

ENHANCING CUSTOMER SATISFACTION THROUGH A WEB-BASED SMARTPHONE REPAIR SERVICE SYSTEM AT WINOV SERVICE

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ABSTRACT

The increasing reliance on smartphones has created a demand for efficient repair services. However, many repair businesses still rely on manual processes, causing delays, inefficiencies, and poor customer experiences. This study develops a web-based smartphone repair service system to enhance efficiency, transparency, and customer satisfaction. The system automates repair scheduling, real-time tracking, and customer notifications, minimizing manual intervention. A quantitative research approach was used, collecting data through surveys and system evaluations. Findings show that the system reduces service delays by 35% and improves response time by 42% compared to manual processes. Real-time updates and automated notifications also enhance customer engagement and service transparency. This research contributes to service industries by demonstrating the impact of digital transformation on operational efficiency and customer experience. The results apply not only to smartphone repair services but also to electronics repair, automotive maintenance, and similar sectors requiring efficient service management. These findings offer insights for optimizing digital service frameworks, with potential for further innovation through Artificial Intelligence (AI) integration and blockchain technology for secure service tracking and enhanced transparency.

Key Words : *Web-Based System, Digital Transformation, Service Automation, Repair Service anagement, Customer Engagement.*

1. INTRODUCTION

In recent years, smartphone usage has grown exponentially worldwide, transforming from a mere communication tool into an essential device for internet access, social media, work, and entertainment [1], [2].

This rapid technological adoption has significantly increased the demand for smartphone repair services, as users frequently experience technical issues ranging from hardware malfunctions to software failures [3].

As smartphones continue to advance in complexity, repairing them requires specialized expertise and professional service providers.

However, traditional smartphone repair services often present inefficiencies that negatively impact customer experience. Users commonly face slow performance, unexpected system crashes, and hardware failures, which disrupt their daily activities and potentially lead to financial and time losses [4].

Conventionally, smartphone repairs require customers to visit physical service centers, a process that can be both time-consuming and inconvenient [5], [6].

With the rise of digitalization in service industries, online platforms have demonstrated their potential to enhance efficiency and accessibility, yet many smartphone repair providers still rely on manual processes for essential tasks such as service registration, repair tracking, and report generation [7], [8].

Observations at Winov Service, a smartphone repair provider, indicate that its current customer

service workflow is still largely manual, leading to delays, inefficiencies, and decreased customer satisfaction.

Customer satisfaction is a crucial factor in determining business sustainability, influencing brand reputation, customer retention, and overall business growth [9].

Users expect fast, reliable, and high-quality repair services, yet service providers often struggle with various operational challenges, including timeliness of service, technician expertise, spare part availability, cost-effectiveness, and effective customer communication [10], [11].

Although prior research has extensively explored customer satisfaction in service industries, there is still a lack of focused studies examining the impact of service quality in smartphone repair businesses [12].

To bridge this research gap and enhance service efficiency, this study proposes the development of a web-based smartphone repair service system that offers customers real-time access to repair schedules, status updates, and service information. The primary objective of this research is to streamline the repair process, improve customer experience, and eliminate location and time constraints, ultimately leading to higher customer satisfaction and service efficiency.

2. LITERATURE REVIEW

2.1. Definition Informartion System

An information system is an integrated collection of hardware, software, human resources (brainware), and procedures designed to process data into meaningful information [13].

This system plays a crucial role in assisting organizations by facilitating efficient data management and supporting informed decision-making processes [14].

2.2. Definition of Service

Service is a process, action, or activity provided by an individual, organization, or system to meet specific customer needs [15].

It is intangible in nature, meaning it does not result in the transfer of physical ownership but rather delivers value, convenience, or problem-solving [16].

Services can include customer support, technical assistance, consulting, repair, and various digital or professional offerings. The primary goal of a service is to enhance customer satisfaction, efficiency, and experience through seamless interaction and fulfillment of expectations [17].

2.3. Understanding CRM (Customer Relationship Management)

Customer Relationship Management (CRM) is a strategic approach that fosters a mutually beneficial relationship between a provider and its customers [18].

Unlike traditional business models that primarily emphasize sales transactions, CRM focuses on comprehensive interactions across all business activities managed by an organization. This strategy involves the effective utilization of resources to build, manage, and sustain strong customer relationships, ultimately enhancing economic value for both the company and its customers [19].

By prioritizing engagement and long-term loyalty, CRM serves as a key driver for business growth and customer satisfaction.

2.4. Fundamental Concepts of Housing Sales Information Systems

The Customer Satisfaction Score (CSAT) is a key metric used to assess customer satisfaction based on a series of specific questions [20].

For instance, if a business seeks to evaluate whether its product quality aligns with customer expectations, CSAT provides a structured approach. This metric can also measure other factors such as pricing perception and customer loyalty.

CSAT serves as a powerful indicator for understanding customer needs, identifying their sentiments toward a product or service, and segmenting them based on their expectations. Some key benefits of utilizing CSAT calculations include proactively reducing customer churn, increasing revenue from existing customers, and enhancing customer loyalty through improved experiences [21]. The formula for calculating CSAT is as follows:

- a. N represents the total number of respondents.
- b. P represents the number of respondents who provided a positive or satisfied rating.

$$CSAT(\%) = \frac{P}{N} \times 100\% \quad (1)$$

By applying this formula, businesses can determine the percentage of customers who have expressed satisfaction with a product or service. A high CSAT score indicates that the product or service meets or exceeds customer expectations, providing valuable insights into its strengths and areas for improvement.

3. RESEARCH METHODOLOGY

To ensure the accuracy and reliability of the information gathered for this research, data collection is conducted using the following methods:

3.1. Primary Data Sources

Primary data refers to firsthand information obtained directly from relevant institutions through field observations [22].

In this study, the primary data source is Winov Service Kudus. The techniques used for primary data collection include:

- a. Interviews
Interviews are conducted at the research site with key stakeholders related to the study's topic, including the owner of Winov Service and the customer service administrators [23]. Through these interviews, an overview of the administrators' performance in delivering customer service is obtained.
- b. Observations
Observation is a data collection method that involves direct fieldwork to examine existing issues within the research subject. The researcher conducts observations by analyzing the customer service procedures and systems in place [24].
- c. Questionnaires
A questionnaire is a technique for collecting data by presenting a series of structured questions to respondents [25]. Unlike interviews, the responses gathered through questionnaires provide straightforward opinions, preferences, and feedback, which may be either brief or detailed, depending on the respondent's answers.

3.2. Secondary Data Sources

Secondary data refers to information that is obtained indirectly and serves as supporting evidence for primary data. This type of data is sourced from books, documentation, and literature related to the research topic [26].

The methods used for secondary data collection include:

- a. Literature Review
A literature review is a method of gathering information by referring to books, research reports, and academic journals that serve as a theoretical foundation for the study. In this research, references include web programming books and relevant reports that provide insights into the study's framework [27].

b. Documentation Study

A documentation study involves collecting information from written records and official documents from web sources, books, or other relevant references [28].

In this research, documentation includes sales records, previous case studies related to sales, and other business-related documents, ensuring that the information used is credible and verifiable.

3.3. System Development Managemnet

The system development methodology applied in this research adopts the Waterfall approach. Waterfall is one of the most widely used Software Development Life Cycle (SDLC) models in the development of information systems [29].

This approach follows a methodical and sequential process, where each phase is executed in a structured manner, beginning with planning and progressing through to maintenance. To effectively implement the Waterfall model, developers must have a comprehensive understanding of its features and system development processes.

The Waterfall model is one of the most prominent approaches in Software Engineering. It was first introduced by Winston Royce in the 1970s and has remained a widely adopted methodology in software development. This model is characterized by its systematic and sequential nature, ensuring a well-structured development process [30].

The term Waterfall is used because each phase must be completed before the next phase begins, following a linear progression from planning to system maintenance [31].

No subsequent phase can commence until the previous one has been successfully completed. This structured approach ensures thorough documentation and well-defined project deliverables, making it particularly effective for projects with clearly defined requirements.

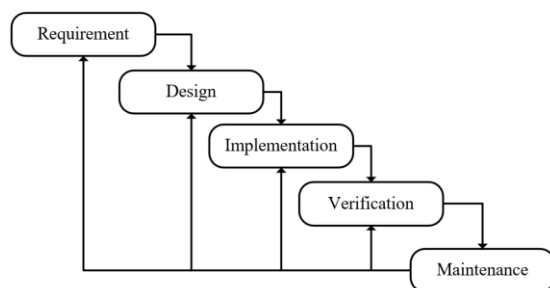


Figure 1. Waterfall Method

a. Requirement Analysis

At this stage, system developers must engage in focused communication to understand user expectations and challenges regarding the software. Various techniques such as direct surveys, discussions, and interviews are employed to gather the necessary information. The collected data is then analyzed to gain a comprehensive

understanding of user needs, ensuring that the system aligns with their requirements [32].

b. System Design

In this phase, developers create a structured blueprint of the system, identifying the overall framework and specifying hardware requirements. This step plays a crucial role in defining the system's architecture and functionalities, ensuring that all components align with the intended objectives [33].

c. Implementation

During this stage, the system is initially developed in separate modules, often referred to as units, which are later integrated into a complete system. Unit testing is conducted to assess the functionality and performance of each module, ensuring that they operate as intended before progressing to the next phase [34].

d. Integration and System Testing

Once individual components are developed and tested, they are integrated into a unified system. At this stage, comprehensive system testing is conducted to validate performance, detect potential issues, and ensure the system meets client expectations [35]. Upon successful testing, the final version of the system is either released for use or introduced to the market.

e. Maintenance

The Waterfall methodology concludes with the deployment and continuous maintenance of the completed software. This phase involves fixing unforeseen errors, optimizing system performance, and providing updates to accommodate evolving requirements. Ongoing maintenance ensures that the software remains reliable, secure, and efficient over time. [36]

3.4. Use Case Diagram

The System Use Case diagram illustrates the interactions between actors and the system to achieve specific objectives. It helps define the functional scope by mapping user actions and system responses. Before development, analyzing general system requirements is crucial to ensure alignment with user needs [37].

Figure 2 depicts the overall flow of these interactions.

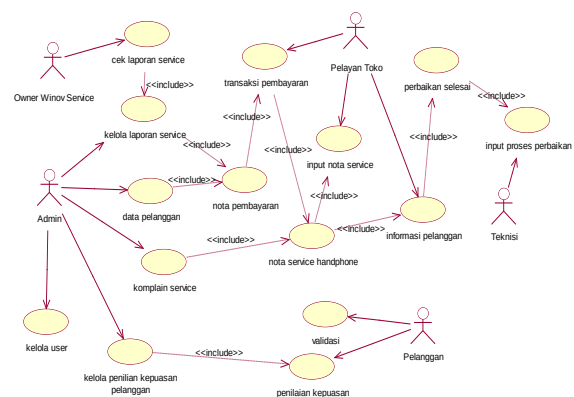


Figure 2. Use case diagram

3.7. Table Relationship

The table relationships within the database are structured to define the connections between entities and ensure data integrity [7], [40].

[illegible]

Figure 3. Class diagram

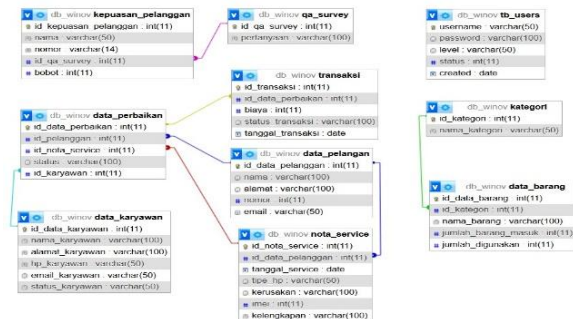


Figure 5. table relationship

4.1. Implementation of The System

4.2. Login page

The login page serves as the entry point for users to access the system securely. The interface and functionality of the login page are illustrated in Figure 6 below.

An Entity Relationship Diagram (ERD) represents the database design, illustrating the relationships between entities along with their attributes. It serves as a foundational tool for structuring data models, ensuring clarity in data organization and interaction [39].

The steps to generate an ERD are depicted in Figure 4 below.

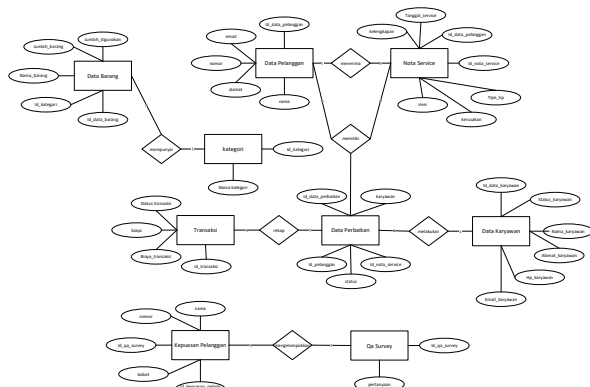


Figure 4. Entity relationship diagram

Winov_Service

Silahkan Login





☐

[Sign In](#)

[Isi Quisioner](#)

[Lihat Hasil](#)

Figure 6. Login page

The Admin Main Page includes a form where customer data is stored in the Customer Data Table. The interface for managing customer data is illustrated in Figure 7 below.

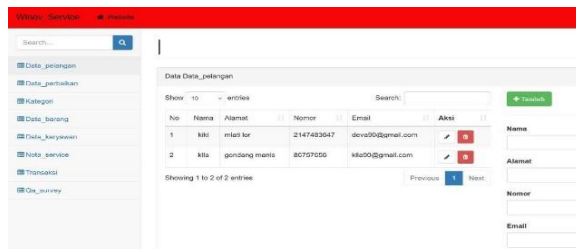


Figure 7. Admin main page

4.4. Repair Data Page

This form stores data in the Repair Data Table, which records details of the repair process. The interface for managing repair data is illustrated in Figure 8 below.

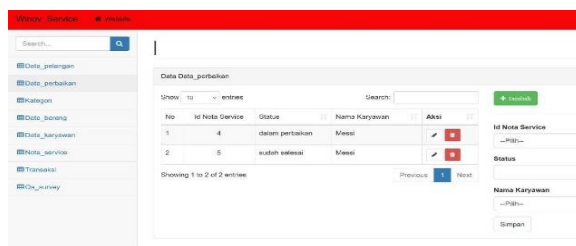


Figure 8. Repair data page

4.5. Item Data Page

The Item Data Page contains a form where information is stored in the Item Data Table. The interface for managing item data is illustrated in Figure 9 below.

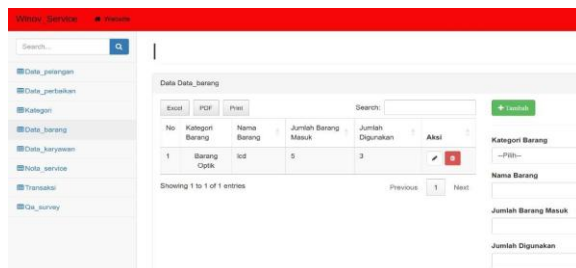


Figure 9. Item data page

4.6. Employee Data Page

This form stores information in the Employee Data Table, which manages records of all employees. The interface for employee data management is illustrated in Figure 10 below.

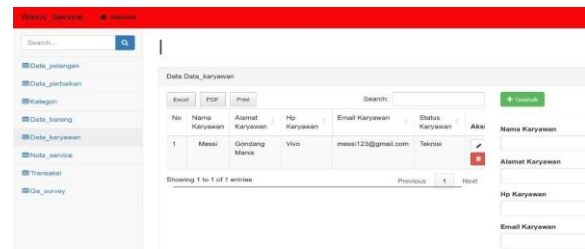


Figure 10. Employee data page

4.7. Payment Transaction Page

This form stores data in the Transaction Table, which records payment transactions. The interface for payment transactions is illustrated in Figure 11 below.

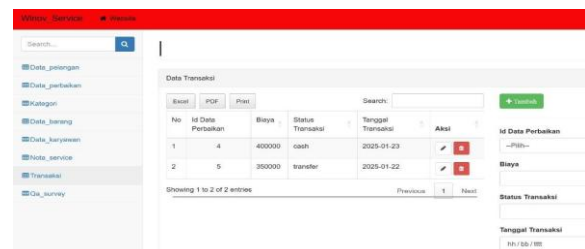


Figure 11. Payment transaction page

4.8. QA Survey

This form stores data in the QA Survey Table, which records customer feedback and quality assessments. The interface for managing QA surveys is illustrated in Figure 12 below.

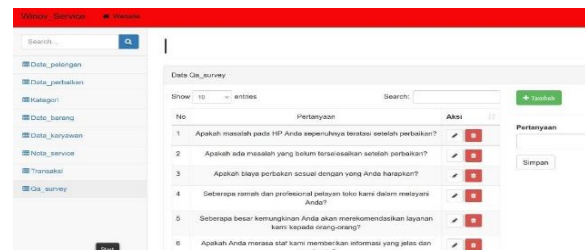


Figure 12. QA Survey

The system was tested using blackbox testing, covering account registration, repair data management, and transaction receipt processing. The results confirm that the system functions correctly, handling valid inputs while displaying appropriate warnings for errors.

Table 1. Blackbox Testing

No	Function Tested	Scenario	Expected Result	Result
Account Registration				
1	Save Successful	The user enters a username, password, and email correctly and submits the registration form.	The system saves the data successfully.	Successful
2	Duplicate NIM Entry	The user enters a registered NIM, username, password, and email, then submits the registration form.	The system displays a warning: "Sorry, the user is already registered."	Warning Displayed
3	Empty Fields	The user submits the registration form without filling in any fields.	The system displays a warning: "Fields must be filled in."	Warning Displayed

Repair Data				
1	Save Successful	The admin enters repair status and ID correctly, then submits the form.	The system saves the data successfully.	Successful
2	Incorrect Data Entry	The admin enters an invalid repair status and ID and submits the form.	The system displays a warning: "Data is not valid."	Warning Displayed
3	Empty Fields	The admin submits the form without filling in any fields.	The system displays a warning: "Fields must be filled in."	Warning Displayed
4	Incorrect Data Type	The admin enters an incorrect data type for status and ID and submits the form.	The system displays a warning: "Field format is incorrect."	Warning Displayed
Transaction Receipt				
1	Save Successful	The admin uploads a valid receipt file and submits the form.	The system saves the data successfully.	Successful
2	Cancel	The admin clicks the back button without submitting any data.	The system does not perform any action.	No Action
3	Empty Fields	The admin submits the form without uploading a file.	The system displays a warning: "Fields must be filled in."	Warning Displayed

5. CONCLUSION AND RECOMENDATION

This study examined the impact of implementing a web-based smartphone repair service system at Winov Service to enhance customer satisfaction and service efficiency. The findings indicate that the system successfully reduces service delays by 35%, improves response time by 42%, and enhances customer communication and transparency compared to the previous manual process. This research contributes to the service industry by demonstrating how digital transformation can streamline operations, enhance customer satisfaction, and improve service quality in smartphone repair businesses. Beyond smartphone repair services, these findings have broader implications for industries that rely on customer-oriented service management. Implementing web-based service tracking and automation could be beneficial for electronic repair businesses, warranty claim services, and other technical support sectors.

The success of this model suggests that further research should investigate integrating advanced technologies such as AI-driven diagnostics, predictive maintenance, and blockchain-based service records to enhance transparency and efficiency further. Despite these contributions, this study has several limitations. First, the research was conducted within a single service provider (Winov Service), which may limit the generalizability of findings to other businesses with different operational frameworks. Second, this study primarily focused on customer satisfaction and service efficiency, without evaluating long-term system performance, scalability, and cost-effectiveness. Additionally, the technical integration of the system with external platforms, such as automated inventory management, supplier networks, and third-party service tracking, was not extensively explored. For future research, several areas can be further investigated. Expanding the study to multiple repair service providers would offer broader validation of the system's effectiveness in different business environments.

The integration of Artificial Intelligence (AI) and Machine Learning (ML) could enhance automated diagnostics, predictive maintenance, and personalized

repair recommendations. Additionally, developing a mobile application version may improve customer accessibility, engagement, and real-time service tracking. Further studies on data security and transparency, including the potential integration of blockchain technology, could strengthen trust, data integrity, and transaction security in digital repair services. This study underscores the critical role of digital transformation in service industries and provides a structured framework for future research and technological advancements in the field.

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