



INVENTORY MANAGEMENT SYSTEM FOR PRODUCTION PROCESS IN RUANG GEBYOK

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Abstract

Jepara has been known as a carved city in foreign countries since hundreds of years ago. Woodcut furniture has been made in Jepara since Hindu, Islamic, and colonial times and is still made today. To maintain the tradition as a producer of Indonesian-style furniture, many Jepara residents choose to work traditionally by becoming craftsmen in the wood carving business. Ruang Gebyok has been in business since 2018 in Jepara, Central Java. Ruang Gebyok is engaged in the sale of furniture. This means records of stock data and transaction data are needed to create sales reports. However, the recording is still done manually in the book, so it can cause errors in stock data and financial calculations, even resulting in the loss of data. Custom goods transactions are made by customers via WhatsApp, so the owner needs a medium to convey customer orders. The advancement of the industrial revolution has forced automation on traditional business operations, especially in the furniture sector. So, the solution that can be proposed is a website-based inventory application for Ruang Gebyok to help with its management. The application is proposed in the form of a website because the owner often leaves the warehouse to install furniture. Waterfall is the design methodology used in this study. The stages of the waterfall method are analysis, design, coding, testing, implementation, and maintenance. The result is the application and the features in it needed by Ruang Gebyok, namely recording supplier data, raw material data, stock data for goods that are ready stock, purchase transactions for goods that are ready stock, purchase transactions for custom ordered goods, and combined sales reports of ready stock and custom foods that have previously been input as sold on the transaction page.

Keyword: *Information System, Waterfall, Inventory, Ruang Gebyok, Jepara.*

1. INTRODUCING

All companies in Indonesia are required to develop information technology (IT) to help their business processes. IT can generate, modify, store, and share information [1],[2]. This technology can help a company complete its work by issuing appropriate and valid reports, especially in terms of providing information [3]. Currently, the information system technology used is still traditional, namely with notes and files in hardcopy, but companies have to start the digitization phase so that all business procedures that occur are carried out using computers [4].

Until now, many companies have not used information systems in terms of recording their work. Inventory applications are needed for companies that carry out business processes in the form of selling goods so that they always deal with the amount of stock and financial records when fulfilling customer orders [5]. Inventory is a system that offers inventory report information in the form of transaction history of goods and stock of goods, thus allowing large amounts of data to be processed quickly, precisely, and efficiently [6]. It would be nice if this application could be accessed via the website so that it could be used anywhere. A website may also be thought of as a page that contains data, including text, a photograph, sound, and other information that can be viewed online [7]. Website-based applications allow users to access the application anywhere through a web browser, so they do not require high hardware specifications [8].

Many companies have sprung up, for example, in the furniture sector. This business sells wood-based goods [9]. Jepara has been known as a carving city in foreign countries for hundreds of years. Woodcut furniture has been made in Jepara since Hindu, Islamic, and Colonial times and is still made today [10]. To maintain the tradition as a producer of Indonesian-style furniture, many Jepara residents choose to work traditionally by becoming craftsmen in the wood carving business [11]. The advancement of the industrial revolution in manufacturing has forced automation on traditional business operations, especially in the furniture sector [12]. Ruang Gebyok has been in business since 2018 in Jepara, Central Java. Ruang Gebyok is engaged in the sale of furniture. This means records of stock data and transaction data are needed to create sales reports. However, the recording is still done manually in the book, so it can cause errors in stock



data and financial calculations, even resulting in the loss of data. Custom goods transactions are made by customers via WhatsApp, so the owner needs a medium to convey customer orders. The solution that can be proposed is a website-based inventory application for Ruang Gebyok to help with its management.

Waterfall is a design methodology used in this study. This method of development has a systematic sequence [13]. Waterfall is also defined as a method of designing information systems in a structured manner, commonly referred to as the classic life cycle [14]. The stages of the waterfall method are analysis, design, coding, testing, implementation, and maintenance [15].

2. RESEARCH METHODS

In the search and collection of data and information needed for this research, interviews and literature studies were conducted. In the interview process, interviews were conducted with the owner of the Ruang Gebyok online via WhatsApp because the research location is located in Jepara, Central Java. In the literature study process, information was collected through research journals.

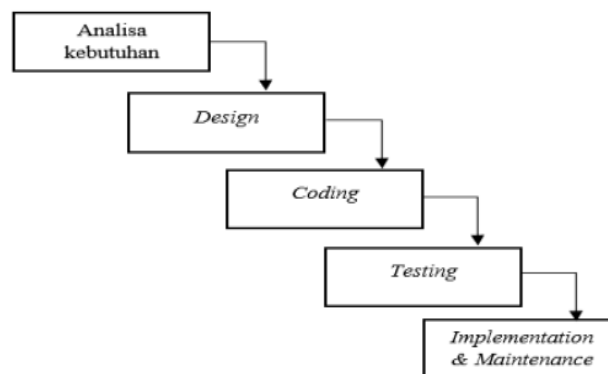


Figure 1. Waterfall Method [16].

Making this application uses the waterfall method as in Figure 1. In the waterfall method, there are several stages [17],[18]. At the analysis stage, information related to company needs is collected. At the design stage, system design is carried out by analyzing data using a data flow diagram (DFD) and an entity relationship diagram (ERD) and making wireframes. At the coding stage, coding is done with PHP, creating a database and manual book [19]. At the testing stage, system testing is carried out using Blackbox, which tests the software while still paying attention to the function of the application [20]. In the last stage, namely implementation and maintenance, implementation is carried out based on the test results from the previous stage, after which system maintenance is carried out.

3. RESULT AND DISCUSSIONS

This section contains analysis carried out in Ruang Gebyok and makes applications using waterfall techniques, starting with analysis and moving on to design, coding, testing, implementation, and maintenance.

3.1 Analysis

The purpose of this analysis is to determine functional requirements. There will be four access rights in this inventory application. Each of these access rights interacts with the system and has various information requirements. The owner has the right to access all menus and features in this application. Warehouse staff can manage suppliers, raw materials, ready stock data, ready goods transactions, and custom goods transactions. While the craftsmen and finishing section can only access the ready stock data, ready goods transactions, and custom goods transactions menus. The craftsman and finishing department can only view the data and cannot make changes to it, but the craftsman and finishing section have the right to change the status of the workmanship contained in the Custom Item Transaction menu.



3.2 Design

At this stage, system design is carried out using data flow diagrams, entity relationship diagrams, and wireframes. The data flow diagram created consists of a context diagram and an overview diagram. In this study, DFD was made because the programming was structured.

3.2.1 Data Flow Diagrams

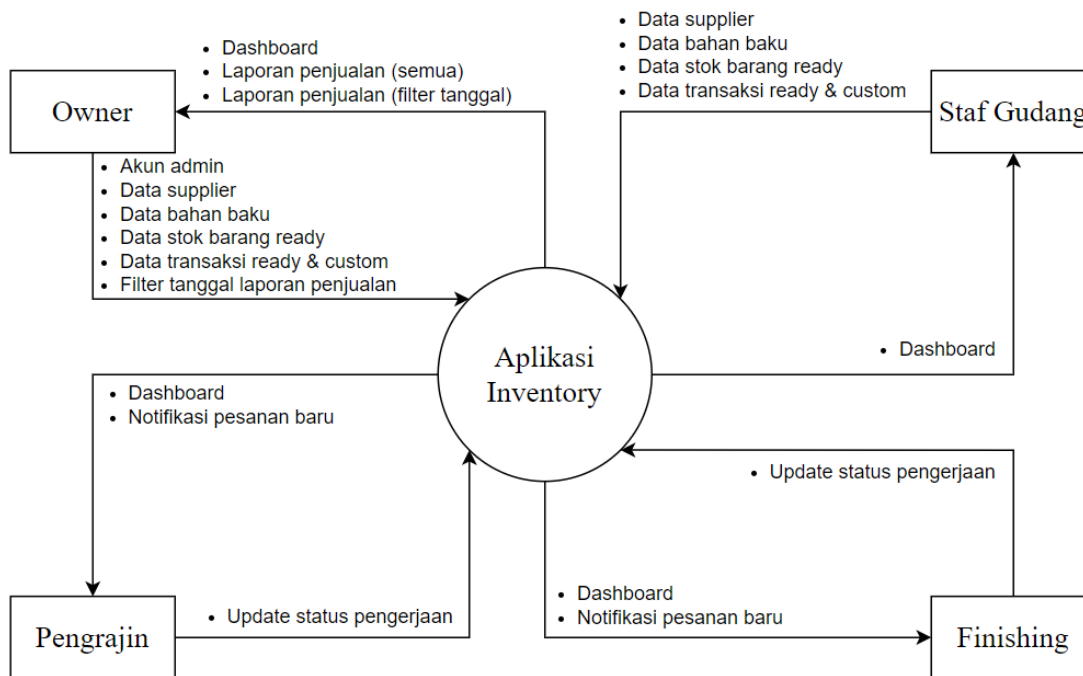


Figure 2. Context Diagram

Figure 2 is a context diagram of the design of a web-based inventory application in Ruang Gebyok. In this picture, it starts with the owner, who creates an admin account so that warehouse staff, craftsmen, and finishers have an account to access the application.

The owner can input supplier data, raw material data, ready goods stock data, ready and custom goods transaction data, and sales report date filters. Meanwhile, warehouse staff can only input supplier data, raw material data, ready goods stock data, and ready and custom goods transaction data. Craftsmen and finishers can update the work status on the custom goods transaction page. Then the owner receives dashboard data, sales reports, and sales reports filtered using dates. Warehouse staff receive dashboard data. Owners and warehouse staff can view data that has previously been input into the system. Craftsmen and finishers receive dashboard data to determine the most-sold ready goods to be remade and get notifications when there are new orders for custom goods.

The owner can input supplier data, raw material data, ready goods stock data, ready and custom goods transaction data, and sales report date filters. Meanwhile, warehouse staff can only input supplier data, raw material data, ready goods stock data, and ready and custom goods transaction data. Craftsmen and finishers can update the work status on the custom goods transaction page. Then the owner receives dashboard data, sales reports, and sales reports filtered using dates. Warehouse staff receive dashboard data. Owners and warehouse staff can view data that has previously been input into the system. Craftsmen and finishers receive dashboard data to determine the most-sold ready goods to be remade and get notifications when there are new orders for custom goods.

The owner is a user who has access to all menus in the application. The owner is the only user who can create accounts and view sales reports. The owner can perform CRUD operations on the supplier menu, raw materials, ready goods stock, and ready and custom goods transactions. The owner can also view sales reports. The results of account creation will be entered into the account data stores. The results of CRUD on the supplier menu will enter the supplier data stores. The results of CRUD on the raw material menu will enter the raw material data stores. The results of CRUD on the ready goods stock menu will enter the stock data stores. The results of CRUD on the ready goods transaction menu will enter the ready transaction data stores. The results of CRUD on the custom goods transaction menu will enter the



custom transaction data stores. While the sales report menu will receive data from transaction data stores, the owner can access this menu and filter by date on the sales report.

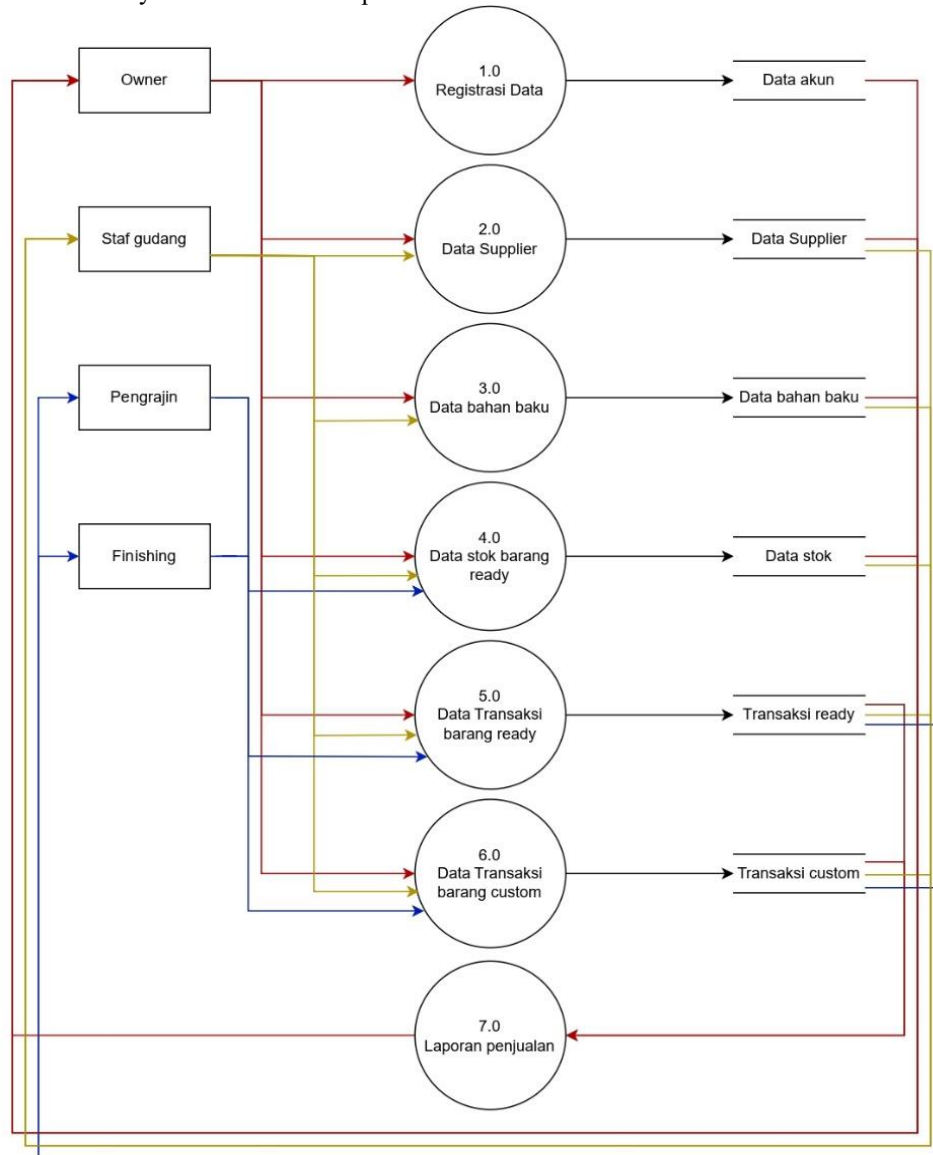


Figure 3. Overview Diagram

Warehouse staff cannot create accounts or view sales reports, but they do have access to all other menus. Warehouse staff can assist the owner in doing CRUD on the supplier menu, including raw materials, ready goods stock, and ready and custom goods transactions. The results of CRUD on the supplier menu will enter the supplier data stores. The results of CRUD on the raw material menu will enter the raw material data stores. The results of CRUD on the ready goods stock menu will enter the stock database. The results of CRUD on the ready goods transaction menu will enter the ready transaction data stores. The result of CRUD on the custom goods transaction menu will enter the custom transaction data stores.

Craftsmen do not have complete access to this application. Craftsmen can only see (read) the ready goods stock menu and ready goods transactions. Craftsmen can see and update this information on the custom goods transaction menu. The results of the update on the custom goods transaction menu will be entered into the custom transaction data stores.

Just like craftsmen, finishing also does not have complete access to this application. Finishing is only visible on the ready goods stock menu and ready goods transactions. Finishing can view and update the custom goods transaction menu. The results of the update on the custom goods transaction menu will be entered into the custom transaction data stores.



3.2.2 Entity Relationship Diagrams

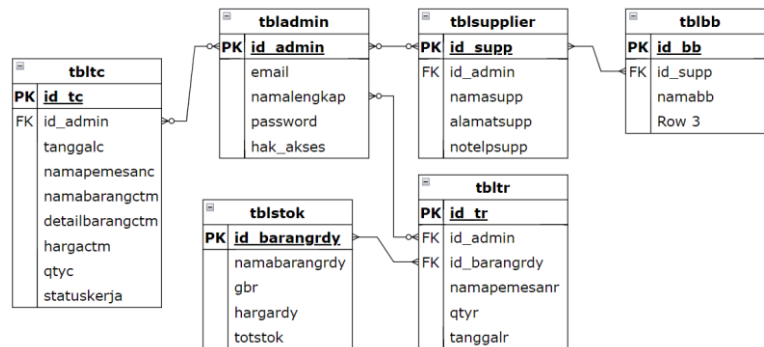


Figure 4. Entity Relationship Diagram

Then the design will continue by creating an entity relationship diagram. Figure 4 is an ERD of a web-based inventory application at the Ruang Gebyok. In the ERD, there are six tables that have relationships with each other. The tbladmin table has a relationship with the tbltc, tblsupplier, and tbltr tables; the relationship is many-to-many optional because many admins can access many options in tbltc, tbltr, and tblsupplier. The tblsupplier table has a relationship with the tblbb table; the relationship is many-to-many because many suppliers can supply many raw materials. The tbltr table has a relationship with the tblstok table; the relationship is many-to-many because many stocks of ready goods can be many transactions in tbltr.

The tbladmin table serves to store employee data as well as login data from each account. In this table, there is a right column where this attribute stores the account level. In this application, there are owner account levels, warehouse staff, craftsmen, and finishers. Actors with the owner account level can do CRUD on tbladmin.

The tblstok table serves to store ready-goods stock data. Actors with the owner account level and warehouse staff can perform CRUD on tblstok. The tblstok table is related to tbltr because when the user wants to add a ready goods transaction in tbltr, the user can directly select the name of the item sold. The item name option in tbltr is taken from tblstok.

The tbltr table serves to store transaction data for purchasing ready goods, while the tbltc table serves to store transaction data for purchasing custom goods. Actors with owner account levels and warehouse staff can perform CRUD on tbltr and tbltc. Actors with craftsmen and finishing account levels can only perform RU on tbltr and tbltc.

The tblsupplier table serves to store supplier data. The tblbb table serves to store raw material inventory data. Actors with account-level owners and warehouse staff can perform CRUD on tblsupplier and tblbb. The tblsupplier table is related to the tblbb table because when the user wants to add raw material inventory data, the user can directly select the name of the supplier who supplies the raw material. The supplier name option in tblbb is taken from tblsupplier.

3.2.3 Wireframes

If the ERD creation is complete, the design will enter the wireframe creation stage. Wireframe means the representation of the application in black and white, which will later be applied at the coding stage.

Figure 5 is the wireframe design of a web-based inventory application at Ruang Gebyok. The wireframe in Figure 5 is an application display for owner-level accounts. On the main page after successfully logging in, all users will see the same thing, namely, a welcome that reads the name of the account owner, as well as the best seller, where in this table is written data on ready goods and the number of buyers. From this table, business owners can determine which items should be remade for sale because they are in great demand.

Meanwhile, accounts other than owner accounts have different access rights, as described in the analysis and design stages of DFD and ERD. Different access rights in this case are the right to access a menu and the right to make changes (CRUD) to the data.

On accounts with warehouse staff account levels, there are no "Admin" and "Sales Report" menu options in the application. On accounts at the craftsman account level, there are no "Admin", "Supplier", "Raw Materials,", or "Sales Report" menu options in the application. On accounts with a finished account level, there are no "Admin", "Supplier", "Raw Materials,", or "Sales Report" menu options in the application. For accounts with craftsmen and finishing account levels, they can only change the work status; they cannot add or delete data.

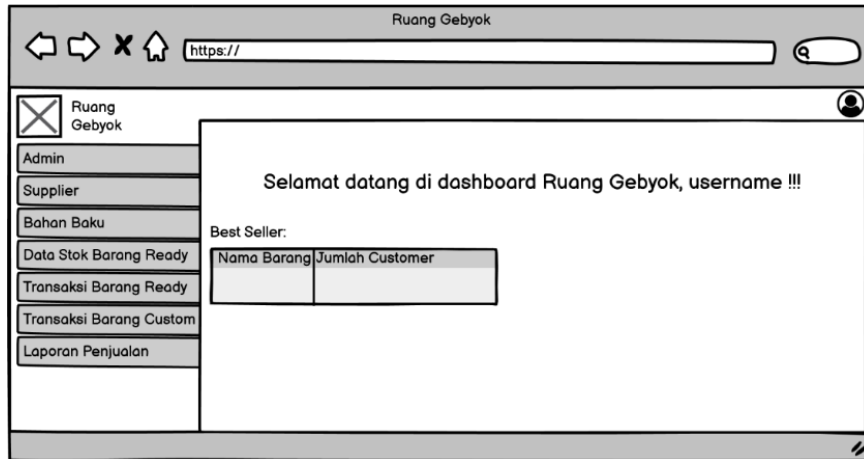


Figure 5. Wireframes

3.3 Coding

In this stage, the data flow diagram, entity relationship diagram, and wireframe designs made in the design stage will be implemented by applying them to the HTML, PHP, and JavaScript programming languages. In this coding stage, CSS and Bootstrap are also used to organize the appearance of web pages.

3.4 Testing

At this stage, tests are carried out on all modules contained in the application using the blackbox testing method. In blackbox testing, the design and program code are not tested, but blackbox testing is done only to ensure that the application output is in accordance with the required specifications. All modules in the application must be tested for functionality to ensure that the output is correct.

Table 1. Blackbox Testing

No	Test Case	Test Steps	Expected Results	Actual Results
1	User want to login using email and password	<ol style="list-style-type: none"> 1. Open the application website 2. Display the login page 3. Enter email 4. Enter password 5. Click "Login" 	User successfully logs in to the application	User successfully logs in to the application
2	Users want to create a new account	<ol style="list-style-type: none"> 1. Go to the "Admin" page 2. Click "Add admin" 3. Enter full name 4. Enter email 5. Enter password 6. Choose access rights 7. Click "Submit" 	User successfully creates a new account	User successfully creates a new account
3	Users want to add supplier data	<ol style="list-style-type: none"> 1. Go to the "Supplier / Store" page 2. Click "Add supplier" 3. Enter supplier name 4. Enter supplier address 5. Enter phone number 6. Click "Submit" 	User successfully added supplier data	User successfully added supplier data
4	Users want to add raw material data	<ol style="list-style-type: none"> 1. Enter the "Raw materials" page 2. Click "Add data" 3. Enter the name of the raw material 4. Select the supplier/shop name 5. Click "Submit" 	Users successfully add raw material data	Users successfully add raw material data



5	User wants to add stock data	<ol style="list-style-type: none"> 1. Enter the “Ready goods stock data” page 2. Click “Add data” 3. Enter the name of the item 4. Upload item photo 5. Enter the price of the item 6. Enter the amount of stock 7. Click “Submit” 	User successfully adds stock data	User successfully adds stock data
6	User wants to add ready goods transaction	<ol style="list-style-type: none"> 1. Enter the “Ready goods transaction” page 2. Click “Add data” 3. Enter the name of the customer 4. Select the purchased order 5. Enter the quantity of items purchased 6. Select the transaction date 7. Click “Submit” 	User successfully adds ready goods transaction	User successfully adds ready goods transaction
7	User wants to add custom goods transaction	<ol style="list-style-type: none"> 1. Enter the “Custom goods transaction” page 2. Click “Add data” 3. Enter the name of the customer 4. Enter the name of the item ordered 5. Enter order details 6. Enter the order price 7. Enter order quantity 8. Select transaction date 9. Click “Submit” 	User successfully adds a custom goods transaction	User successfully adds a custom goods transaction
8	User wants to print the report	<ol style="list-style-type: none"> 1. Enter the “sales report” page 2. Click “Print all” 3. Enter the “sales report” page 4. Filter by date 5. Click “Print data by date” 	The user successfully prints a report of all dates, the user also successfully prints a report based on the selected date filter	The user successfully prints a report of all dates, the user also successfully prints a report based on the selected date filter

The following are the results of blackbox testing of website-based inventory applications at Gebyok Room, especially on accounts at the owner account level, as seen in Table 1. The test results show that all modules work well and the results are as expected.

3.5 Implementation & Maintenance

At the implementation stage, the implementation of the test results from the testing stage is carried out so that the application system becomes better and there are fewer errors in the system. The following are the results of the implementation of the user interface for accounts at the owner account level of the web-based inventory application at the Ruang Gebyok.

On this page, all users (not only the owner) will see the same thing, namely a welcome that reads the name of the account owner, as well as the best seller, where in this table is written the data of ready items and the number of buyers. As explained in the design diagram overview section, accounts with the owner account level will be able to create accounts and access the sales report menu. Accounts at the owner account level can also CRUD the supplier menu, including raw materials, ready goods stock, and ready and custom goods transactions.

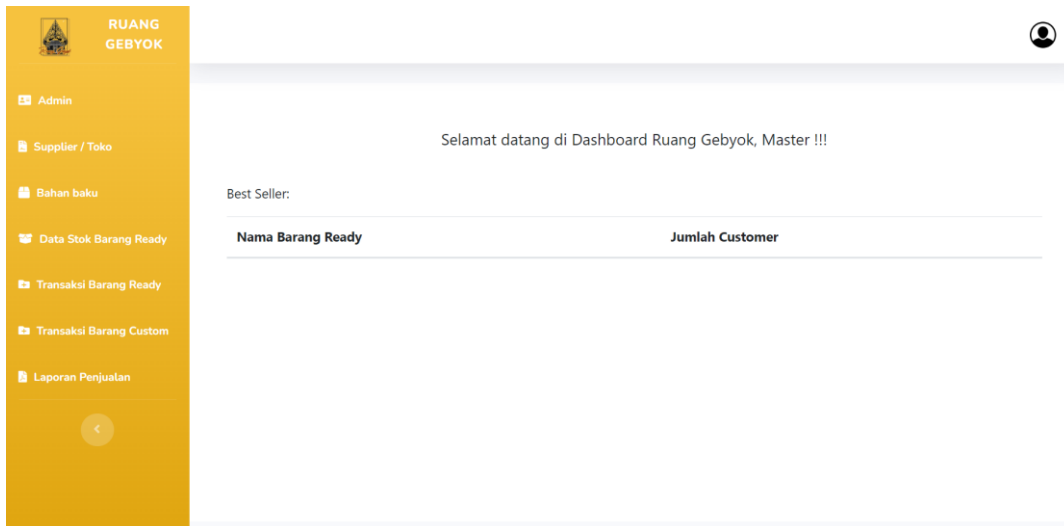


Figure 6. User Interface

3.6 Propose Business Process

The need for an inventory system in Ruang Gebyok warehouse management activities results in changes in business processes. The proposed business process can be seen in Figure 7.

The process starts with (1) the owner receiving an order through the WhatsApp application, then (2) the owner recording the transaction in the application. In addition to the owner, three warehouse employees can also add data to the application. Then (4) there will be notifications in the application for craftsmen and finishing level accounts regarding new orders that must be done. The craftsmen and finishing department can change the work status of each transaction (6), which will then be stored in the application. The transactions that enter the application are then automatically formed into (7) sales reports. The owner (8) can access the sales report through the application, and the sales report can also be saved in PDF form. Everything that is inputted into this inventory application will be stored in the database.

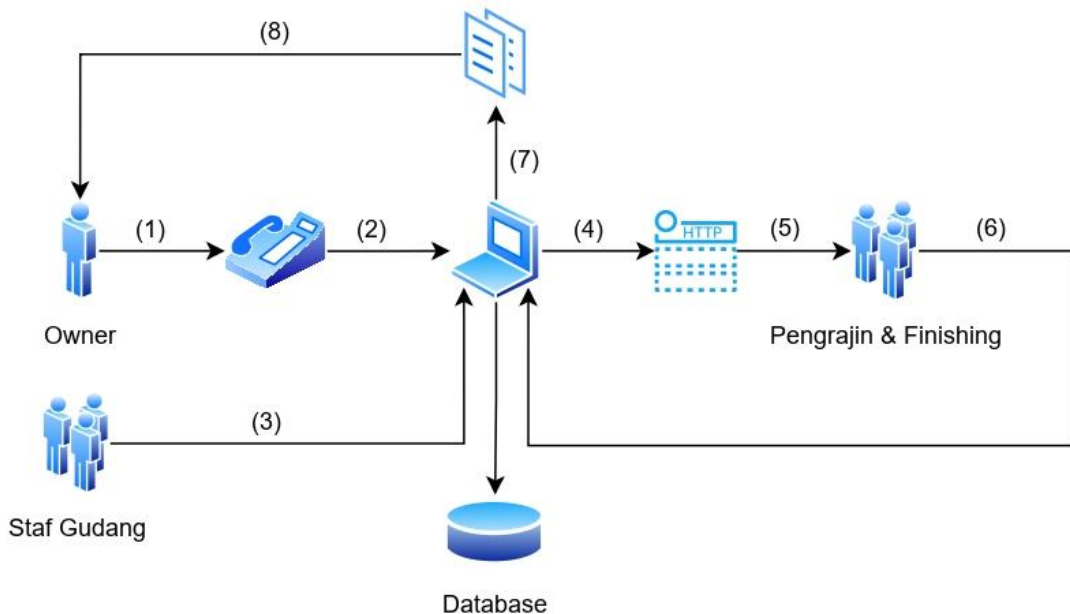


Figure 6. Propose Business Process

4. CONCLUSION

Based on the research, there are results in the form of applications that can be used in the Ruang Gebyok to record supplier data, record raw material data, record item data for ready stock items, record purchase transactions for ready stock items, record purchase transactions for custom ordered items, and generate combined sales reports from ready stock



items and custom items that have previously been input as sold on the transaction page. The application to be designed will also have different access rights for each type of account. From the results of this research, there are four types of accounts (account levels), namely owner accounts, warehouse staff, craftsmen, and finishing. In the account with the owner account level, there will be 7 menu options, namely "Admin", "Supplier", "Raw Materials,", "Ready Goods Stock Data,", "Ready Goods Transactions,", "Custom Goods Transactions," and "Sales Report." On accounts with warehouse staff account levels, there are no "Admin" and "Sales Report" menu options in the application. On craftsman accounts, there are no "Admin", "Supplier", "Raw Materials,", or "Sales Report" menu options in the application. On accounts with a finished account level, there are no "Admin", "Supplier", "Raw Materials,", or "Sales Report" menu options in the application. For accounts with craftsmen and finishing account levels, they can only change the work status; they cannot add or delete data.

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