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# Implementation and Training of a VBA for Service Information System using Waterfall Model: A Case Study of Laundry Hasanah

**Zulfahmi Noor[1], Lintang Puja Prameswarie[2], Siti Irma Fadilla[3], Sheila Carol Dorothy Kemur[4], Arif Mustakim[5], Nur Ainun Musvirah[6], Nurmasitya Kemalaintan[7], Fauziah[8]**
[1,2,3,4,5,6,7]Department of Logistics Engineering Technology, Politeknik Sinar Mas Berau Coal
[8]Department of Mechanical and Industrial Engineering, Universitas Negeri Makassar

Corresponding Author: zulfahmi@polteksimasberau.ac.id

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***Abstract:*** The advancement of information technology has driven the digitalization of the MSME sector; however, most businesses still rely on manual systems that are inefficient and prone to errors. This issue is also encountered by Laundry Hasanah MSME in Berau Regency in managing its service operations. Therefore, this study aims to develop and implement a service information system based on Visual Basic for Applications (VBA) to improve data processing efficiency and enhance service quality, which is expected to have a significant impact on the business sustainability of Laundry Hasanah. The development and design method employed in this study and community service activity is the Waterfall model, consisting of the stages of analysis, design, implementation, and testing. The implementation results indicate that the system is capable of accelerating the recording process, reducing errors, and improving service quality in a more effective and accurate manner. Based on the design and implementation of the VBA based laundry service information system, it can be concluded that the application was systematically designed and developed in accordance with the Waterfall model. Each stage, from requirements analysis to maintenance, was carried out sequentially and consistently, ensuring that the development process was structured, controlled, and capable of minimizing potential errors.



## INTRODUCTION

The rapid advancement of technology, particularly in information technology, has transformed the way individuals perform activities, including in service-based business sectors. Companies or enterprises engaged in service provision require well-established information systems, especially for operational data processing and financial management, to ensure that business activities are conducted effectively and efficiently. Therefore, every company or enterprise needs to enhance the development of its service operations to improve service quality and increase productivity (Leo et al., 2026).

The current global developments have brought significant impacts on daily life, where many individuals are engaged in various activities for career advancement. This busyness not only affects professional work but also extends to many other aspects of life, including maintaining clothing hygiene, which is one of the basic human needs. Simple activities such as washing and ironing clothes are often neglected due to demanding schedules and limited available time. As a result of this phenomenon, service-based businesses specializing in washing and ironing clothes, commonly known as laundry services, have emerged (Patasya & Meutia, 2026). Furthermore, based on a study conducted by Annisa Ilmi Suqni et al., (2026), laundry business operators are required to deliver optimal service quality by satisfying customers through fast response, accurate service, and efficient operations. Meanwhile, research by Rahman et al., (2026) indicates that many laundry businesses, particularly small and medium scale enterprises, still rely on manual administrative systems, recording transactions in notebooks and, in many cases, using loose sheets of paper to document service activities. In addition, a study by Soewandi et al., (2026) reveals that the use of manual administrative systems often leads to various challenges, such as service inefficiency, risk of data loss, recording errors (human error), and difficulties in managing financial reports.

Laundry Hasanah is a small and medium sized enterprise engaged in laundry and ironing services with a weight-based system, located on Jalan Diponegoro 1, Tanjung Redeb District, Berau Regency, East Kalimantan. Based on observations and brief interviews with the business owner, it was found that as the number of customers and transaction volumes increase, the manual administrative system that has been used begins to exhibit limitations. The processes of recording customer data, receiving garments, delivering completed laundry, and preparing financial reports require considerable time and are prone to errors or human error. In addition, the limitations of a manual system make it difficult for the business owner to monitor business development in real time, such as daily revenue, operational expenses, and customer transaction history. According to a study conducted by Alanuari & Harits, (2026), addressing the challenges faced by laundry business operators who still rely on manual systems can be achieved through optimization involving information technology and computerization. Computerization not only functions as a data storage tool but can also be utilized for fast, accurate, and integrated data processing (Herasmus & Suryadi, 2026). Furthermore, a study by Diasti et al., (2026) states that one form of implementing technology-based systems is through the development of desktop-based information systems specifically designed to meet operational needs and improve service quality in laundry businesses, thereby enhancing productivity. Meanwhile, research conducted by W Simbolon & M Putri, (2026) indicates that the developed system must be capable of handling various business processes, ranging from customer data management and transaction recording to the automated generation of financial reports.

Based on these issues, this research and community service activity aims to design and implement an application that can support laundry businesses in managing all administrative activities and business processes by utilizing Visual Basic for Applications (VBA) for generating reports from ongoing operational processes. According to a study conducted by Umagapi & Ambarita, (2026), VBA-based applications are designed with a user-friendly interface and features that comprehensively cover the operational needs of laundry businesses. Meanwhile, a study by Rishad & Bakhtiar, (2026) states that VBA applications are capable of encompassing features for customer data processing and management, transaction processing, and the generation of financial reports.

The method employed to design and develop an information technology system that aligns with user requirements and meets established quality standards is the Waterfall method. According to research conducted by Abdurahman & Thohir, (2026), the Waterfall method is a systematic software development approach aimed at producing applications or information systems that correspond to user needs. Meanwhile, a study by Ramadhan et al., (2026) states that, in practice, the Waterfall method is closely related to the concept of the System Development Life Cycle (SDLC), which is a structured framework representing and describing the main stages in information system development, from design to post-implementation maintenance. Furthermore, research conducted by Ginting et al., (2026) indicates that systems developed using the Waterfall method adopt a methodological approach within the SDLC framework. A study by Prayitno & Bryan Imbiri, (2026) also notes that the Waterfall method is one of the most widely used system development models among software engineers. In addition, Aditiya et al., (2026) state that the Waterfall model remains a commonly used software development model, characterized by a systematic and sequential approach (Armanto et al., 2026). It is referred to as the Waterfall model because each stage must be completed before proceeding to the next (Cahyani & Anisa, 2026). Moreover, Ariq Firdaus & Suharso, (2026) explain that the Waterfall model is a systematic development model that begins with the initial planning stage and continues through to the final stage of maintenance. Similarly, Natarajan & Pichai, (2024) describe the Waterfall method as a plan-driven process based on structured principles. Based on the study conducted by Thummadi & Lyytinen, (2020), the Waterfall method consists of five main stages: analysis, design, development, testing, and maintenance.

With the implementation of the developed information technology automation system, it is expected that Laundry Hasanah will be able to improve operational efficiency, reduce administrative errors, and provide better service to customers. Furthermore, this application is anticipated to serve as a reference for other businesses in adopting appropriate information systems that not only support operational continuity and business processes but also provide added value in industry competition, particularly in the laundry service sector. Thus, this study not only offers a practical solution for Laundry Hasanah but also contributes to the advancement of small and medium enterprises through the application of information technology.

## METHOD

This research and community service activity was conducted by considering an appropriate timeframe and location to obtain relevant data and support the achievement of the research objectives. The study was carried out at Laundry Hasanah, located at Jalan Diponegoro 1, Tanjung Redeb District, Berau Regency, East Kalimantan. This location was selected because it represents a highly demanded laundry service business with a strategic location. The research was conducted from January 5 to January 11, 2026, while data collection through interviews and questionnaire distribution was carried out during employees' break times to avoid disrupting service activities. The type of research employed is descriptive analysis, with qualitative data processing. Qualitative research is a method that produces descriptive outcomes in the form of explanations derived from written text, spoken words, or observable behaviors of individuals as the subjects of observation.

Furthermore, according to research conducted by Z Noor & Safitriani, (2026) qualitative research can be used to identify, describe, investigate, and explain the

characteristics of objects that cannot be measured quantitatively. Therefore, this study is expected to identify, describe, and explain information regarding the problems occurring within the business in a clear manner. The data sources in this study consist of primary and secondary data. The data collection technique employed includes interviews, in which the researcher applied a semi structured interview method aimed at discussing issues related to operational risks, allowing respondents to express their perspectives openly on the topic. The interviews were conducted through direct face to face interactions with the business owner and employees of Laundry Hasanah. These interviews were carried out to enrich the data obtained directly from the respondents and to ensure validation of the issues experienced by the business. The second data collection technique involved documentation and observation, which are quantitative data collection methods consisting of factual data and records stored in documented form to support the previously obtained information. The research flow is illustrated in Figure 1.

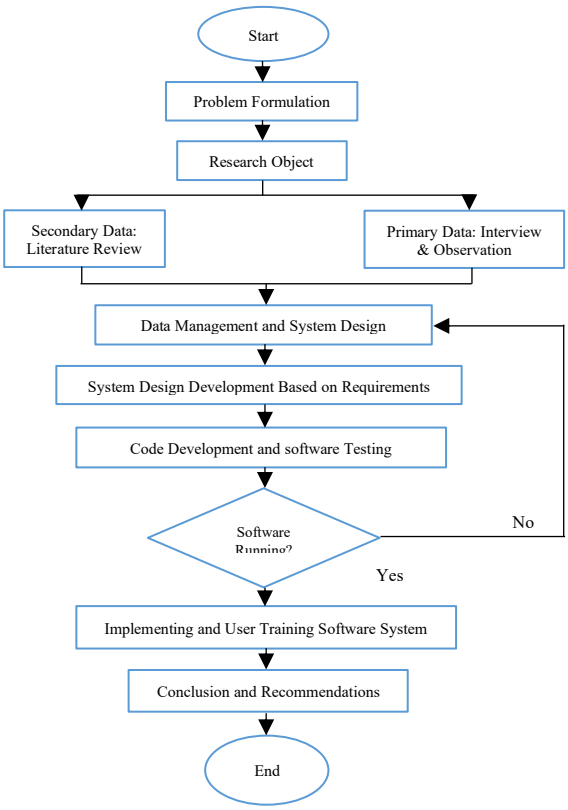



**Figure 1**. Reserch Flowchart

The conceptual framework developed in this study represents a systematic conceptual flow in the problem-solving process based on a scientific approach, initiated by the identification of problems or the initial conditions of the Laundry Hasanah service business process, which serves as the basis for formulating the study. The subsequent stage is strengthened by the integration of various relevant factors, including both empirical data and theoretical foundations, which function as the basis for constructing the analytical framework. In the next stage, the data and information obtained are compiled and processed through a structured and logical analysis, resulting in a more comprehensive understanding of the phenomenon under investigation. The following process involves the application of an effective method to develop an improved laundry service information

system, namely the Waterfall method, as illustrated in Figure 2. This stage includes evaluation or decision-making processes, in which testing is conducted to assess the conformity between the analysis results and the predetermined criteria or indicators. If the results do not meet the required standards, adjustments or reprocessing are carried out until optimal outcomes are achieved for implementation. The subsequent stage involves comprehensive system testing prior to implementation, followed by an evaluation stage using black-box testing. The final stage leads to the formulation of research outputs or findings that are objective and academically accountable, along with the successful implementation of a laundry service information system that is expected to enhance efficiency, reduce administrative errors, and provide improved service quality.

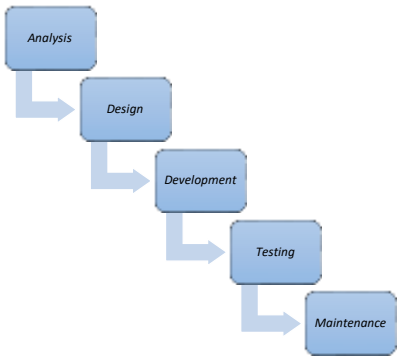



**Figure 2**. Stage of Waterfall Model

The first stage is analysis, which involves analyzing the system to solve problems by decomposing it into smaller components. The objective is to understand the performance of each component, the interactions among components, and how to improve the overall system performance (Mahardika et al., 2023). The second stage is design, which refers to the process of software design conducted prior to coding. This stage aims to provide a detailed description of system requirements and development, as well as to formulate the system architecture to be developed (Fachri & Rizal, 2024). The third stage is development, which involves the coding process of the software. At this stage, the system is divided into smaller modules that will later be integrated in the subsequent phase. In addition, each module is tested to ensure that its functionality meets the expected requirements (Ridwan & Fitri, 2021). The fourth stage is testing, which involves integrating all developed modules and conducting tests to ensure that the software conforms to the planned design and is free from errors (bugs) (Valerian et al., 2025). The final stage is maintenance, which refers to the process of maintaining the system after the software has been implemented and used by users, in order to ensure that the system continues to operate effectively and to perform improvements when necessary (Iswandi & M I A Siregar, 2026).

## RESULTS AND DISCUSSIONS

Laundry Hasanah Service is one of the micro, small, and medium enterprises (MSME) independently owned and managed by Fitri Suharni since early 2024. The business is strategically located in an area with high activity, surrounded by office centers and residential communities, at Jalan Diponegoro 1, Tanjung Redeb District, Berau Regency, East Kalimantan. Figure 3 illustrates the location map of Laundry Hasanah, which serves as the site for this research and community service activity.

**Figure 3.** Location Map of the Community Service

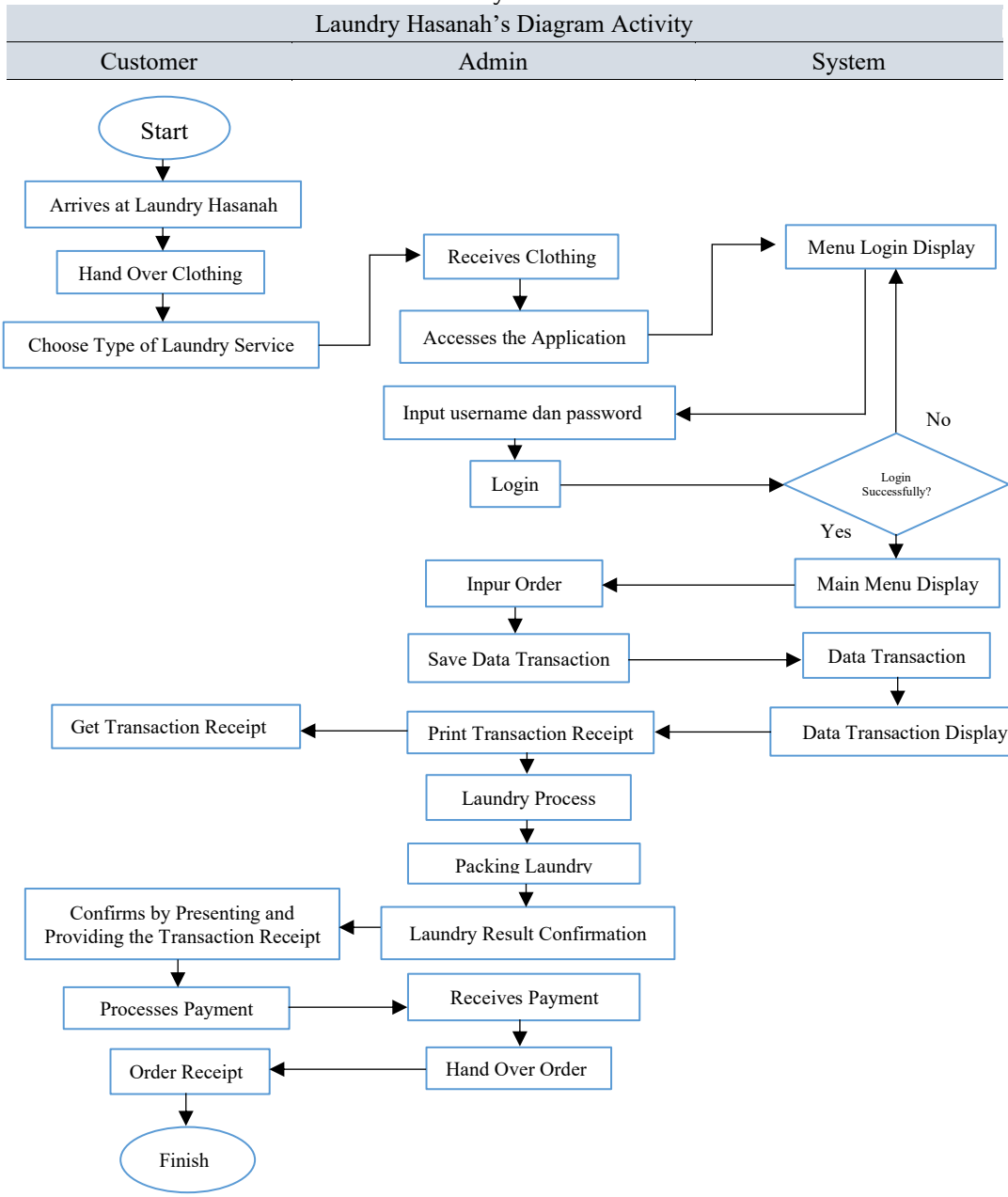
## Analysis

The establishment of Laundry Hasanah was driven by the increasing public demand for fast, practical, and affordable laundry services, in line with modern lifestyles that increasingly emphasize time efficiency. In response to this opportunity, the business was established to provide a solution in the form of accessible laundry services for various segments of the community while maintaining service quality. Laundry Hasanah offers a variety of services tailored to customer needs, ranging from regular daily packages to specialized services for large items such as pillowcases, various types of pillows and stuffed toys, as well as bedcovers. Based on interviews conducted with several randomly selected customers, it was found that the prices offered by Laundry Hasanah are relatively affordable. Many customers use the service on a weekly or even daily basis, making it highly competitive within the laundry service market. Furthermore, based on an interview with the business owner, it was stated that although the operational process is still conventional, it is designed to be efficient and supported by friendly customer service. To enhance efficiency and service quality, Laundry Hasanah provides a pickup and delivery service, referred to as the "Hasanah home pickup service." The business is directly managed by Ms. Fitri, assisted by three employees who handle daily operational activities, as well as one courier responsible for picking up and delivering customers' laundry. The types of services offered by Laundry Hasanah are presented in Figure 4.

**Figure 4**. Type of Laundry Hasanah Service

Following data collection and processing, the next stage in this research and community service activity is system design, utilizing VBA as the database platform and the Waterfall method to ensure the development and implementation of the system. The process begins with the analysis phase, which focuses on gathering user requirements and understanding the objectives of the system to be developed. This phase requires comprehensive execution to produce a design that aligns with user specifications. As stated by Z Noor et al., (2026), this phase is essential in addressing user needs and ensuring that the system is properly designed and implemented. This approach enables researchers to analyze, observe, evaluate, and understand the function of each component individually. The system workflow is presented in Table 1.

**Table 1**. System Architecture




The system flow presented in Table 1 illustrates the operational workflow of laundry service activities, designed to depict the sequence of activities and interactions among processes in a systematic manner. Based on the defined scheme, the laundry service process begins when the customer arrives at the laundry facility, hands over the clothing to be washed, and specifies the desired type of service. At this stage, an initial interaction occurs between the customer and the admin, where the admin receives the clothing and identifies the customer's requirements. The subsequent stage involves the admin accessing the laundry application system, which is used to manage all operational processes. The system then displays a login page as an access security measure, ensuring that only authorized users can operate the system. Subsequently, the admin enters a username and password as authentication credentials. The system performs a validation process on the entered data. If the provided credentials match the data stored in the database, the system grants access

to the main menu. Conversely, if a mismatch occurs, the system displays an error message prompting the admin to re-enter the correct login information.

After successfully logging into the system, the admin proceeds to the data processing stage by entering customer data, such as the customer's name, contact number, and other relevant information, as well as transaction data, including the type of service, quantity or weight of clothing, price, and transaction date. The system then stores this data in the database as part of the transaction recording process. Once the data has been successfully saved, the system displays the transaction details as confirmation that the data has been properly recorded. The next stage involves recording and generating the transaction receipt by the admin. This receipt serves as an official proof of transaction provided to the customer and is required for collecting the completed laundry. Subsequently, the admin performs the core operational process, namely washing the clothing in accordance with the selected service. After the washing process is completed, the clothing is dried, ironed (if included in the selected service package), and then packaged for delivery to the customer. The admin also confirms that the laundry process has been completed.

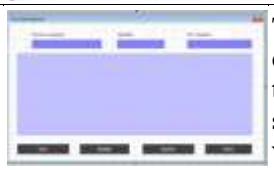
In the final stage, the customer returns to the laundry facility by presenting the transaction receipt to complete the payment. The admin then verifies the receipt, receives the payment in accordance with the total amount stated, and hands over the completed laundry to the customer. The service process is considered complete when the customer receives the clothing in a clean, neatly arranged condition, consistent with the selected service.

**Design**

The next stage in this research and community service activity involves the development of the use case diagram, which represents the general system design of the application. The design forms are presented in Table 2.

**Table 2**. Laundry Hasanah Express Form Design in the Visual Basic Editor

| Visual Desain | | |
|---|---|---|
| Name of Interface | Display | Description |
| Form Transaction |  | This form serves as the main interface of the Hasanah Laundry Express application, designed to support user interaction with the system through various components, including navigation menus, authentication fields (username and password), and functional buttons such as Transaction, Open Sheet, Report, and Status. Each element is implemented using an event-driven programming approach to execute processes such as login validation, opening worksheets in Microsoft Excel, and managing other operational functions. The interface design also adopts a combination of blue and orange colors to represent the business's visual identity (branding). |

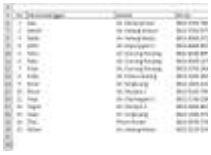
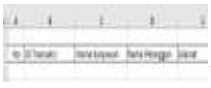
| Visual Desain | | |
|---|---|---|
| Name of Interface | Display | Description |
| Form Consumer |  | This form serves as an interface designed for inputting customer data, including name, address, and phone number, as part of recording customer identity for transactions in Hasanah Laundry Express. |
| Form Package |  | This form is specifically designed for the laundry owner as a tool for managing available service data, including adding new service types and modifying existing service options. It enables the management of service variations to be carried out systematically, in a structured manner, and in accordance with the operational needs of the laundry business. |
| Form Description |  | This form is displayed when the admin accesses the Item Status Data page and functions as an interface to support the tracking and updating of laundry item statuses in a systematic manner, thereby facilitating accurate and integrated management of information regarding the condition and processing stage of each laundry item within the system. |
| Form Employee |  | This form is specifically designed as an interface for managing employee data, including the addition of new employee records and the updating of existing employee information, thereby supporting structured, accurate, and integrated human resource management within the system. |
| Page Transaction |  | This page serves as an interface displaying the transaction menu, designed to facilitate the admin in managing customer transaction data, including recording, processing, and monitoring transactions in a systematic manner, thereby supporting data accuracy and operational efficiency in service management. |
| Page of Transaction Report |  | On this page, customer transaction data are stored in a structured manner within the system and can be accessed by the admin for management, tracking, and data evaluation purposes, thereby supporting organized record-keeping and facilitating access to information related to customer transaction activities. |
| Page of Item Data |  | In this section, the admin is granted access to display, review, and update the status data of laundry items, enabling the monitoring and control of each processing stage to be conducted systematically, accurately, and in an integrated manner within the system. |

The menu interface design of this application was developed using the Visual Basic Editor as the primary tool. Each menu or form is specifically designed to meet the system's functional requirements, including the placement of command buttons aligned with the user workflow. This interface design not only considers aesthetic aspects but also emphasizes ease of navigation and user efficiency. With this approach, users are expected to interact with the system intuitively and effectively, enabling operational processes to run smoothly and in a well organized manner.

In the Transaction Form section, there are several functional buttons, including Transaction, Open Sheet, Report, and Status. One of the most essential features is the Open Sheet function, which enables users to access the Microsoft Excel interface containing multiple worksheets that constitute the core structure and functionality of the application. Overall, there are nine interconnected worksheets, namely Laundry Packages,

Customers, Transactions, Search Transactions, Employees, Transaction Codes, Receipts, Status, and Search Status. Each worksheet has a specific role in supporting the application system. The worksheets are presented in Table 3.

**Table 3**. Worksheet for Hasanah Laundry Express System

| Worksheet Application Desain | | |
|---|---|---|
| Name of Worksheet | Display | Description |
| Transaction Report Page |  | This worksheet functions as a data storage medium containing information related to various available laundry service types, including service categories, pricing or rates, minimum weight requirements, and estimated completion time. The data stored in this worksheet serves as the primary reference for transaction input and service cost determination, thereby supporting consistency, accuracy, and efficiency in system operations. In addition, it includes a main option specifically designed to return to the Visual Basic Editor. |
| Page Consumen |  | This worksheet functions to record and store customer data in a systematic and structured manner, including information such as name, address, and phone number. This data collection plays an important role in supporting accurate customer identification, as well as serving as the basis for preparing service reports that are personalized and oriented toward individual customer needs. |
| Page Transaction |  | This worksheet functions as a medium for recording all customer laundry transaction activities in a systematic and integrated manner. Each transaction entry contains comprehensive information, including customer identification (ID and customer details), the responsible employee, the selected service type, the transaction date and time, and the total cost to be paid, thereby supporting data accuracy and facilitating monitoring and reporting processes. |
| Transaction Search |  | This worksheet functions as a search feature designed to retrieve previously recorded transaction data, enabling users to locate specific transaction information quickly and accurately based on the entered search criteria, thereby supporting efficiency in systematic data management and retrieval. |
| Employee |  | Records information regarding staff or employees involved in laundry service operations. This data includes names, positions, and contact information, which are useful for human resource management and task accountability. |
| Transaction Code |  | This worksheet functions as a generator or repository of unique transaction codes used as a single identifier for each transaction. These codes facilitate the tracking and organization of transaction data within the system. |
| Receipt |  | This worksheet generates a printable format for transaction receipts that are provided to customers. The receipt includes transaction details, the total payment amount, and customer identification information. |
| Status |  | Used to record and monitor the progress status of laundry service operations, such as “In Process,” “Completed,” “On Shelf,” and “Picked Up.” This information is essential for both internal management and customer service purposes. |
| Status Searcher |  | Provides a service status search feature that enables users, both customers and administrators, to quickly determine the current stage or status of a service based on a transaction code or customer name. |

**Development**

The next stage in the Waterfall method is the development phase, in which the coding process is carried out as a crucial part of the software development lifecycle. At this stage, the previously designed system is translated into a programming language to produce a system that meets the specified requirements. This process is conducted by dividing the system into smaller modules to facilitate development, management, and independent testing. Using the Visual Basic Editor, each module is implemented in accordance with the functional and technical specifications established during the design phase. Figure 5 illustrates an example of coding in the Transaction Form.

**Figure 5**. Coding User Form

The coding of the user form demonstrates that each form within the application is interconnected through an initialization procedure known as UserForm_Initialize. This procedure invokes several subroutines, such as *Retrieve Package*, *Retrieve Receipt*, and *Retrieve Customer*, which function to load data from other forms or external sources into the transaction form. In addition, the properties of MultiPage and ComboBox controls are dynamically configured to display specific data, such as user names and transaction statuses. This reflects a modular and structured form design, in which each component is not standalone but interconnected. The invocation of subroutines and the configuration of these controls strengthen the integration of the user interface and maintain functional consistency within the application system. Figure 6 presents an example of coding with a different structure.

**Figure 6**. Coding Private Sub

The scope of constants in Visual Basic is determined through the use of the keywords Public, Private, and Const. Constants declared with the Private keyword can only be accessed by all procedures within the module in which they are defined. Code in the form of a Private Sub, such as (*CBSUSER_Change)*, is used to handle changes in the value of a ComboBox element. This subroutine functions to provide an automatic response to user interaction; for example, when a user selects a specific name, the system automatically populates the corresponding password field with the predefined value. The coding structure in this application design is organized systematically to ensure optimal integration of each component. Although each form has distinct functions and elements, they are collectively interconnected through an integrated coding mechanism. Each form and its components not only operate independently but also support one another through subroutine calls, initialization procedures, and the application of event driven logic. This approach results in an application workflow that is efficient, well structured, and easily

scalable, while also facilitating system maintenance and ensuring consistency of data and functionality across all components of the application.

The next stage in this method is the testing phase, which is an essential stage in the software development lifecycle and serves as an evaluation mechanism to ensure the overall quality of the system. This process not only verifies the conformity of the software functions with the established specifications but also aims to identify potential weaknesses, logical errors, and technical defects that may affect system performance when used by end users. In general, software testing aims to ensure a high level of reliability, consistent operational stability, and the system's ability to deliver an optimal user experience. Therefore, testing plays a critical role in enhancing trust in the system, minimizing the risk of errors in the operational environment, and supporting the successful implementation of the software in real world applications.

**Testing**

The testing results of the Laundry Express application indicate that the system functions properly, with no errors or bugs identified. The implementation results of the application are presented in the form of interface displays of Hasanah Laundry Express. Main page as well as the login interface of the Hasanah Laundry Express application, which is developed using Microsoft Excel in a macro enabled workbook format to ensure ease of access. The interface is designed to facilitate user navigation and interaction in managing laundry services. The main menu consists of Home, Employees, Customers, Packages, Save, and Exit, arranged horizontally to enable quick and convenient access, accompanied by a welcome message and a promotional slogan to reinforce the service identity. Additionally, there are buttons for Transaction, Open Sheet, Report, and Status, which direct users to the main modules and support a systematic workflow from data recording to reporting. The login panel, located in the lower-left section, includes fields for username and password, indicating support for a multi-user system. Meanwhile, the right side displays promotional flyers and highlights key service advantages, such as fast processing, affordable pricing, free pickup and delivery, and clean and fragrant results, representing the core values of the service. Employees menu on the main page of the application, which presents employee data for Laundry Hasanah. In this menu, the admin has access rights to add, modify, and save employee data, which are then automatically stored in a worksheet in Microsoft Excel. Customers menu on the main page of the application, which functions to present and manage customer data, including name, address, and phone number. This form is designed as an input interface for entering customer data for those who will conduct transactions in Hasanah Laundry Express. Packages menu on the main page of the application, which presents information on the types of services available at Laundry Hasanah. This information includes the package name, minimum weight requirements, price per kilogram, and service details such as estimated processing time. This form is designed for use by the owner to add or update laundry service data. Transaction page of the application, which is designed to support customer data input, service package selection, and automatic, structured calculation of total transactions. On the left side, there is a customer data table displaying names and addresses, equipped with search and reset features to facilitate data retrieval. The central section of the interface contains the customer data form, including transaction ID, name, address, phone number, check-in date, and completion date. In addition, there is a package data section that includes service type, laundry weight, unit price, and total cost calculated automatically, along with a list box displaying transaction details. At the bottom, functional buttons such as New, Save, Delete, Update, Print, and Reset are provided to

support flexible transaction data management. Meanwhile, the right side displays a table of service packages complete with pricing and minimum weight requirements, along with an Add button to include selected services in the transaction. Processed transactions that have been systematically stored are documented on the transaction report page. In this section, the admin can access all transaction data by selecting the All Data button, allowing complete transaction information to be displayed along with the financial report summary. The final menu in the application is the Item Status Data page, which is used to monitor the status of laundry services. In this section, the admin can access all data related to items currently being processed and update their status according to the latest condition, such as "In Process," "Completed," or "Picked Up" by the customer. This feature supports real-time and structured monitoring and management of service processes.

After all transaction processes have been completed, the admin can save the data by pressing the Save navigation button on the main application page. Through this action, all transaction data are automatically stored in the worksheet and the Microsoft Excel file. Subsequently, once the application has been fully utilized, the admin can exit the system by selecting the Exit navigation button, which is also available on the main page.

**Maintenance**

The final stage in this study is the maintenance phase, which focuses on ensuring that the system continues to operate optimally, including bug fixing, performance enhancement, and adaptation to new requirements. At this stage, there is still a possibility that errors or bugs not detected during the previous testing phase may emerge. Therefore, the maintenance process may involve revisiting certain development stages, ranging from requirements analysis to functional adjustments, without the need to rebuild the entire system. To date, the implementation of the Hasanah Laundry Express application has not shown any errors or system disruptions. However, if issues are identified in the future, corrective actions will be required through the maintenance process, which includes problem identification, adjustments to program code or Excel formulas, and retesting to ensure that the system continues to operate optimally and supports operational activities effectively and efficiently. In addition, this phase also involves system testing to evaluate performance and the integration of application components. The method used is black box testing, which focuses on software functionality by comparing system outputs with expected results based on given inputs. The results of this testing are presented in Table 4.

**Table 4**. Result Black-Box Testing

| Function | Display | Result |
|---|---|---|
| | | Success / Not |
| **Main Page Application** | | |
| Display the Login Page | Displays the main application interface when the file is opened | Success |
| Navigates to the Employee Menu | The employee's button is accessible and displays the corresponding page | Success |

| Function | Display | Result |
|---|---|---|
| | | Success / Not |
| Navigates to the Customers Menu | The customer's button is accessible and displays the corresponding Page | Success |
| Navigates to the Packages Menu | The Packages Button Is Accessible and Displays the Corresponding Page | Success |
| Save Button | Saves processed transaction data | Success |
| **Main Page Application** | | |
| Exit Button | Closes the Application or Returns to the login page | Success |
| Home Button | Redirects to the Main Application Page | Success |
| Transaction Button | Navigates to the Transaction Form | Success |
| Open Sheet Button | Opens the Excel file to view the application worksheets | Success |
| Report Button | Navigates to the Transaction Report Page | Success |
| Status Button | Navigates to the item status page | Success |
| Login Form | Displays dropdown username and input password for authentication as an admin | Success |
| Errase Button (login) | Delete input username and password | Success |
| **Employee Menu** | | |
| Displays Employee Data | Shows all employee records | Success |
| Update Data | Edit dan updates employee data | Success |
| Save Data | Save and keep data karyawan | Success |
| Delete Data | Delete employee data | Success |
| Reset Data | Returns to the initial state | Success |
| **Consumer Menu** | | |
| Displays customer data | Shows all customer records | Success |
| Update Data | Modifies and Updates Customer Data | Success |
| Save Data | Save and keep consumer data | Success |
| Delete Data | Delete consumer data | Success |
| Reset Data | Returns to the initial state | Success |
| **Package Menu** | | |
| Display all types of services (paket) | Shows all types of laundry services | Success |
| Update Data | Modifies and updates package data | Success |
| Save Data | Save and keep package data | Success |
| Delete Data | Delete package data | Success |
| Reset Data | Returns to the initial state | Success |
| **Transaction Page** | | |
| Transaction Menu Page | Displays the transaction page | Success |
| Update Data | Edits and updates data | Success |
| Save Data | Saves processed transaction data | Success |
| Delete Data | Deletes transaction data | Success |

| Function | Display | Result |
|---|---|---|
| | | Success / Not |
| Reset Data | Resets to initial state | Success |
| New Data | Creates a new transaction | Success |
| Search Data | Searches transaction data | Success |
| Print Data | Prints transaction data | Success |
| Add Data | Adds new package data | Success |
| **Transaction Receipt Page** | | |
| Displays the transaction report page | Shows the transaction report interface | Success |
| Search Data | Searches transaction data | Success |
| **Status Page** | | |
| Displays the Item Status Page | Shows the item status interface | Success |
| Search Data | Searches item data | Success |
| Edit Data | Modifies and updates item status | Success |
| Update Data | Save updated item data | Success |

## CONCLUSIONS

Based on the results of the design and implementation of the VBA based laundry service information system using Microsoft Excel, it can be concluded that the application was successfully developed in a systematic manner by adhering to the stages of the Waterfall Model. Each phase of the method, including requirements analysis, system design, implementation, testing, and maintenance, was carried out sequentially, in a structured and consistent manner. This approach enabled the development and design processes to be conducted in a controlled manner while minimizing potential errors at each stage. The application of the Waterfall method provides a clear and well-organized framework, allowing each development stage to be completed comprehensively before proceeding to the next phase. This contributes to the creation of a system that aligns with user requirements, both in terms of functional and operational aspects. Therefore, the resulting information system not only meets the established specifications but also enhances efficiency and effectiveness in managing laundry service operations optimally. Documentation of the implementation and the research and community service activities for MSMEs is presented in Figure 7.

**Figure 7**. Documentation of Application Usage Training Activities as a Form of Community Service

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