

Design and Development of a Multi-Product, Multi-Branch Laundry Application with Tracking Features

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Abstract

Laundry businesses are a thriving type of MSME (Micro, Small, and Medium Enterprise). These businesses provide cleaning services for clothing and similar items, ranging from garments, carpets, and stuffed toys to bags, shoes, and curtains. Service costs and turnaround times vary based on the specific service requested and the items being cleaned; standard services follow a routine schedule, whereas express services are prioritized. Relying on manual record-keeping (logbooks) presents challenges for many laundry businesses, such as frequent calculation errors, time-consuming report generation, a lack of visibility for customers regarding their laundry status, and the need for cashiers to manually calculate totals and change. This research involved designing and developing an application to help businesses overcome these obstacles. The process encompassed requirements analysis, system design, programming, manual creation, and subsequent training and support. The final outcome enables more accurate and rapid transactions, allows customers to track processing status via the web, and facilitates faster, easier transaction report generation for managers.

Keywords : Laundry Application, Customer Tracking, Transaction Report, Web Based, Multi Branch

1. INTRODUCTION

Laundry businesses are currently mushrooming in Indonesia, with many MSME operators choosing this sector for their ventures. In many areas, laundry outlets are located just a few hundred meters apart. Consequently, maintaining customer satisfaction is crucial for laundry businesses to remain competitive. Beyond factors such as cleanliness, punctuality, and friendly service, customers also pay close attention to the accuracy and reliability of billing.[1]Micro, Small, and Medium Enterprises (MSMEs) play a vital role in Indonesia's economy, serving as pillars of economic growth and key providers of employment. However, many MSMEs continue to face operational challenges that hinder their growth and competitiveness, particularly regarding management efficiency and customer service quality. One MSME sector experiencing rapid growth is laundry services; these businesses involve complex operational processes, ranging from transaction recording, order management, and laundry status tracking to financial reporting. [2]

Common issues faced by laundry MSMEs include error-prone manual record-keeping systems, difficulties in monitoring laundry status in real-time, and limitations in providing clear service information to customers (Mansyur et al., 2024; Adetya, 2024). Manual record-keeping not only leads to time inefficiencies but also carries the risk of data errors, the loss of transaction information, and difficulties in compiling accurate financial reports [3] [4]. These factors directly impact service quality and customer satisfaction, ultimately affecting business sustainability.

Digitalization through the implementation of technology-based information systems has proven effective in enhancing operational efficiency and service quality across various MSME sectors. Studies indicate that implementing web- or mobile-based information systems in laundry businesses can improve data recording accuracy, accelerate transaction processes, facilitate operational monitoring, and boost customer satisfaction through features such as order tracking and automated notifications [5] [6] [7]. Integrated information systems also assist business owners in making data-driven decisions through real-time reporting [8] [9] .

Operational efficiency is also key to the competitiveness and profitability of small-scale service businesses [10] [11]. Inefficiencies in order management and financial processes can lead to a number of critical issues [12]. Enabling technologies—such as barcodes or QR codes for order tracking and the integration of digital payments—are also increasingly being adopted to enhance service speed and convenience. (Dwi Nurul Huda & Muhammad Syafi'i, 2022). One major challenge lies in the management of transaction and inventory data. Manual record-keeping for orders, cost calculations, and laundry status tracking—often done via logbooks or simple spreadsheets—is highly susceptible to human error. Input errors can lead to calculation discrepancies, handover mistakes, and even the loss or mix-up of customer garments, ultimately damaging customer satisfaction and the business's reputation. Furthermore, tracking raw material inventory—such as detergents, fabric softeners, and packaging—becomes inaccurate, resulting in overstocking or stockouts that disrupt operations.

A second issue centers on time efficiency and operational processes. Manual recording consumes valuable time, particularly during peak hours, creating long queues and reducing employee productivity. The lack of an integrated system also makes it difficult for business owners to monitor business performance in real-time. They struggle to obtain prompt, accurate financial reports or analyze customer trend data—such as the most popular services or peak operating hours—to inform strategic decisions. This lack of visibility hinders efforts to optimize pricing, manage staff schedules, or plan effective promotions.

Two key features targeted for the application are multi-product and multi-branch capabilities. The multi-product feature encompasses the various service offerings available to customers, serving as a crucial factor in attracting both individual and corporate clients. The multi-branch feature allows the laundry company to open numerous branches while using a single application to manage transactions across all locations, thereby ensuring consistency in service and product offerings.

Furthermore, the tracking feature is highly valued by customers, as it allows them to view the status of their laundry. This builds customer trust, demonstrating that the laundry service processes the items systematically. Therefore, an integrated, computer-based application solution is required. This application must be capable of automating transaction recording, digitally managing customer data and inventory, and providing comprehensive analytical reports. Additionally, laundry tracking is a feature desired by customers. The implementation of this technology is expected to be key to overcoming existing operational inefficiencies, improving data accuracy, optimizing service times, and ultimately driving competitiveness and sustainable growth for the laundry business.

2. RESEARCH METHODOLOGY

a. Implementation Workflow

A laundry business involves providing garment cleaning services using washing machines, automatic dryers, specialized cleaning agents, and fabric softeners [14]. In the context of MSMEs, the quality of service offered extends beyond mere garment cleanliness to encompass service speed, the safety of items, and the customer experience throughout the transaction process [15].

This research aims to address service-related issues in laundry businesses by prioritizing effective and efficient service and by providing a tracking feature that allows customers to monitor the status of their laundry.

The primary stages of the research follow the Waterfall SDLC (Software Development Life Cycle) model. This model was selected due to its established status and proven effectiveness in software development. The workflow is illustrated in Figure 1.



Figure 1. Research implementation workflow

b. Needs Analysis and Preliminary Observation

This stage aims to gain an in-depth understanding of laundry's business processes, issues, and specific requirements. The methods employed are:

1. Direct Observation: The team visited the business premises to observe the workflow, ranging from laundry intake, record-keeping, and the washing process to the final handover to the customer.
2. Interviews: Structured interviews were conducted with the owner/manager and employees (cashiers) as prospective end-users.
3. Document Analysis: Analysis of the formats of the logbooks, receipts, and simple financial reports currently in use.

The output of this stage is the Software Requirements Specification document, which serves as the primary reference for the design phase.

c. System Design

Based on the generated specification document, the system design is conducted, covering the following:

1. **System Architecture Design:** The system is designed as a web application installed on a primary computer (server) and accessible to users via the internet. This architecture was selected for its stability and ability to provide customers with tracking access.
2. **Database Design:** A database schema is designed using Entity-Relationship Diagram (ERD) notation and subsequently converted into relational tables. Key entities include: Customer, User (application user), Service, Transaction, Transaction_Detail, and Payment.
3. **User Interface (UI/UX) Design:** Mockups are created for each application interface, adhering to principles of simplicity and ease of use. User-centered design principles are applied to ensure that employees with limited technical proficiency can adapt quickly.

d. Application Development

The application implementation (coding) phase utilized the following technologies:

1. Programming Languages: HTML, PHP, JavaScript, CSS
2. Development Environment: Visual Studio Code
3. Database System: MySQL
4. Web Server: Apache

Development was carried out in a modular fashion, corresponding to three user roles:

1. **Cashier Module:** Features transaction capabilities including input validation, automatic calculations, and direct thermal receipt printing.
2. **Tracking Module (Guest Tracking):** A simple web page accessible via browsers on other devices; this page retrieves status data from the main application's database.
3. **Manager Module:** Includes master data screens and a reporting module capable of displaying daily or weekly data in the form of tables and simple charts.

e. Implementation and Installation

The fully developed application is installed on the prepared hosting environment. The installation stages include:

1. Checking the software installation, including the web server and DBMS (Database Management System).
2. Creating the database and populating it with initial master data (service types, prices, and admin/cashier user data).
3. Limited testing (alpha testing) within the internal team environment to ensure there are no critical bugs.
4. Comprehensive testing (beta testing) to verify all features, along with stress testing (simultaneous user logins).
5. Implementation: Using the application to support daily operations.

f. User Training

Intensive training is provided to the owner and employees. The training methods include:

1. **Live Demonstration:** The team demonstrates how to use each of the application's features.
2. **Hands-on Training:** Participants practice by simulating transactions, payments, and report generation under guidance.
3. **Preparation of a Quick Reference Guide:** An operational manual containing screenshots is distributed for independent reference.

g. Evaluation and Support

This stage aims to measure the success of the implementation and ensure continued usage. The lecturer team conducts periodic site visits to the laundry and provides support whenever difficulties arise in using the application.

Through this systematic and participatory approach, the application is expected to support laundry operations and enhance competitiveness by increasing customer satisfaction.

3. RESULTS AND DISCUSSION

This research was conducted by implementing the planned methodology. This chapter discusses the modules and features within the application, as well as the results of the program implementation.

a. System Modules

The developed application is named Pamulang Laundry. This web-based application has been successfully implemented with three main modules to meet user requirements. These three modules are to support four actors as depicted in the following picture.

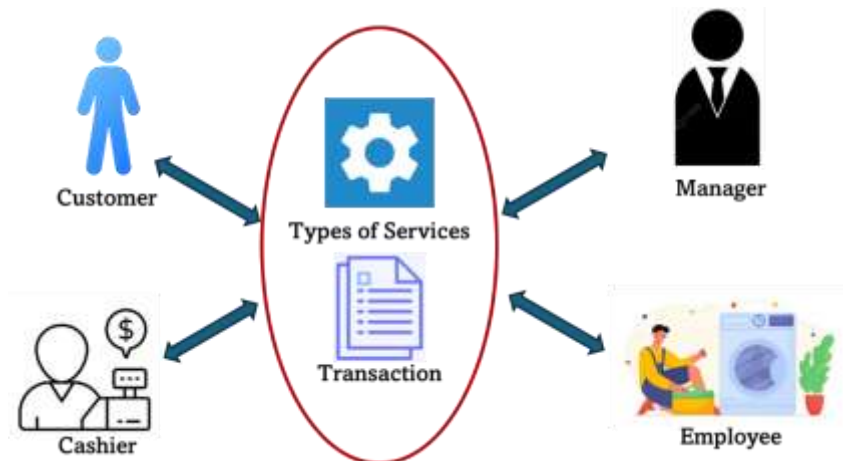


Figure 2. Four actors in the application

Steps in the application are as follow.

1. The owner defines the types of services offered.
2. A customer arrives.
3. The cashier records the transaction in the system, selecting the appropriate service type.
4. Laundry staff perform the work.
5. Upon completion, the status is updated.
6. The customer is notified that the laundry is ready and can then come to pick it up.

b. Cashier Module: Transaction Automation and Error Reduction

This module serves as the core of daily operations. Its primary feature is a transaction form integrated with the customer and service databases (Figure 3). When the cashier selects a customer and adds service items, the system automatically calculates the subtotal, any applicable discounts, and the final total. This feature eliminates manual calculation errors. Each transaction generates a unique transaction number that also serves as a tracking code for the customer. Order status can be updated in real-time via a dropdown menu with options such as "In Progress," "Completed," and "Picked Up." Payments can be recorded in real-time, and thermal receipts can be printed immediately in a professional format.

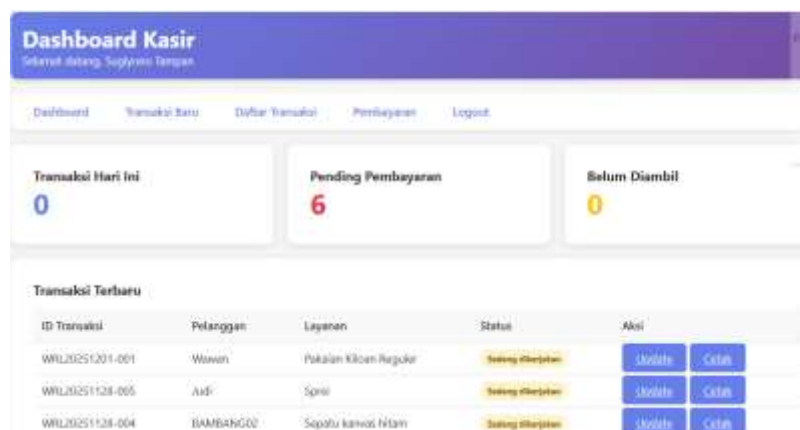


Figure 3. Cashier module interface

c. Guest Tracking Module: Enhancing Service Transparency

Customers access this module via the tracking webpage. The printed receipt displays a Transaction ID that must be entered into the designated field (Figure 4). Customers can view the laundry status, estimated completion date, and cost details. This feature has successfully reduced phone interruptions and direct inquiries to staff regarding laundry status, allowing employees to focus more on operational tasks.

Figure 4. Customer Tracking Feature via Transaction ID

d. Manager Module: Data-Driven Decision Making

This module provides full control over master data and analytics. Managers can:

1. Manage Master Data: Easily add, modify, or deactivate application user data, service types, and pricing.
2. Access Reports: Generate daily and weekly reports displaying key metrics such as Total Revenue, Transaction Volume, Best-Selling Services, and Average Transaction Value. Reports can be exported in PDF format for record-keeping (Figure 5).
3. Basic Analytics: Bar or pie charts visualize revenue comparisons by day or service composition, assisting owners in identifying trends.



Figure 5. A Sample of Daily Report

e. Impact of Implementation and Evaluation

1. Increased Operational Efficiency

Observations of transactions before and after implementation, combined with feedback from employees and the owner, indicate improved efficiency. Generally, they reported that transactions became easier and faster, report

generation became accurate and highly efficient, and customers were satisfied due to the ability to check status updates at any time.

2. Improved Customer Service Quality

Observations and informal interviews with five regular customers revealed that the tracking feature is perceived as a modern value-added service. "Now there is no need to call; I can simply check via my mobile phone," remarked one customer. This indicates an improved perception of service quality, reflecting a more professionally managed business.

f. Discussion

The results obtained align with previous research findings regarding the positive impact of digitalization on MSMEs [16]. Time efficiency gains were likely achieved through a user-centered design approach and intensive training that reduced the learning curve. The successful adoption demonstrates that the challenge of resistance to change can be overcome via a participatory approach, wherein partners are involved from the needs analysis phase and receive post-implementation support.

Overall, the implementation of the "Pamulang Laundry" SIM-Laundry system has successfully transformed laundry's business processes from paper-based to data-driven—a fundamental step in enhancing the business's competitiveness and scalability.

4. CONCLUSION

Based on the entire series of research activities, it can be concluded that the partner's needs have been effectively identified and addressed. Key issues facing the laundry business—specifically the inefficiencies of manual record-keeping, a lack of customer transparency, and difficulties in financial monitoring—have been successfully resolved through a technological solution: the "Pamulang Laundry" Management Information System (SIM-Laundry) application. This application, featuring three core modules (Cashier, Guest Tracking, and Manager), was developed according to specific requirements and is currently operational at the partner's site. The success of this initiative was underpinned by a participatory and sustainability-oriented methodology. An adaptive Research and Development approach—combined with partner involvement from the needs analysis stage, intensive training, and post-implementation support—proved crucial in overcoming resistance to change and ensuring the application's continued use. The project entailed not only the transfer of a software product but also the transfer of knowledge and capabilities to the partner.

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