

Design and Implementation of a Web-Based Customer Complaint Information System for Lamongan Water Supply Company

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ABSTRACT

The rapid development of technology especially on information system more optima is by customer for making the performance of a company easier. Lamongan water supply company is one of regional owned enterprises that working in water supply section. It need to use an integrated information system for manage complaint file of the customers. Now, the company already has the billing, system and accounting, but still hasn't information system for web based complaints. So, it can cause the customer who wants to complaint their problems must come to the central office or in the units according to their respective coverage areas. Some customer's complaint that often submitted is clogged water, pipeline leakage, interrupted temporarily, change meters, change name, etc. This research is designed to create a new system whose development using object modeling methodology is a technique that tries to unite data and process into a single concept called object. As an application development route, using rapid application development (RAD) is a system development strategy that emphasizes the speed of development through extensive user engagement in construction, fast, repetitive and multiples a series of prototypes working on a system and eventually evolves into the final system. The database used is a well-tested MySQL. MySQL capable of handling databases with a large scale.

1. INTRODUCTION

The rapid advancement of information technology has significantly transformed the way organizations manage data, deliver services, and interact with customers. Information systems have become essential tools for improving operational efficiency, enhancing service quality, and supporting decision-making processes in both public and private organizations [1]. The adoption of web-based technologies enables organizations to provide services that are more accessible, responsive, and efficient compared with conventional manual procedures.

Customer service is one of the most important aspects of organizational performance, particularly for public utility companies. The ability to respond effectively to customer complaints directly influences customer satisfaction and organizational credibility [2]. Therefore, organizations are increasingly utilizing information systems to facilitate communication between customers and service providers, enabling complaints to be submitted, monitored, and resolved more efficiently.

The Lamongan Regional Water Supply Company (PDAM Lamongan) is a regional government-owned enterprise responsible for providing clean water services to the community. Although the

company has implemented billing and accounting systems to support its operational activities, the customer complaint process remains largely conventional. Customers are generally required to visit the central office or local service unit to submit complaints regarding service disruptions, pipeline leakage, water supply interruptions, meter replacement, and other service-related issues. This approach often results in inefficiencies for both customers and company personnel, particularly when complaint volumes increase [3].

The implementation of a web-based complaint management system offers an opportunity to improve service accessibility and streamline complaint handling procedures. Through a centralized online platform, customers can submit complaints remotely, while administrators can monitor, process, and respond to customer reports more effectively. In addition, digital complaint records can improve data management, reduce administrative workload, and support service evaluation activities [4].

Several previous studies have demonstrated the benefits of complaint management systems in improving communication and service quality. For example, web-based complaint systems have been successfully implemented in educational institutions, government organizations, and service-oriented businesses to facilitate complaint submission and resolution processes [5]. However, the implementation of such systems within regional water supply companies remains relatively limited, particularly in the context of integrating customer complaint management with existing operational procedures and service standards.

Based on these considerations, this study aims to design and develop a web-based customer complaint application for PDAM Lamongan. The proposed system is intended to facilitate complaint submission, improve communication between customers and administrators, and support more efficient complaint management processes. By digitizing the complaint handling mechanism, the system is expected to improve service quality, enhance customer satisfaction, and contribute to the overall effectiveness of PDAM Lamongan's operational activities.

2. METHODS

This study employed a system development approach to design and implement a web-based customer complaint application for the Lamongan Regional Water Supply Company (PDAM Lamongan). The system was developed to facilitate customer complaint submission and improve complaint management processes within the organization. The development process consisted of data collection, system analysis, system design, implementation, and testing.

2.1. Data Collection

Data collection was conducted to obtain information regarding the existing complaint handling process and system requirements. The following techniques were employed during this study.

2.1.1. Observation

Observation was carried out directly at PDAM Lamongan to understand the operational workflow, customer complaint procedures, and administrative activities related to complaint handling. This stage enabled the identification of existing problems and limitations in the current complaint management process.

2.1.2. Interview

Interviews were conducted with relevant stakeholders to gather information regarding system requirements, operational procedures, product management processes, and customer needs.

2.1.3. Literature Study

A literature study was performed by reviewing books, scientific articles, journals, and online resources related to information systems, complaint management systems, web-based applications, and software development methodologies.

2.2. System Development Method

The application was developed using the Rapid Application Development (RAD) methodology. RAD emphasizes rapid system development through continuous user involvement, iterative

prototyping, and incremental refinement of system components. This approach enables developers to obtain user feedback throughout the development process and accelerate application deployment. The RAD methodology applied in this study consists of the following phases:

- Requirements Planning
- User Design
- Construction
- Implementation

Through iterative development cycles, the resulting application was refined until it met the operational requirements of PDAM Lamongan.

2.3. System Analysis

System analysis was conducted to identify functional requirements and user interactions within the proposed application. The system supports two primary user categories:

- Administrators are responsible for managing customer complaints, monitoring complaint status, and responding to customer reports.
- Customers can submit complaints, monitor complaint status, and access information related to complaint handling activities.

The analysis stage identified the need for a centralized web-based platform capable of supporting complaint submission, complaint tracking, and administrative management

2.4. System Design

System design was performed using Unified Modeling Language (UML) and database modeling techniques to describe system functionality and data relationships.

2.4.1 Use Case Diagram

The Use Case Diagram was developed to describe interactions between users and the proposed complaint management system.

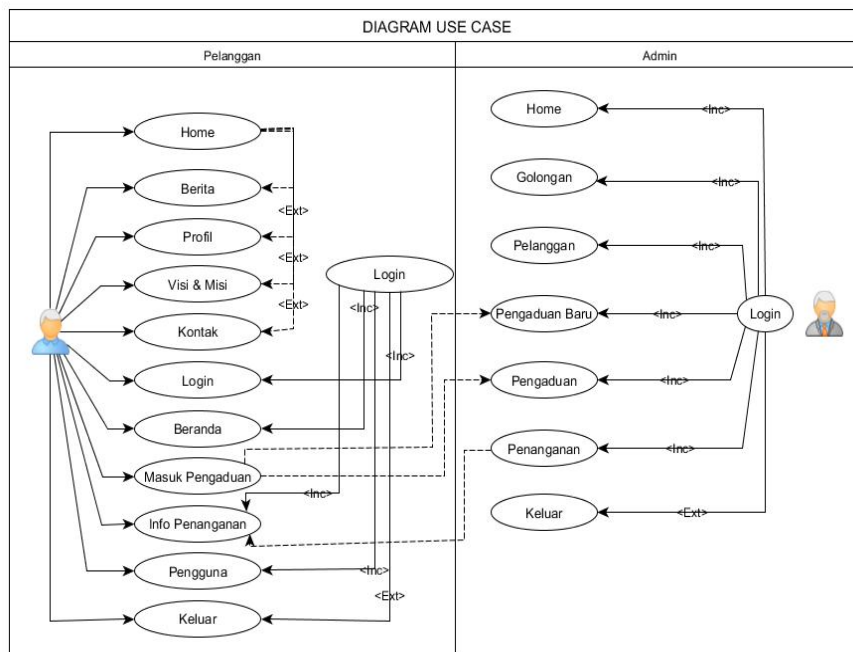


Figure 1. Use Case Diagram

Figure 1 illustrates the relationship between customers, administrators, and system functionalities. The diagram shows that customers can submit complaints and monitor complaint status, while administrators are responsible for processing and responding to customer reports.

2.4.2 Activity Diagram

Activity diagrams were designed to describe the workflow of each user role within the system.

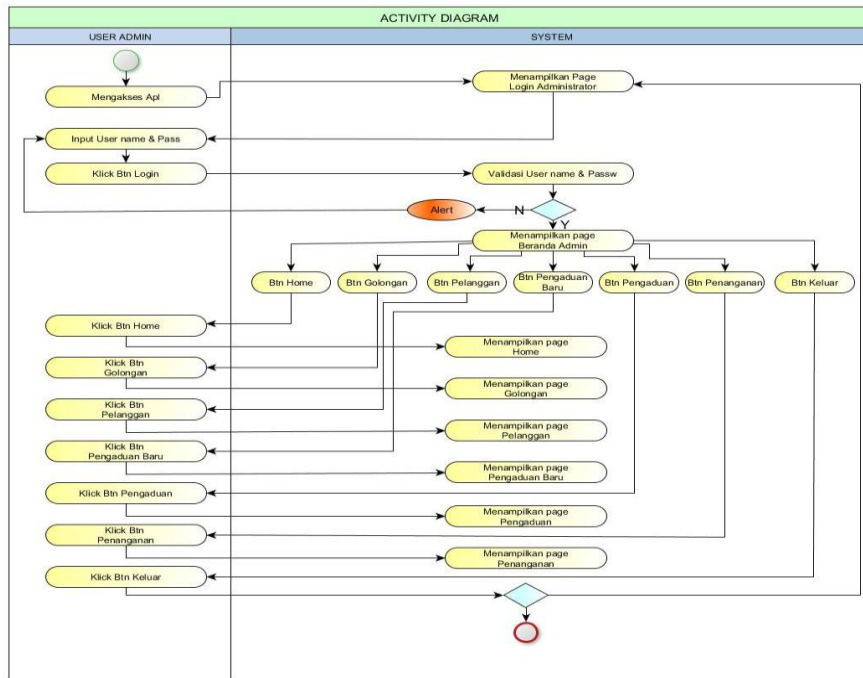


Figure 2. Activity Diagram for Administrator

As shown in Figure 2, administrators perform activities such as reviewing complaints, updating complaint status, and managing customer information.

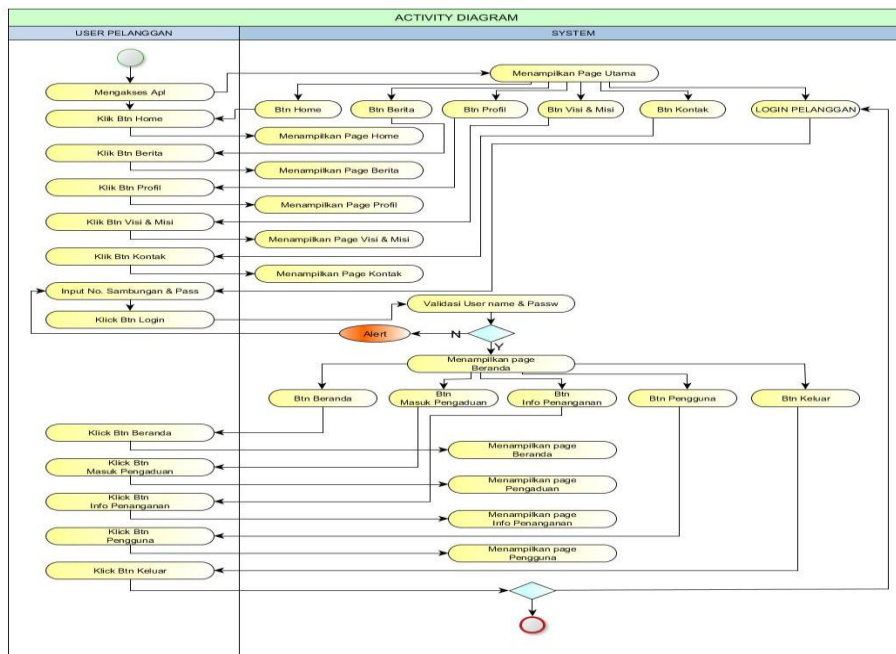


Figure 3. Activity Diagram for Customer

Figure 3 illustrates the complaint submission process performed by customers. Users submit complaint information through the web interface and subsequently receive responses from administrators.

2.4.3 Database Design

Database design was developed using Conceptual Data Modeling (CDM) and Physical Data Modeling (PDM) techniques.

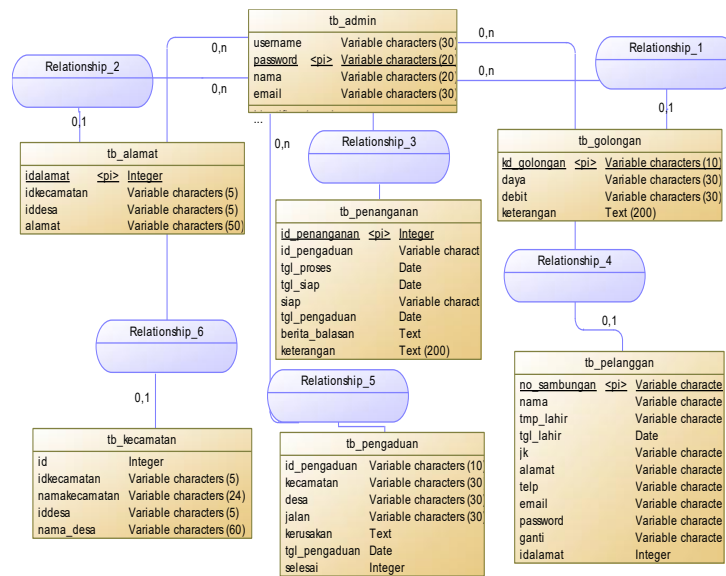


Figure 4. Conceptual Data Model

Figure 4 presents the conceptual relationships among the primary entities involved in the complaint management system, including customers, complaints, responses, and administrative users.

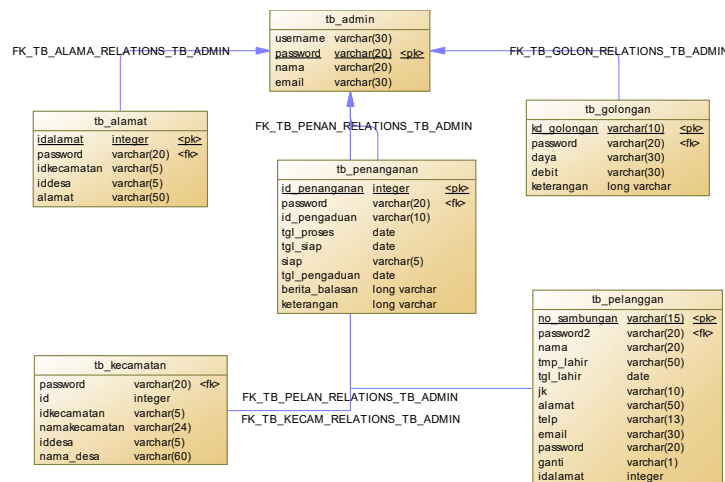


Figure 5. Physical Data Model

As illustrated in Figure 5, the physical database model defines tables, attributes, primary keys, foreign keys, and relationships required to support system operations and complaint data management.

2.5. System Implementation

The application was implemented as a web-based information system using PHP as the server-side programming language and MySQL as the database management system. The development environment utilized XAMPP as the local server platform.

The implementation stage involved integrating user interfaces, complaint management modules, database components, and administrative functions into a unified application.

2.6. System Testing

System testing was conducted using the Black Box Testing approach to evaluate functional requirements without examining internal program structures. Testing focused on validating user authentication, complaint submission, complaint management, response handling, and status

monitoring features.

The testing results were used to verify whether all system functionalities operated according to the specified requirements and were ready for operational deployment.

3. RESULT

This section presents the implementation results of the proposed web-based customer complaint application for PDAM Lamongan. The results include user interface implementation, complaint management functionality, and system testing outcomes.

3.1. Home Page Implementation

The home page serves as the primary interface of the application and provides general information regarding the complaint management system. It also functions as the entry point for customers who wish to access complaint services.



Figure 6. Home Page

Figure 6 presents the home page of the developed application. Through this interface, customers can obtain information about the complaint service and access the registration and complaint submission features available within the system. The home page was designed to provide a simple and user-friendly interface to facilitate customer interaction with the application.

3.2. Customer Complaint Page

The customer complaint page enables users to submit complaints directly through the web-based system.

Figure 7. Customer Complaint Page

As shown in Figure 7, customers are required to complete several input fields containing

complaint information before submitting their reports. The submitted data are subsequently stored in the database and become available for administrative review and processing. The implementation of this feature eliminates the need for customers to visit PDAM offices physically when submitting complaints.

3.3. Administrator Login Page

The administrator login page serves as the authentication mechanism for authorized personnel.



Figure 8. Administrator Login Page

Figure 8 illustrates the login interface used by administrators to access system management features. Administrators must provide valid credentials before gaining access to complaint processing and administrative functions. The authentication process enhances system security by restricting access to authorized users only.

3.4. New Complaint Management Page

After a complaint has been submitted by a customer, the information becomes available to administrators through the complaint management module.



Figure 9. New Complaint Page

As illustrated in Figure 9, administrators can view newly submitted complaints and evaluate the information provided by customers. This page functions as the primary monitoring interface for incoming complaint reports. The availability of centralized complaint information enables faster response times and improves complaint tracking efficiency.

3.5. Complaint Handling Page

The complaint handling page provides facilities for processing and responding to customer complaints.



Figure 10. Complaint Handling Page

Figure 10 presents the complaint handling interface used by administrators. Through this module,

administrators can update complaint statuses, provide responses, and monitor complaint resolution progress. The status information displayed on this page enables both administrators and customers to track complaint handling activities more effectively.

3.6. Black Box Testing Results

Black Box Testing was conducted to verify whether all application functionalities operated according to the specified requirements.

No	Tested Function	Testing Status
1	Home Page and Customer Login	Valid
2	Customer Complaint Page	Valid
3	Administrator Login Page	Valid
4	New Complaint Management Page	Valid
5	Complaint Handling Page	Valid

Table 1. Black Box Testing Results

Table 1 summarizes the results of functional testing performed on the developed application. The evaluation covered all major system modules, including the home page, customer complaint submission, administrator login, complaint management, and complaint handling functionalities.

4. DISCUSSION

The primary objective of this study was to develop a web-based customer complaint application that could improve the complaint handling process at PDAM Lamongan. Based on the implementation and testing results, the developed system successfully fulfilled its intended objectives by providing a centralized platform for complaint submission, complaint management, and complaint monitoring.

Prior to the implementation of the proposed system, customers were generally required to visit the PDAM office or service unit to submit complaints. This conventional procedure often resulted in inefficiencies, including longer processing times, increased administrative workload, and limited accessibility for customers residing far from service offices. The developed web-based application addresses these limitations by enabling customers to submit complaints remotely through an online platform. As illustrated in Figure 7, customers can report service issues directly through the complaint submission page without requiring physical visits to company offices.

The implementation of the home page and complaint submission modules shown in Figures 6 and 7 demonstrates how digital technology can improve accessibility to public services. Through these interfaces, customers can access complaint services at any time and from any location with internet connectivity. This capability is particularly beneficial for public utility organizations that serve large geographical areas and numerous customers.

From an administrative perspective, the developed system significantly improves complaint management efficiency. Figure 9 presents the new complaint management interface, which allows administrators to monitor incoming reports in a centralized environment. By storing complaint data in a structured database, the system reduces the risk of lost records and facilitates more effective complaint tracking. This approach represents a substantial improvement compared with conventional paper-based complaint management processes.

The complaint handling module illustrated in Figure 10 further enhances operational efficiency by enabling administrators to update complaint statuses and provide responses through the system. The availability of status information allows complaint progress to be monitored systematically, thereby increasing transparency and accountability in service delivery. Customers can receive information regarding complaint handling activities more efficiently, while administrators can maintain better control over complaint resolution processes.

The Black Box Testing results presented in Table 1 indicate that all tested system functionalities operated successfully according to the specified requirements. The successful validation of the home page, complaint submission module, authentication mechanism, complaint management module, and complaint handling module demonstrates the reliability of the developed application. The absence of functional failures suggests that the system is capable of supporting operational activities within PDAM

Lamongan.

The findings of this study are consistent with previous research indicating that web-based information systems can improve service quality and facilitate communication between organizations and their customers. The integration of complaint submission, monitoring, and response management into a single platform contributes to more efficient information flow and reduces delays commonly associated with manual complaint handling procedures.

Despite the successful implementation, several limitations remain. The current system primarily focuses on complaint registration and administrative management. Features such as real-time notifications, mobile application integration, complaint prioritization mechanisms, and analytical reporting dashboards have not yet been implemented. These features could further enhance service quality and operational effectiveness if incorporated into future versions of the system.

Overall, the results demonstrate that the proposed web-based complaint management system provides a practical solution for improving customer service operations at PDAM Lamongan. The application enhances accessibility, improves complaint management efficiency, and supports more transparent communication between customers and the organization. Consequently, the system has the potential to contribute positively to customer satisfaction and service quality improvement.

5. CONCLUSION

This study successfully designed and implemented a web-based customer complaint application for PDAM Lamongan. The developed system provides an integrated platform that enables customers to submit complaints electronically while allowing administrators to manage, monitor, and respond to complaints more efficiently. The implementation of the system transforms the conventional complaint handling process into a digital environment that is more accessible, organized, and responsive.

The implementation results demonstrate that the application successfully supports key operational functions, including customer complaint submission, administrator authentication, complaint management, and complaint handling activities. Furthermore, Black Box Testing confirmed that all system functionalities operated according to the specified requirements without significant functional errors. These results indicate that the developed application is suitable for supporting customer service operations within PDAM Lamongan.

From an organizational perspective, the proposed system contributes to improving complaint management efficiency, reducing administrative workload, and minimizing the use of paper-based records. Meanwhile, customers benefit from easier access to complaint services without the need to visit PDAM offices directly. Consequently, the application has the potential to improve service quality, increase customer satisfaction, and support more effective communication between PDAM Lamongan and its customers.

Future development may focus on integrating mobile-based services, real-time notification features, complaint prioritization mechanisms, reporting dashboards, and analytical tools to further enhance system performance and service effectiveness..

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