Modeling and Developing a Reservation Customer Management Web System Based on a Sequential Software Development Methodology

Hardiansyah Putra, Isnar Sumartono

Abstract

In practice, conventional haircut services often face a number of problems, such as difficulties in managing customer schedules, poorly organized queues, and the absence of an effective booking system. To address these challenges, the implementation of a Website-Based Reservation and Customer Management System using the Waterfall Development Model becomes the right solution. This system is designed to make it easier for customers to book services online, display pricing information, employee profiles, booking history, and give customers the freedom to choose their barber and appointment time. Its development follows the main stages of the Waterfall model, including requirements analysis, design, implementation, verification, and maintenance. In the design stage, Unified Modeling Language (UML) is used to model the system through use case diagrams, activity diagrams, sequence diagrams, and class diagrams to make the analysis and design process more structured. In the implementation process, MySQL is used as the database, Bootstrap is used to design the user interface, and PHP becomes the main programming language. The system is then tested using black-box testing methods to ensure that each feature functions properly. Test results show that this system successfully improves the speed and ease of the service ordering process for customers, while also making it easier for the admin to manage data on prices, employees, orders, customers, and invoices.

***Keywords**:* System, Customer, Diagram, Design

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Introduction

In recent years, the barbershop industry has experienced rapid growth. Business owners in this field continue to strive to improve service quality and operational efficiency by leveraging technological advancements and adapting to changes in consumer preferences [1]. One of the innovations that is highly sought after is the online reservation system, which allows customers to book services through a digital platform, thereby minimizing waiting time and providing a more convenient experience [2]. The service process is usually done through phone orders or by coming directly to the location. However, this often results in long queues, causing many customers to wait for a long time, and some of them even choose not to get a haircut because the waiting time is too long [3].

The rapid advancement of information technology has brought significant changes in various aspects of life, including the service sector such as hair salons. Nevertheless, many hair salon businesses like Pangkas Candu still use traditional systems in their operations, especially in serving customers [4]. For companies, the implementation of technology can increase operational efficiency and have a significant impact on profit growth. Through the use of online reservation systems, customer data collection can be done more quickly, scheduled properly, and capable of minimizing human error [5]. The application to be developed will play a significant role and provide benefits in various aspects of life, one of which is in the business field [6].

Literature Review

Reservation is the activity of booking or scheduling the use of a service, place, or specific facility before the customer comes to enjoy it [7]. Customers are individuals or organizations who make purchases, use, or receive products and services provided by a company or service provider [8]. The Waterfall model is one of the classical approaches in software engineering that describes the development process in an orderly and systematic manner, where each phase must be completed fully before moving on to the next phase [9].

A website is a collection of interconnected pages that can be accessed via the internet using a domain address. Each page generally contains text, images, videos, as well as various other interactive elements built with web programming languages such as HTML, CSS, and JavaScript [10]. The system is developed through a series of specific processes with the aim of producing information that can support decision-making in daily operational activities as well as provide relevant data for management needs [11]. In the business world, the positive impact of information technology is not only felt by large-scale businesses. Small and medium enterprises that implement information technology can make it easier for business actors to carry out all their business activities. In addition, it can reduce mistakes made by humans [12]. A system has certain characteristics or properties, namely having components, system boundaries, external environment, connectors, inputs, processed outputs, and goals or objectives. Some components of the system are as follows: [13]

1. Components
   A system consists of a number of interacting components, which means they work together to form a whole. The components of a system or elements of a system can be a subsystem or parts of the system.
2. Boundary
   System boundaries are areas that separate one system from another system or from its external environment.
3. Environtment
   The external environment of a system is anything outside the boundaries of the system that affects the system's operations. The external environment of a system can be beneficial as well as detrimental.
4. Interface

System connectors are media that connect one subsystem to another. Through this connector, resources can potentially flow from one subsystem to another.

5. Input
   System input is the energy that is put into the system. Inputs can be in the form of maintenance input and signal input. Input is the energy put in so that the system can operate.
6. Output
   System output is energy that is processed and classified into useful output. Output can serve as input for other subsystems.
7. Process
   A system processing can have a processing component or the system itself as the processor. The processor will convert inputs into outputs.
8. Objective
   A system's goal has an objective or target; if a system has no target, then the system will not exist. A system is said to be successful if it achieves its objective or goal. The goal greatly influences the input and output produced.

Research Methodology

Research Stages

Figure 1.1 Research Stages

Data Collection Method

1. Interview
   Conducting interviews with business owners to understand the business flow and strategic needs.

2. Observation
   Directly observing how customers place orders, who records the reservations, what media is used, and then how the queue process is carried out.
3. Study Literature
   Reading books, journals, or modules about information systems, understanding system architecture, databases, and system components, and then studying customer management concepts.

Results

This research successfully produced a reservation and customer management system that can be accessed through a web browser. The system was built using the Waterfall development model approach, which consists of the stages of requirements analysis, system design, implementation, testing, and maintenance.

1. Admin Interface Implementation

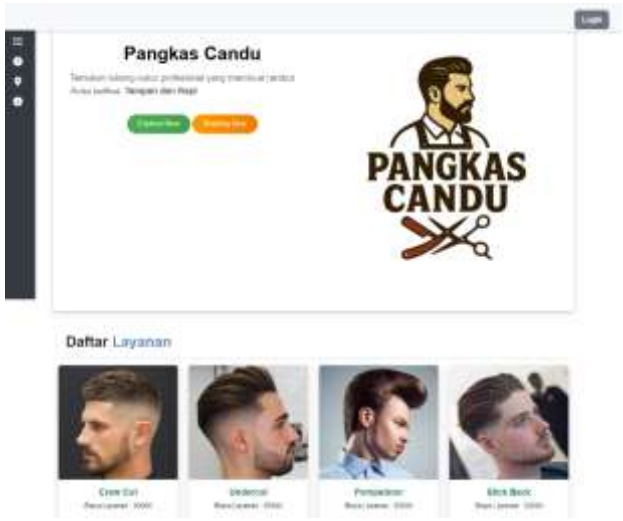

Figure 1.2 Admin Main Page

This page plays an important role in providing an overview of the system, ease of navigation, and quick access to main features.

Figure 1.3 Login Page

This page serves as the main gateway for admins to access the information system.

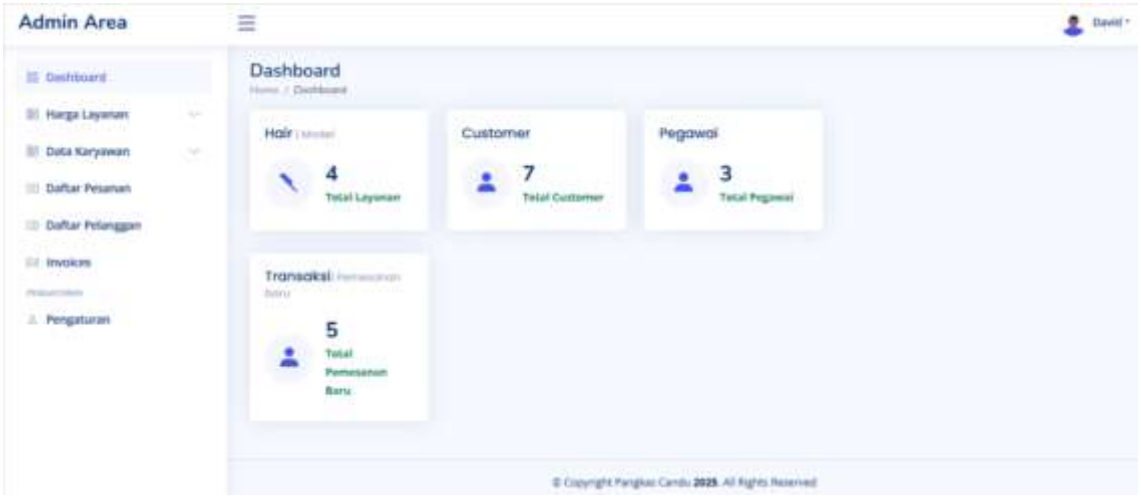

Figure 1.4 Dashboard Page

This page serves as the main view that presents various important information, namely the total services, total customers, number of employees, and total new orders.

Figure 1.5 Add Service Type Data Page

This page is used to add available service type data to the database.

Figure 1.6 Service Management Page

This page is used to manage all data related to the available services.

Figure 1.7 Add Employee Data Page

This page is used to add employee data available in the database.

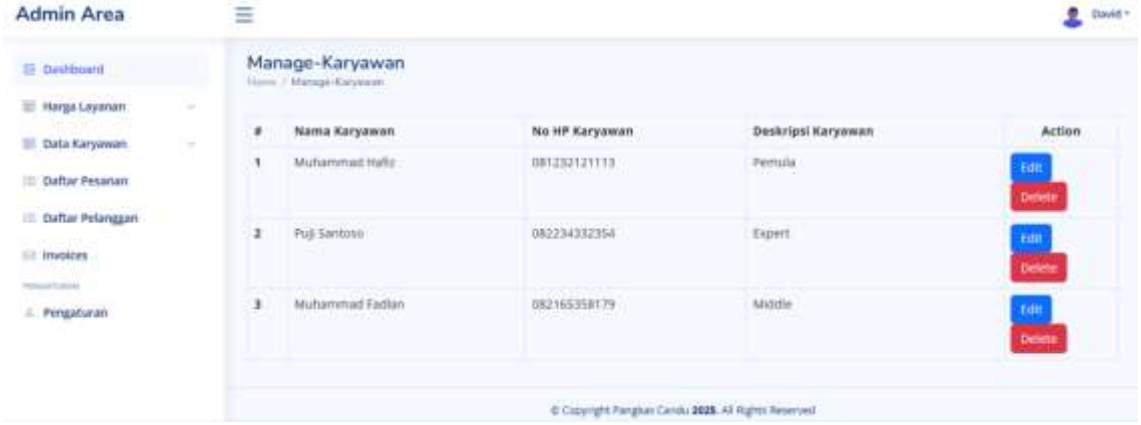

Figure 1.8 Employee Data Management Page

This page is used to manage all available employee data.

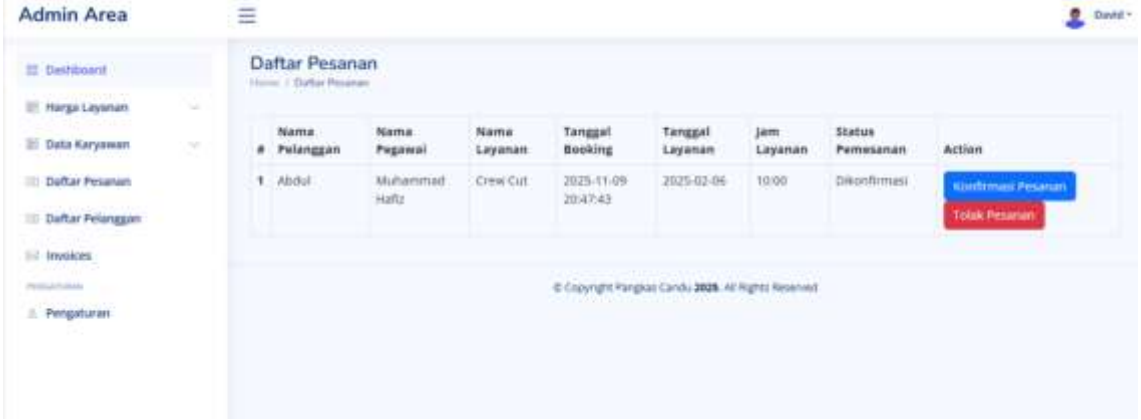

Figure 1.9 Order List Page

This page displays a list of customer reservations that will be followed up by the admin.

Figure 1.10 Customer List Page

This page displays customer data in the system database.

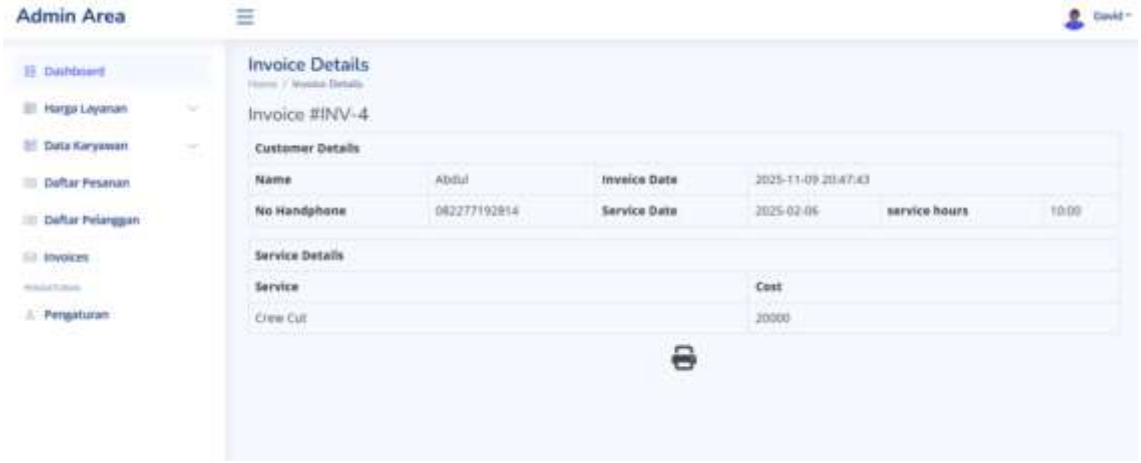

Figure 1.11 Invoice Page

This page displays the accumulated bills that need to be paid by the customer.

2. Customer Interface Implementation

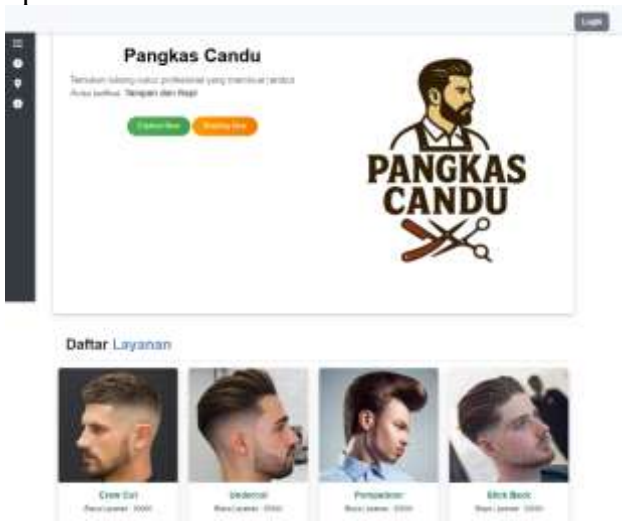

Figure 1.12 Customer Home Page

This page plays an important role in providing an overview of the system, ease of navigation, and quick access to main features.

Figure 1.13 Customer Login Page

This page serves as the main gateway for customers to access the information system.

Figure 1.14 Customer Order Form Page

Conclusion

This study successfully designed and implemented a Website-Based Reservation and Customer Management system using the Waterfall development model. Some conclusions that can be drawn from this study are as follows:

1. System development using the waterfall model has proven effective in this study due to its structured and systematic development process.
2. The Website-Based Reservation and Customer Management System has been tested by integrating various main features, including user registration and authentication, online service booking, employee data management, service rate settings, sending notifications to customers, as well as managing customer data and billing.

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