website;
Waterfall.

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1. Introduction

Many small- to medium-sized accommodations, such as The Backyard Villa, still rely on manual booking methods via phone or text message, which are prone to data inaccuracies, late confirmations, and duplicate records. This manual process is highly inefficient, leading to data management errors and a decline in guest service quality (Damayanti et al., 2023; Khuluq et al., 2023). This situation exacerbates the risk of losing customers, especially in an era where customers expect accurate and instant information. Digital transformation in the hospitality industry has been shown to improve operational efficiency and service quality. According to Anwar et al. (2024), implementing a cloud-based property management system and adopting AI (chatbots, big data analytics) can increase efficiency by up to 30%, reduce staff workload by up to 70%, and increase guest satisfaction by 15% (Anwar et al., 2024).

In Indonesia, the implementation of a web-based villa reservation system has proven effective. Research on Villa Gunung Gare (2024) showed that the online system made it easier for customers to book without having to visit in person, while also increasing the management's operational efficiency

(Apriansyah & Jimmie, 2024). Elsewhere, a project in Teluk Tamiang Village also recorded significant improvements in service efficiency and professionalism, supported by staff training and the integration of waterfall-based web technology (Pratomo et al., 2024).

Unlike many other accommodations that have adopted technology, The Backyard Villa still relies on manual booking methods, such as text messages and phone calls. This method often creates various operational challenges, including delays in booking confirmations, the risk of duplication or loss of customer data, and limited direct access to information for potential guests. This situation not only slows down the service process but also creates a less professional impression in the eyes of customers, especially those accustomed to booking online through other digital platforms.

These limitations pose a serious obstacle to business development, particularly in efforts to expand market share and build a competitive image in the increasingly digital-driven tourism industry. In an era where fast access to information and instant processes are paramount, the use of a manual system undoubtedly puts The Backyard Villa at a disadvantage. Besides hampering internal efficiency, delayed responses to customers can lead to missed reservations and decreased customer satisfaction.

Based on these challenges and opportunities, this research focused on designing a website-based villa booking information system for The Backyard Villa. This system is designed to allow prospective customers to check room types, prices, and availability, and even make bookings independently. For villa management, this system facilitates data processing and automated confirmation, with the hope of improving response speed, data accuracy, and competitiveness within the local and digital tourism ecosystem.

2. Literatur Review

Several studies have shown that implementing a web-based reservation system can significantly reduce administrative errors, speed up transaction processes, and improve the effectiveness of customer data management (Khuluq et al., 2023; Nirmala & Sari, 2023). Such systems also enable managers to easily monitor room availability in real time, update pricing information, and automatically generate operational reports. This reduces staff workload while improving guest service speed and accuracy. Web-based systems offer numerous advantages: real-time room availability and pricing information, automated booking processes, structured customer data storage, and flexible 24/7 access. In addition to improving internal management, studies have shown that such systems expand the reach of digital marketing and increase the competitiveness of local accommodation providers (Damayanti et al., 2023; Jannah et al., 2023).

3. Research Method

The research method in this study is divided into two main parts, namely the data collection method and the system development method, as shown in Figure 1. In conducting this study, the researcher used several data collection methods to obtain relevant information. The first method is observation, which is done by conducting a direct visit to the research location. The researcher observed and analyzed the system currently running at The Backyard Villa. The results of the observation showed that data management and operations are still carried out manually and not yet computerized. Activities such as recording villa reservations, managing customer data, check-in/check-out schedules, and preparing financial reports still use paper media such as notebooks. This condition creates various obstacles in terms of efficiency, data accuracy, and speed of service. Based on the results of these observations, it can be concluded that The Backyard Villa requires a computerized information system to improve work efficiency, minimize data errors, and support faster and more accurate decision-making.

In addition to observations, researchers also conducted interviews to supplement the data obtained. Interviews were conducted directly with key informants, namely those involved in the daily operations of The Backyard Villa, to obtain more in-depth information regarding their experiences, knowledge, and workflow. In this case, researchers directly interviewed the owner of The Backyard Villa. In addition, researchers also conducted a literature review, namely collecting data through reviewing various credible reading sources such as books, scientific journals, trusted websites, and other academic articles. This literature review aims to obtain supporting theories that can strengthen the preparation of the research report.

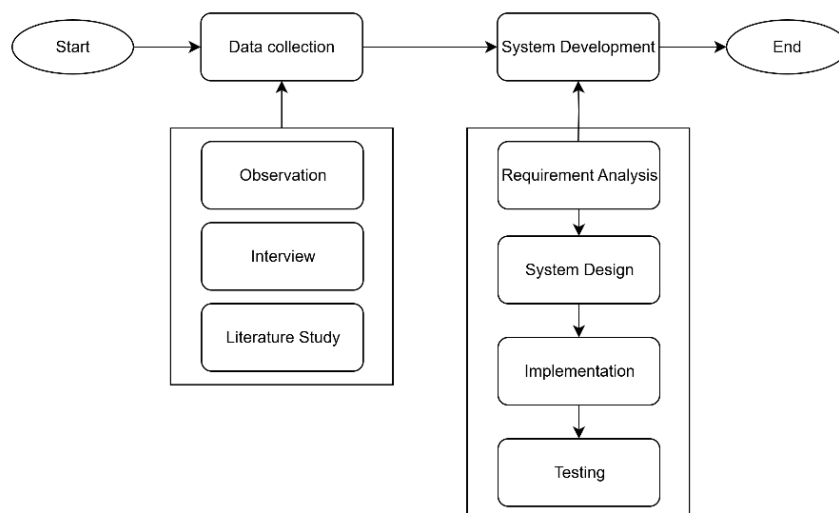


Fig. 1. Research methods

In conducting the design research, researchers used the waterfall system design method (Akbar, 2023; Gunawan et al., 2021). The waterfall method is an approach to the software development cycle that proceeds sequentially, starting with the analysis, design, coding, and testing stages (Akbar, 2023; Haniva et al., 2023). This approach is considered systematic and suitable for projects with clearly defined needs from the outset (Sasmito, 2017; Usnaini et al., 2021). Figure 1 illustrates the stages of system development using the waterfall method. The first stage is system analysis, in which researchers identify and assess the system's functional requirements. In this stage, researchers ensure that the system comprehensively meets user needs.

After the analysis stage is complete, the process proceeds to the system design stage. At this stage, researchers develop a system design based on the results of the previous analysis (Arsa, 2015). This design includes the application flow and the user interface that will be used when the application is run. Researchers used software such as Balsamiq and Drawio to design the application's appearance and structure. Next, the implementation phase involved implementing the design into a real-world application through coding. After implementation, the final stage was system testing to ensure the application ran as planned, functioned properly, and met user needs. Testing was conducted using the black-box testing method (Abdillah et al., 2023; Praniffa et al., 2023), a testing method focused on system functionality without examining the internal structure of the program code (Abdillah et al., 2023; Ariyana et al., 2023). This stage was crucial for assessing the system's efficiency, reliability, and compliance with established specifications (Praniffa et al., 2023).

4. Result and Discussions

4.1 Requirement Analysis Results

The system requirements analysis produced a list of requirements that served as the basis for the application design, including the identification of two main user types: visitors and admins. Visitors are general users who can access villa information, view room availability, and make reservations independently through the website. The results of the visitor requirements analysis are shown in Table 1.

Table 1. Requirements Analysis Results - Visitors

No	Requirements	Goal
1	Villa Information	This website must contain all information about The Backyard Villa, such as a profile, address, contact information, and a list of available villas for rent.
2	Check Villa Availability	This website must provide a feature to check villa availability.
3	Villa Reservation Form	This website must have a feature that allows users to complete a complete booking form.

No	Requirements	Goal
4	Automatic Message Delivery	This website must be equipped with a notification system for users upon successful villa booking.

The next access point is the admin, who is the villa owner, with full access to manage room data, verify reservations, manage customer data, and generate operational reports. The results of the admin requirements are shown in Table 2.

Table 2. Requirements Analysis Results - Admin

No	Requirements	Goal
1	Authentication	This website must be equipped with an authentication system to access sensitive features or administrative areas.
2	Managing Booking Data	This website must have a reservation management system, through which admins can verify and confirm reservations.
3	Managing Villa Data	This website must have a comprehensive villa data management system, allowing admins to perform various villa management operations.
4	Managing Admin Data	This website must have an admin data management system.
5	Managing Report Data	This website must have a report management system, allowing admins to view and download booking reports.

4.2 Design Results

In the developed system, there are two main users: visitors and admins, who have different roles and access within the system. Use case diagrams are used to illustrate the interactions between users and the system. Figure 2 shows the use case diagram of the system being developed.

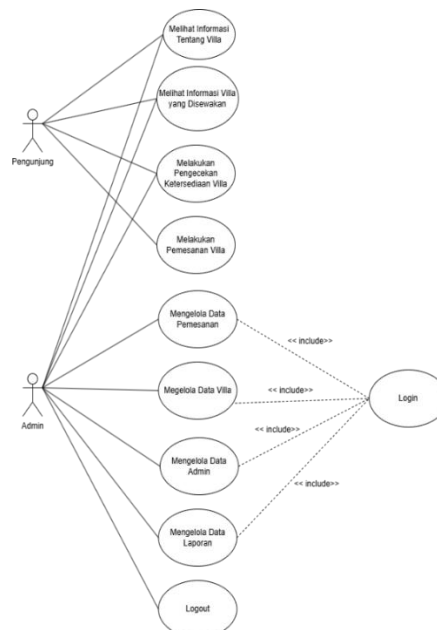


Fig. 2. Use Case Diagram

In developing the information system for The Backyard Villa, database design was carried out using an Entity Relationship Diagram (ERD). An ERD is a visual aid used to model database structures, including entities, attributes, and relationships between entities. By using an ERD, the design process becomes more structured, because this diagram is able to illustrate how data is interconnected. Figure 3 shows an overview of the results of the ERD design.

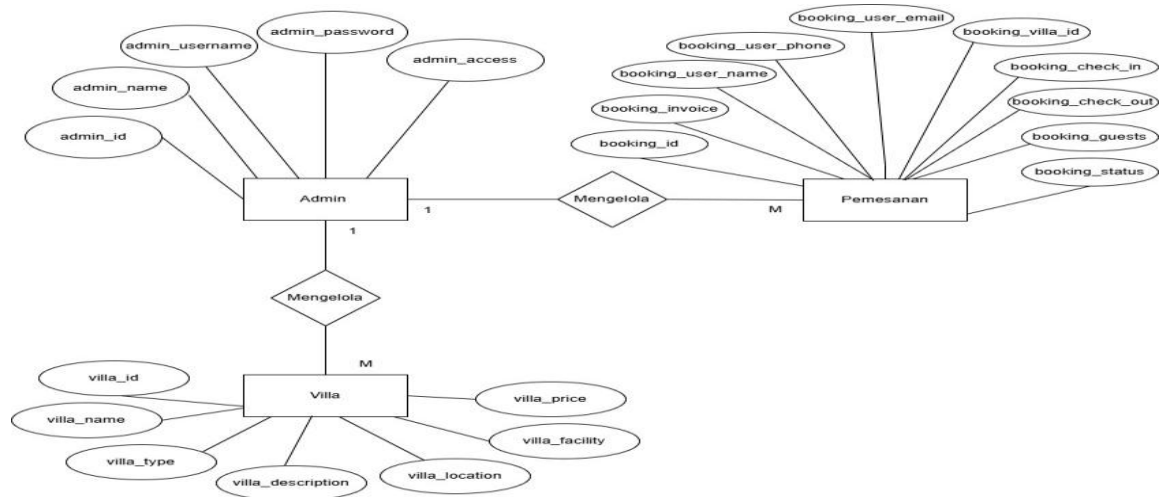


Fig. 3. Entity Relationship Diagram

This interface design was created to determine the layout of pages accessible to visitors. This design provides an initial overview of how villa information will be presented and organized before implementation. The visitor interface design for the home page will display information as shown in Figure 4. The admin interface design was created to ensure easy access to the various pages managed by the admin. This design provides an initial overview of the layout and display of villa information that can be managed before implementation.

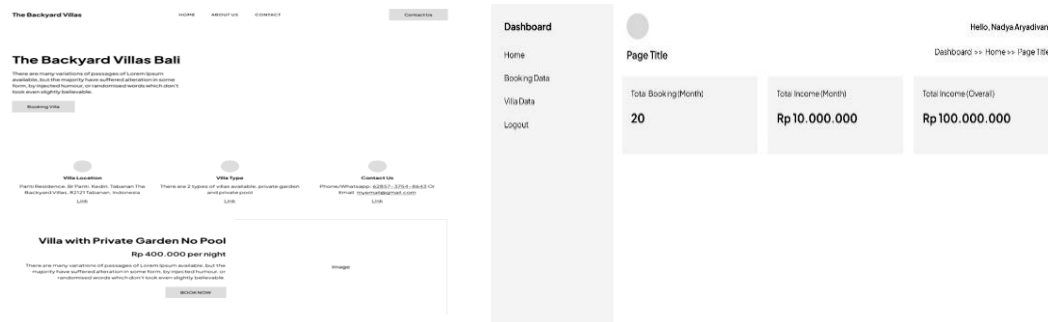


Fig. 4. Interface Design

4.3 Implementation Results

The implementation of this main page visitor interface is the result of the design discussed in the design phase. Figure 5 shows the results of the visitor interface implementation for the main website page. Figure 5 also shows the results of the dashboard implementation for admin access.

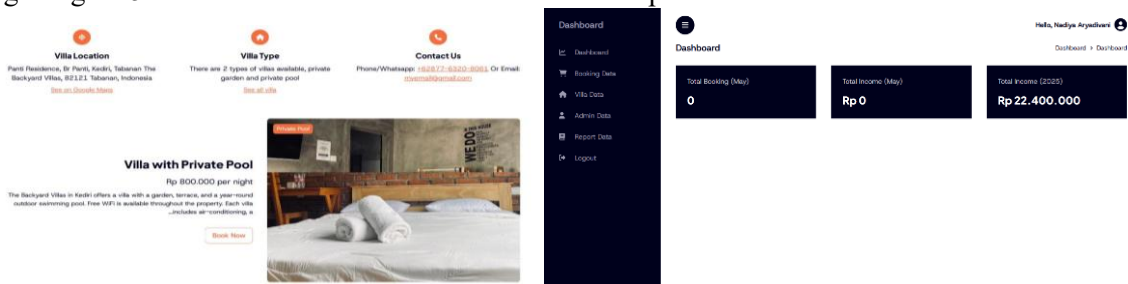


Fig. 5. Implementation Results

4.4 Test Results

The system testing results on the visitor page included testing various functions on the website's main page to ensure everything was working properly. Table 3 shows the results of the tests performed.

Table 3. Visitor Page Test Results

No	Test Scenario	Predicted Error	Expected Result	Result
Home Page Test Results				
1	Click each menu in the main navigation (Home, About, Contact)	Menu does not work or does not go to the correct page	Menu should work and go to the page correct	Valid
	Users click the "Contact Us" button in the main navigation.	Buttons not working or not going to the correct page	The button must work and lead to the correct page.	Valid
2	Users click the "Book Now" button on the available villa.	Buttons not working or not going to the villa details page	The button must work and lead to the villa details page.	Valid
Villa Details Page Test Results				
3	The user fails to fill in all the information on the "Check-in," "Check-out," and "Guests" forms, then clicks the "Check Now" button.	The villa check is still being processed by the system.	The user must remain on the page and a warning appears to fill out all forms.	Valid
4	The user fails to fill in all the information on the "Name," "Phone," and "Email" forms (if the villa is available).	The booking is still being processed by the system, but the stored data is empty.	The user must remain on the page and a warning appears to fill out all forms.	Valid

The system testing results on the admin page include testing various functions on the admin page to ensure everything is working properly. Table 4 shows the results of the tests performed.

Table 4. Admin Page Test Results

No	Test Scenario	Predicted Error	Expected Result	Result
Admin Login Page Test Results				
1	The user attempts to log in without entering a username and password, then presses the "Login" button.	Users can still log in and be redirected to the admin page even if the username and password are blank.	The user remains on the login page and a warning message appears prompting them to enter their username and password.	Valid
2	The user enters the username (incorrect) and password (correct) and then clicks the "Login" button.	Users can still log in to the admin page even if the username is incorrect.	The user remains on the login page and a warning message appears stating that the username or password is incorrect.	Valid
3	The user enters the username (correct) and password (incorrect) and then clicks the "Login" button.	Users can still log in to the admin page even if the password is incorrect.	The user remains on the login page and a warning message appears stating that the username or password is incorrect.	Valid
4	The user enters the correct username and password and then clicks the "Login" button.	Users remain on the login page or receive an error message even if the username and password are correct.	The user is successfully logged in and redirected to the admin/dashboard page.	Valid
5	The user does not select the "Remember me" option.	Users are still automatically logged in when they reopen the login page, even if they haven't	After logging out or closing the browser, the user must log back in because the session is not	Valid

No	Test Scenario	Predicted Error selected the "Remember Me" option.	Expected Result saved.	Result
6	The user selects the "Remember me" option.	Users are still prompted to log in again even if they have selected the "Remember Me" option.	The user remains automatically logged in without needing to re-login when reopening the page.	Valid
Dashboard Page Test Results				
7	Click each menu in the main navigation (Booking Data, Villa Data, Admin Data).	The menu is unresponsive or redirects to the wrong page.	Each menu item redirects to the appropriate page without error.	Valid
8	The user then clicks the "Logout" menu.	Users remain on the admin page after logging out. After logging out, users can still access the admin page without logging in again.	Users are redirected to the login page after logging out. User sessions are deleted, so accessing the admin page requires a re-login.	Valid Valid
Booking Data Page Test Results				
9	The user clicks the "Details" button.	The "Details" button is not working or is unresponsive. Users are redirected to the wrong page.	The "Details" button must be functional or responsive. The user is redirected to the correct booking details page.	Valid Valid
10	The user clicks the "Confirm" button on the order details with the status "Pending."	The "Confirm" button is not working or is unresponsive. The order status does not change after confirmation.	The "Confirm" button must be functional or responsive. The booking status must change from "Pending" to "Booked."	Valid Valid
11	The user clicks the page number or pagination button.	The pagination buttons are not working or are unresponsive. Pagination is not working properly, for example, it remains on the first page even when another page is selected.	The pagination buttons must be functional or responsive. The system displays data according to the page number clicked.	Valid Valid
Villa Data Page Test Results				
12	The user clicks the "Add data" button.	The "Add Data" button is not working or is unresponsive. Users are not redirected to the villa data add page/form.	The "Add Data" button must be functional or responsive. Users are directed to the villa data add page/form.	Valid Valid
13	The user clicks the "Details" button.	halaman/form tambah data villa. Users are redirected to the wrong page.	The "Details" button must be functional or responsive. Users are directed to the correct details page.	Valid Valid
14	The user clicks the "Update" button.	The "Update" button is not working or is unresponsive. Users are redirected to the wrong page.	The "Update" button must be functional or responsive. Users are directed to the correct data update page.	Valid Valid
15	The user clicks the "Delete" button.	The "Delete" button is not working or is unresponsive. Data remains after clicking the "Delete" button.	The "Delete" button must be functional or responsive. Data must be deleted after clicking the "Delete"	Valid Valid

No	Test Scenario	Predicted Error	Expected Result button.	Result
Villa Add Data Page Test Results				
16	The user does not fill in all the required input and then clicks the "Save" button.	The form is still processed by the system but the stored data is empty.	The user must remain on the page and a warning appears to fill in all the forms.	Valid
Villa Update Data Page Test Results				
17	The user does not fill in all the required input and then clicks the "Update" button.	The form is still processed by the system but the stored data is empty.	The user must remain on the page and a warning appears to fill in all the forms.	Valid
Admin Data Page Test Results				
18	User clicks the "Update" button	The "Update" button doesn't work or isn't responsive.	The "Update" button must be functional or responsive.	Valid
		Users are redirected to the wrong page.	Users should be directed to the correct data update page.	Valid
Admin Update Data Page Test Results				
19	The user does not fill in all the required inputs and then clicks the "Update" button.	The form is still processed by the system but the stored data is empty.	The user must stay on the page and a warning appears to fill out all the forms.	Valid
Report Data Page Test Results				
20	The user selects the "Month" input but does not select the "Year" input and then clicks the "Filter" button.	The form is still processed by the system but the report data does not appear because the "Year" input is empty.	The user must stay on the page and a warning appears to fill out all the forms.	Valid
21	The user selects the "Year" input but does not select the "Month" input and then clicks the "Filter" button.	The form is still processed by the system, but the report data is not displayed because the "Month" input is blank.	Users must remain on the page and be prompted to complete all forms.	Valid
22	The user selects the "Month" input and the "Year" input and then clicks the "Filter" button. (If the requested data exists.)	The system does not display data even though the requested data should be present.	The system must display data according to the requested month and year.	Valid
23	The user selects the "Month" input and the "Year" input and then clicks the "Filter" button. (If the requested data does not exist.)	The system continues to display data even though the requested data should not be present.	The system must display a message if the requested data is unavailable.	Valid
24	The user clicks the "Download" button.	The "Download" button is not working or is unresponsive. The system does not send report data, or the user does not receive the report data as requested.	The "Download" button must be functional or responsive. The system must send the report data, or the user must be able to receive the report data as requested.	Valid

5. Conclusion

Based on the results of the research and system implementation, it can be concluded that the web-based booking information system for The Backyard Villa was successfully designed and built according to user needs, both from the visitor and admin side. This system successfully overcomes

the problems of manuality, confirmation delays, and potential data duplication previously faced by The Backyard Villa, thereby significantly improving operational efficiency and service quality. This system provides key features such as villa information, checking room availability, online booking, customer and booking data management, and structured reporting. Comprehensive system testing, involving 28 test scenarios (24 on the admin side and 4 on the visitor side), demonstrated 100% functional validity. These results confirmed that all designed features operated properly and met expected functional requirements, ensuring the system was ready for use. For further development, it is recommended to consider the integration of online payment systems.

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