

Development of a Web-Based Laundry Information System with Customer Self-Service Using the Rapid Application Development Method

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Article Information	ABSTRACT
Article History Received : October 29, 2025 Revised : November 10, 2025 Published : January 02, 2026	The development of information technology has encouraged various business sectors to digitize their service processes, including the laundry sector. However, Holly Jolly Laundry still uses a manual transaction recording system that has the potential to cause service delays, recording errors, and difficulties in managing customer data. This condition has an impact on low operational efficiency and decreased customer satisfaction levels. Based on these problems, this study aims to design and develop a web-based laundry transaction information system equipped with a self-service feature that allows customers to place orders independently while reducing the potential for recording errors by the admin. The system development method used is Rapid Application Development (RAD), which emphasizes the speed of prototyping and active user involvement in every stage of development, including requirements planning, user design, construction, and cutover. The results show that the developed system is able to accelerate the ordering process, improve the accuracy of transaction recording, and facilitate the admin in managing service data in a more structured and efficient manner. In addition, the self-service feature allows customers to input data directly, thereby reducing the admin's workload and minimizing input errors. Thus, the resulting information system is proven to improve operational efficiency, transaction data accuracy, and service quality at Holly Jolly Laundry.
Keywords: <i>Information Systems; Laundry; Rapid Application Development; Customer Self-Service; Web Application.</i>	

INTRODUCTION

Indonesia is one of the countries experiencing rapid information technology development. The development of new technologies and innovations is heavily influenced by human influence. In today's modern society, both individually and collectively, the use of technology has provided numerous benefits, particularly in simplifying daily tasks, such as faster data processing, which makes work more efficient in terms of both energy and time. However, despite this rapid technological advancement, there are still businesses in Indonesia that have not yet utilized information technology as a tool to optimize their transactions, including laundry businesses (Mulyani et al., 2022). A laundry business is defined as a business that offers laundry services using automatic washing machines and dryers, along with special cleaning fluids and fragrances (Mansyur et al., 2024). These businesses are common in cities, especially large ones, where

boarding house and rental tenants don't have the time or ability to wash and iron their own clothes due to their busy schedules as students or employees (Paiso & Yunianto, 2022).

This study uses Holly Jolly Laundry, located in Surabaya, as its research object. The problem faced by Holly Jolly Laundry is that it currently still uses manual recording in its operational activities. Transactions are recorded in books, laundry status is monitored directly, and sales reports are compiled manually and fully operated by the sales admin. This causes various problems such as frequent recording errors such as data duplication, the risk of forgetting and losing archives, delays in information retrieval, inaccurate reports, and transaction queues that customers consider non-transparent. This condition clearly has an impact on this laundry business, resulting in decreased customer trust, decreased revenue, and customers switching to competitors (Chandra & Wirapraja, 2020).

Self-service technology is defined as technology that allows end users to produce and use services without the assistance of company employees. Self-service technology also means a technological machine that allows customers to receive services without the direct involvement of the service provider (Isman, 2023). This self-service can take the form of a touchscreen or a feature that allows customers to enter their own orders into a computer, then select their orders, and complete the payment process independently. Self-service technology also includes laundry services, online banking, hotel cabins, e-commerce, and others (Laureti et al., 2018) (Alwazni et al., 2020). In this research, the self-service laundry feature was developed as an effort to enable customers to directly input orders independently and ensure that the customer's orders and laundry orders are not mixed with other people's clothes (Maulida et al., 2024). Developing this information system with these features will also help business owners save time and minimize human error in their business management processes. With the rapid growth of the laundry business and the rapid advancement of technology, a laundry application management system is the perfect solution for increasing efficiency and effectiveness (Bhakti et al., 2023).

In this research, software development will utilize the Rapid Application Development (RAD) method. Previous similar research has shown that implementing a web-based laundry information system using the Rapid Application Development (RAD) method can improve operational effectiveness (Cahyo et al., 2025). The RAD method enables faster system development through iterative stages and direct user involvement. Case studies at several laundry businesses demonstrate that RAD-based systems can integrate transaction management, customer data, and financial reporting within a single platform.

This research stems from the research gap between the need for digitalized laundry services and the limitations of the manual systems in most small and medium-sized laundry businesses. Most previous research focuses on general web-based information systems without integrating self-service features that allow customers to place orders and input data independently. Furthermore, there is little research specifically applying the Rapid Application Development (RAD) method in the laundry business context to accelerate the system development process by actively involving users. Another gap is also seen in the aspect of evaluating the system's effectiveness in improving operational efficiency and reducing human error in the transaction process. Therefore, this research aims to fill this gap by designing and implementing a web-based laundry transaction information system integrated with self-service features and using the RAD approach to produce a system that is responsive to user needs and capable of significantly improving service quality.

Research Objectives

The research objective of this study is to design and develop a web-based laundry transaction information system equipped with self-service features for customers to facilitate the process of ordering services independently. This study also aims to reduce the potential for errors in recording transaction data caused by human error in the manual administration process, as well as increase the efficiency and speed of the ordering process through digitizing the transaction system. In addition, this study aims to make it easier for admins to manage service and transaction data in a more structured and real-time manner. In addition, this study also aims to analyse the effectiveness of the application of the Rapid Application Development (RAD) method in accelerating the

system development process and increasing user involvement during the system design and improvement process.

Research Contribution

The contribution of this research lies in the development of a web-based laundry transaction information system equipped with self-service features, which provides an innovative solution to operational problems in conventional laundry services. Practically, this system is able to improve service efficiency, speed up the ordering process, and reduce data recording errors due to human error. From a theoretical perspective, this research enriches the study of the application of the Rapid Application Development (RAD) method in information system development, especially in the small and medium service sector, by emphasizing the importance of user involvement in every stage of system design. Technologically, the results of this study show how the integration of web-based self-service features can improve customer independence and service quality, which can be used as an implementation model for other service businesses that are transforming towards service digitalization.

RESEARCH METHODS

This database application was developed using the Rapid Application Development (RAD) method, a software development approach that emphasizes accelerating the development process by breaking down projects into smaller, more manageable pieces (Priyatna et al., 2022). This method allows for iterative and collaborative development, actively involving users at every stage. The Rapid Application Development (RAD) method consists of four stages:

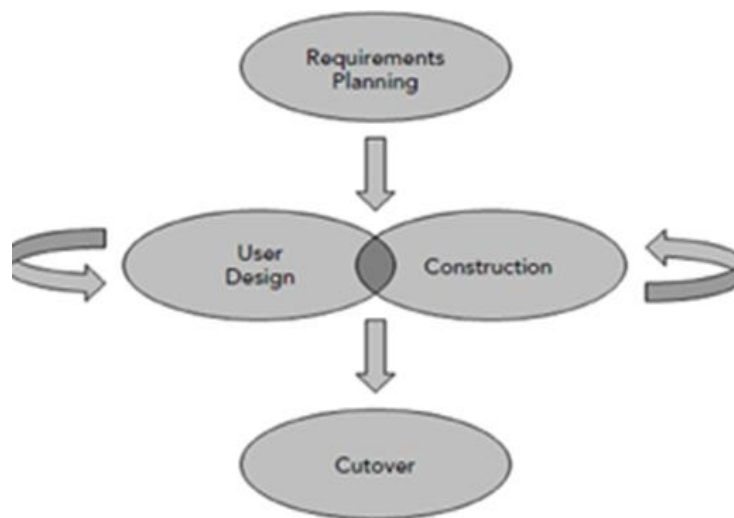


Figure 1. Application Development Stages in RAD (adapted from (Budiarti, 2022))

The explanation of the application development stages using the RAD method, as shown in Figure 1, according to reference (Budiarti, 2022), is as follows:

1. **Requirements Planning:** This initial stage includes the process of gathering and analyzing system requirements with the business owner and users. The goal is to formulate the requirements and scope of the system to be developed to meet business needs (Kusuma, 2023).
2. **User Design:** In this stage, the system is designed by developing several models, namely the Data Flow Diagram (DFD), Entity Relationship Diagram (ERD), Conceptual Data Model (CDM), and Physical Data Model (PDM).
3. **Construction:** After the system design process in the User Design stage is completed and the initial prototype is agreed upon with the users, the next stage is Construction. In this phase, the system is built in stages based on the design (Fatmala & Azizah, 2023). The developers used the Bootstrap framework to build a responsive, engaging, and user-friendly interface for the Holly Jolly Laundry system. Furthermore, the developers implemented several key system

modules using PHP, including user login, laundry service data management, transaction recording, and customer self-service features. All of these functions are integrated with a MySQL database, enabling real-time data exchange and improving Holly Jolly Laundry's overall operational efficiency.

The development process is carried out iteratively, involving users so that all input can be immediately accommodated (Budiarti, 2022). Next, the system is tested using blackbox testing methods to ensure that each function operates according to the specified requirements. System testing is conducted using the Blackbox Testing method with the aim of ensuring that all functions in the system run according to user needs without directly examining the program code. Testing is focused on the output generated by the system based on input provided by the user. In the testing process of the information system at Holly Jolly Laundry, there are four categories of users involved, namely the Owner (Admin) who is responsible for managing transaction data, users, and system reports, Four employees who use the system to record and process customer transactions and Three users (customers) who act as test samples for the self-service feature in the system. Each user category is tested according to the access rights and functions available for their role.

4. Cutover: After the construction phase produces a system that has been built and has gone through the testing process, the next step is the cutover phase. In this phase, the completed system is implemented in an operational environment (Vahdat et al., 2020). Activities carried out include training users on how to use the system, data migration if necessary, and initial evaluation to ensure the system functions according to the established requirements.

RESULTS AND DISCUSSION

System Design

The initial stage in designing a web-based application for Holly Jolly laundry is system design, while in application design, system design is the process of designing architecture, components, workflows, and data interactions in an application before entering the implementation stage.

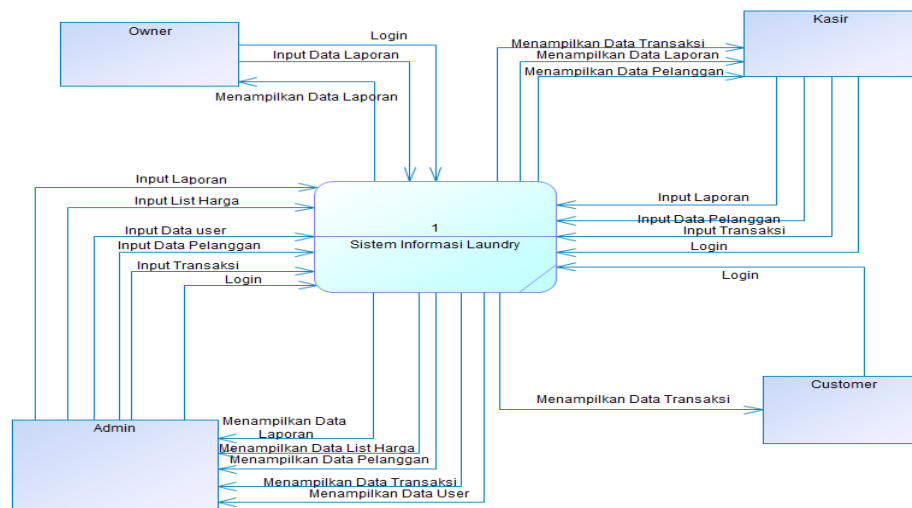


Figure 2. Data Flow Diagram

Figure 2 is a context diagram showing the data flow in the laundry information system being developed (Prabowo et al., 2021). This diagram illustrates the interactions between four entities within the system: the admin, cashier, owner, and customer. The admin acts as the primary controller, managing user and customer data, package lists, transactions, and reports. The cashier is responsible for recording transactions, inputting customer data, making payments, and accessing

cashier reports. The owner monitors transaction results and business revenue, while customers can obtain information on laundry status and payment receipts.

Conceptual Data Model

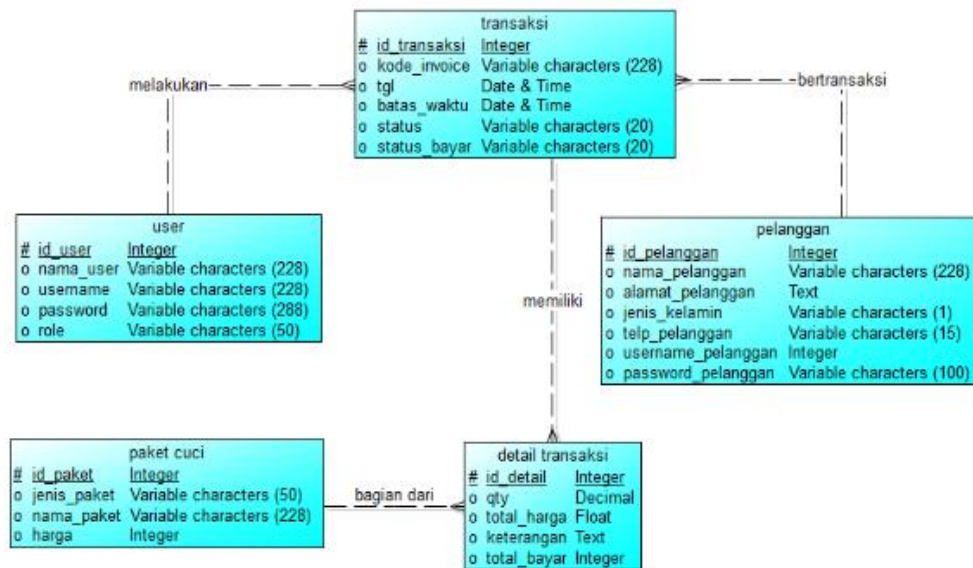


Figure 3. Conceptual Data Model

Conceptual Data Model (CDM) is a high-level representation of the data structure in a system that describes entities (objects), attributes, and relationships between entities without considering the technical details of the database to be used (Al-Fedaghi, 2021). In this study, the CDM Model as shown in Figure 3 describes the analysis of user needs that can be seen through database design, such as recording transaction data and its relationship with other tables such as transaction processes, user management, payments, and transaction reports.

Physical Data Model

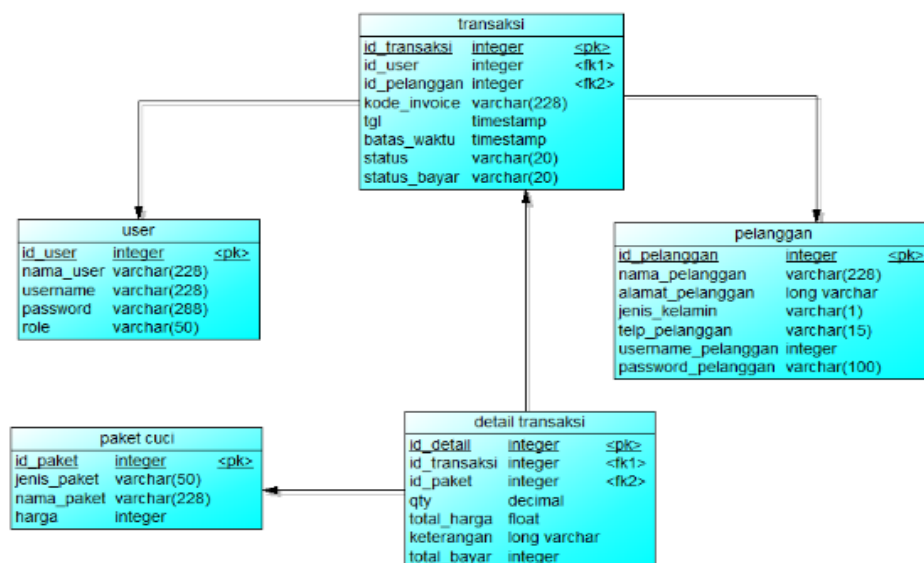


Figure 4. Physical Data Model

The Physical Data Model (PDM) is the final stage in database design, a generalization of the Conceptual Data Model. The PDM aims to provide details and an overview of how data will

be technically stored in the database (Wirapraja et al., 2024). Figure 4 above shows the physical data model, a detailed representation of the database design in physical form for the Holly Jolly Laundry information system.

System Implementation.

Dashboard Menu

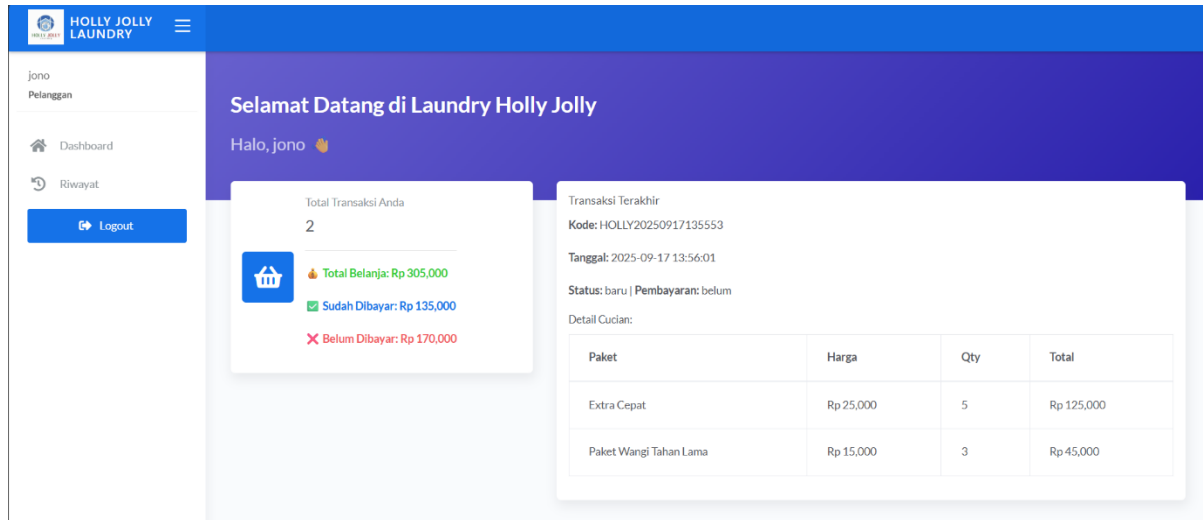


Figure 5. Information System Dashboard Menu at Holly Jolly Laundry

Figure 5 shows the dashboard menu used by customers to view information on laundry transactions that have been made. In previous research from (Christianto et al., 2020), it was stated that the Dashboard menu is an information system application model provided for managers to present information on the performance quality of a company or organizational institution. On this page there are several features such as total transactions, namely (1) the total number of laundry transactions that have been made, (2) total shopping which contains information on the total value of laundry costs, (3) Payment notifications which include the total transactions that have been paid and transactions that have not been paid. The benefit of this feature is to provide convenience, transparency, and efficiency in managing laundry information for customers, so that customers can know the status of laundry and transaction details clearly and in real-time.

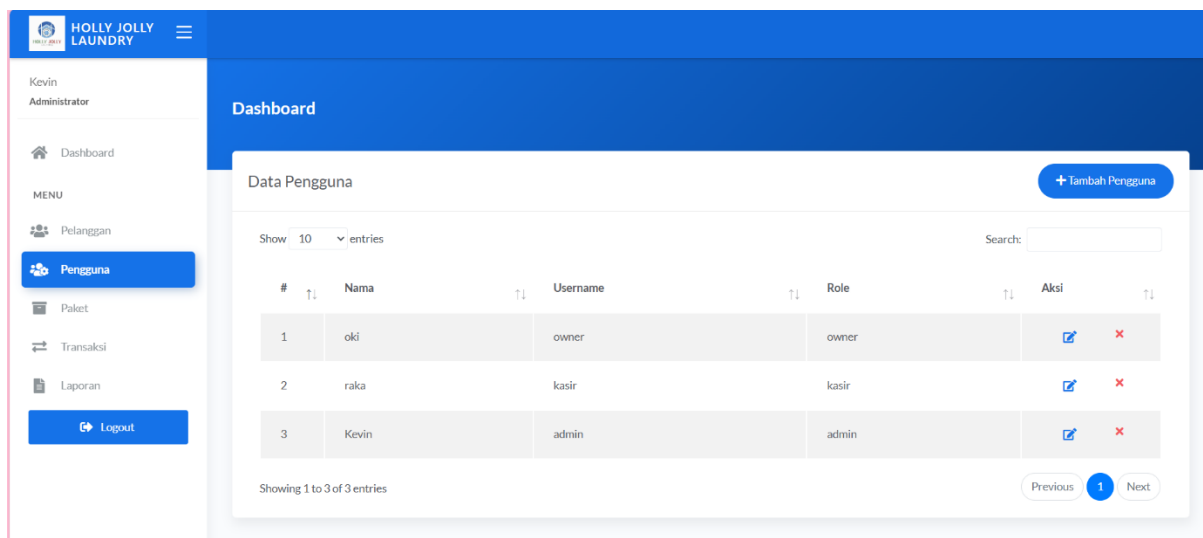


Figure 6. User Data Management Page

Figure 6 above displays the user data dashboard used by Laundry admins, which serves as a central account management platform. This view allows admins to merge, add, update, and deactivate accounts directly. Regarding security, the system also includes search and access control

features to maintain data security and prevent unauthorized use. This menu was designed based on previous research which stated that good data management will help improve operational efficiency and decision making based on data analysis (Dirgantara et al., 2023).

The screenshot shows the 'Tambah Transaksi' page. On the left is a sidebar with a menu: Dashboard, Pelanggan, Transaksi, Laporan, and a Logout button. The main content area has a breadcrumb trail: Forms > Transaksi > Tambah Transaksi. The form itself has the following elements:

- Kode Invoice:** A text field containing 'HOLLY20250929163041'.
- Pelanggan:** A text field containing 'Reza'.
- Pilih Paket & Jumlah:** A table with two rows:

Pilih Paket & Jumlah		
Paket Wangi Tahan Lama (Rp 10.000)	1	Hapus
Extra Cepat (Rp 25.000)	1	Hapus
- + Tambah Paket:** A blue button to add more packages.
- Total Harga:** A text field showing '35,000'.

Figure 7. Transaction Page

The Transaction page, as shown in Figure 7 above, serves as a display used by consumers when making laundry service orders. This page is also integrated with the cashier admin to record laundry transactions quickly and in a structured manner. On this page, the system automatically generates an Invoice Code, so that each transaction has a unique and easily trackable reference number. The Cashier Admin can select registered customers and determine the laundry service package and amount according to the customer's request. The system also provides an Add Package button to add more than one type of service in one transaction, as well as a Delete button to remove unnecessary packages.

The screenshot shows the 'Pembayaran' page. The breadcrumb trail is: Pembayaran > Transaksi > Konfirmasi Pembayaran > Pembayaran. The form contains the following fields:

- Kode Invoice:** 'HOLLY20250929160835'.
- Nama Pelanggan:** 'Reza'.
- Total Yang Harus Dibayarkan:** 'Rp 45,000'.
- Masukkan Jumlah Pembayaran:** A text field with '50000' and a dropdown arrow.
- Kembalian:** 'Rp 5,000'.

Figure 8. The Payment Page

The Payment page processes the transaction after the laundry service has been recorded. On this page, shown in Figure 8, a cashier can clearly see the invoice code, customer name, and total amount due, displayed automatically by the system. The cashier can then enter the amount paid by the customer, and the system will automatically calculate the change, reducing the possibility of manual calculation errors. The "Finish" button confirms the transaction and saves it

as a paid transaction, while the "Cancel" button cancels the payment process if an input error or decision is made. This page supports a faster, more accurate, and more transparent payment process, while simultaneously improving cashier efficiency and customer satisfaction.



HOLLY JOLLY LAUNDRY

Kode Invoice: HOLLY202509292133243

Pelanggan: Dhenny

No. Telp: 08123456789

Tanggal Transaksi: 2025-09-29 13:32:53

Paket	Harga	Qty	Total
Paket Wangi Tahan Lama	Rp 10.000	5	Rp 50.000
Extra Cepat	Rp.25.000	2	Rp 50.000
Grand Total			Rp 100.000

Terima kasih sudah menggunakan layanan HOLLY JOLLY

Silakan ambil laundry sesuai tanggal yang ditentukan.

Cetak

Figure 9. Preview of Transaction Note Print Results

The Transaction Receipt Print Preview page, as shown in Figure 9, displays a complete summary of the laundry transaction before printing. This invoice clearly displays important information such as the invoice code, customer name, contact information, and transaction date to ensure identity and transaction details can be verified. The transaction table displays a list of service packages, unit price, quantity, and total cost per package, allowing customers to transparently view the calculation of the fees charged. Finally, the system displays the Grand Total, which helps customers and cashiers ensure the correct payment amount. Additionally, QR codes serve as digital transaction identifiers to facilitate data retrieval or verification, if necessary. A "Print" button allows cashiers to immediately print receipts as valid proof of transactions. This preview makes the printing process more accurate, controlled, and professional, while also increasing customer trust in the service. Research from (Riady et al., 2022) also states that QR code utilization has become a trending alternative digital payment method.

System Testing Result

System testing was conducted using the Blackbox Testing method to ensure all core functions operate according to user requirements (Paiso & Yunianto, 2022). This method assesses system performance based on the output generated without viewing the program code, making it effective in testing the validity of functions from a user perspective. Testing covered four user types: Admin, Owner, Cashier, and Customer. An example of the results of system function testing carried out on customer access rights is as follows:

Table 1. System Function Test Results For Customers

Tested Module	Testing Procedures	Input	Expected Output	Results
User Login	Enter Username & Password	Valid Username & Password	Users are directed to the customer dashboard.	Valid
User/Customer Dashboard	Access the Dashboard Page	User Transaction Data	Displays Summary of Last Transactions, Status, Total Fees	Valid
Transaction History	Access the Transaction History Menu	Click Invoice Details	Display Transaction List and Laundry Details	Valid
Check Payment Status	Access Transaction Details	Click Invoice	Payment Status Displayed (Paid/Unpaid)	Valid
Logout	Click the Logout Menu	-	User Exits System and Returns to Login Page	Valid

The test scenario and results shown in Table 1 above represent the results of testing user access rights, indicating that all functions have run as required. In the login module, users who are laundry service customers provide input in the form of a valid username and password to be directed to the customer dashboard page. On the dashboard page, users are able to display a summary of recent transactions along with the status and total cost accurately. Test results in the transaction history module show that the system can display a list of customer transactions as well as laundry details through the invoice detail feature. Meanwhile, in the payment status check module, the system displays payment status information correctly, whether it has been paid or not. The logout module is used to end the session and return the user to the login page. Thus, all test results in the user module can be declared valid and its functionality is running as desired by the user.

CONCLUSION

The design of a web-based transaction information system at Holly Jolly Laundry, incorporating consumer self-service features and QR code-enabled invoices, has successfully increased service process efficiency and transaction transparency. Through the self-service feature, customers can register for services, select laundry packages, and fill in their personal data independently without relying entirely on a cashier. This not only speeds up the service process but also reduces the potential for data input errors and reduces queues during peak operating hours.

Furthermore, the use of invoices integrated with QR codes simplifies transaction verification and tracking. The QR code serves as a digital identity for each transaction, allowing cashiers to quickly search for data within the system, and customers can access service status more conveniently. The implementation of this technology improves accountability, cost calculation accuracy, and customer trust in the service provided.

Overall, the designed information system has been able to support Holly Jolly Laundry's business processes in a more structured, transparent, and automated manner, while providing a more modern and responsive service experience to customer needs.

Practical Implications

The implementation of this web-based system can serve as a model for other small and medium-sized laundry businesses aiming to digitize their operations. It demonstrates that integrating self-service and QR-based transaction tracking can reduce human dependency, enhance operational efficiency, and increase customer satisfaction. Business owners can also use this system as a foundation for developing loyalty programs, dynamic pricing strategies, or online booking services. Additionally, the improved data accuracy and transaction logs can support better financial reporting and decision-making.

Future Research Directions

Future studies could explore the integration of this system with mobile applications or IoT-based smart washing machines to further enhance automation and real-time monitoring. Researchers might also investigate user experience (UX) optimization in self-service modules, data security and privacy concerns in QR-based systems, or scalability aspects when the number of users increases. Comparative studies between different development methodologies (e.g., RAD vs. Agile) could also be conducted to evaluate system performance, maintainability, and adaptability in various operational contexts.

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