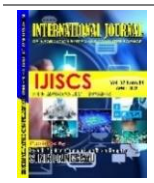

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PROTOTYPING METHODOLOGY IMPLEMENTATION IN B2B SALES INFORMATION SYSTEMS: A CASE STUDY OF INDONESIAN COFFEE SUPPLIERS

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Abstract
Coffee Suppliers is a business that sells items made from coffee beans to other businesses that sell processed coffee. This firm operates on a B2B model. Coffee Suppliers' current issues include the manual recording of all inventory items and sales transactions on paper, which increases the likelihood of data reporting inaccuracies. The prototyping approach, which is a step in constructing a system with the outcomes of analysis being directly applied using a model without having to complete the entire system, is utilized in this web development. Before designing Unified Modeling Language diagrams and building databases, the initial build identifies user requirements. To create the necessary web, the system is created using the CodeIgniter framework. It is anticipated that the construction of a web-based system will assist Coffee Suppliers in managing their business, particularly in sales, listing, and reporting, thereby lowering the possibility of data.

1.0 INTRODUCTION

Indonesia should implement the industrial revolution 4.0 which is expected to improve the country's economy and can help agencies or companies in terms of convenience. In the industrial revolution, there are many types, one of which is system integration [1]. The need for data that is always real-time is important for now. Many decisions need to be made using data, if the data taken is real-time then the decisions taken can also be better if the data is not real-time [2]. For companies engaged in buying and selling, this will be an advantage in itself, because there is a lot of data used by various divisions that need data from each other with other divisions, one of which is the type of company engaged in buying and selling B2B [2]. B2B is Business to Business or in other words, a company sells its products to another company, which usually the company will sell its goods again [3]. B2B companies need large data, both customer data, products, orders, etc. With this data, the company can display sales, and profit/loss to make future decisions [3][4]. There are many companies with a B2B business model, one of which is Supplier Coffee.

Coffee Suppliers is a company with a B2B business model that offers coffee bean products, which will be distributed to companies that sell processed coffee. In the process of selling it, Coffee Suppliers purchase coffee fruit from farmers, which is processed into coffee beans. The sales process requires a system that is integrated with existing divisions in the company, such as sales and stock of goods. This integration system can use applications, one of which is a website-based application [5][6].

Difficulties that exist now Coffee Suppliers continue to manually record all incoming inventories of goods by penning them on paper, which raises the chance of a recording error

that may affect reports used to calculate earnings. The fact that buyer debts and notes are still manually entered by handwriting, opening the door to transcription errors and the possibility of note records going missing, is another problem with sales transactions. While manually recording and handling goods data, there is a risk for errors to be committed by salesmen [7].

Based on previous research, research "Information System for Sales of Building Materials at the Berkah Building Store" creates an information system that can effectively carry out sales transactions and record inventory. This research is a reference for making activity diagrams. In research "Design and Build a Library Information System Using Java (Netbeans 7.3)", a library information system was built at SMKN 01 Prabumulih using the Prototyping method, providing fast and timely information, and was used as a reference for using the Prototyping method in system development. Research "UML Modeling of Population Administration Information Systems for Village Offices" creates UML modeling for the design process and is used as a reference in creating Use case diagrams. In research "Design of a Student Attendance System Using RFID Sensors with MySQL XAMPP Database and Visual Basic Interface", the integrated system with a database makes it easier for admins to record student attendance and is used as a reference for database design using MySQL and XAMPP. Finally, research "Waterfall Method for Sales Information Systems" created a system to reduce the error rate in the payment or transaction process with a computerized system, used as a reference for creating class diagrams and ERDs. According to the description and issues raised above, an integrated system is required to manage staff information, provide sales transactions with computerized sales notes, and provide inventory management, correct recording of goods, and ease of discovering and managing goods in-store inventories [8].

2.0 RESEARCH METHODOLOGY

In this study, prototyping is chosen because it offers a relatively short development duration for the system and allows for easier and more flexible modifications according to customer requirements while the system is still in the prototype stage. The prototyping method is a step in developing a system with the results of a division analysis of a system directly applied using a model without having to complete the entire system. It is hoped that web system design using the Prototyping method can accept changes and improve existing Prototyping so that it can produce an information system that is acceptable and useful for a company [9].

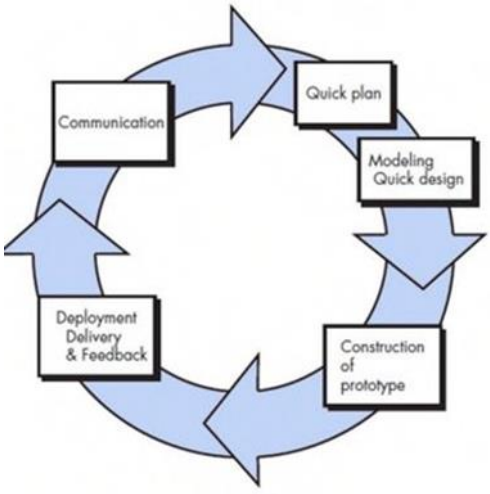

Figure 1. Prototyping Method [10]

At this stage the developer meets with the client to discuss the problems currently being experienced, and also discuss the system that will be developed in the future in order to solve the problems currently being experienced [10]. After the communication stage, the developer carries out system design quickly based on the information received by the developer [10]. Use case diagrams are diagrams that are useful for describing the behavior of actors in the system to be designed. Use case diagrams explain a relationship between actors and the system to be designed. Use case diagrams are useful for explaining the functions of the system and what access is given by actors to use these functions. This stage begins with designing a Use case diagram. After designing and identifying the system to be created, the next stage is developing

the system by prototyping or creating a web display using the chosen programming language [10]. After all the design and prototyping has been carried out, the next stage is deployment delivery & feedback, namely carrying out an analysis of the system that has been created. The analysis is carried out based on feedback from users about the features and appearance that have been created [10].

This stage involves comprehensive system testing, performance assessment, implementation, and ongoing enhancements to ensure the fulfillment of all user requirements. System testing is particularly crucial, as it plays a vital role in detecting and correcting errors to ensure smooth operations. The fourth phase includes Deployment, Delivery, and Feedback, incorporating User Acceptance Testing as a critical step for validating the system's functionality. During this testing phase, various user roles such as Super Admin and Admin actively engage to verify that all design features adhere to user requirements and function as intended [11].

2.3. Data Collection Techniques

In this research framework in Figure 2, the process starts by observing the research subject, which is coffee suppliers. Once the observation stage is complete, the next step is to carry out the stages of the prototyping method, starting with communication, which entails talking about the problems that are currently being experienced as well as the system that will be created in the future to address those problems. The following phase is quick planning and modeling quick design, which entails beginning to develop a UML diagram to design the upcoming system [12].

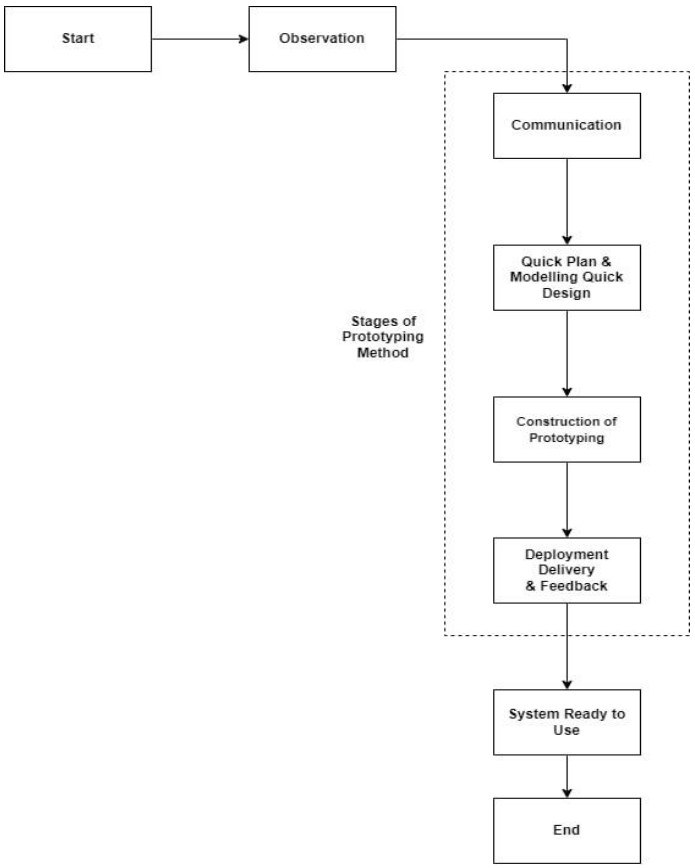

Figure 2. Research Framework

The next step is the construction of prototyping, namely developing a system with prototyping or creating a web display using a programming language. The final step in system development, namely deployment delivery & and feedback, carries out an analysis of the system that has been created. The analysis is carried out based on feedback from users about the features and appearance that have been created. After all the Prototyping method processes have been carried out, the system can be fully used [13][14].

3.0 RESULT AND DISCUSSION

3.1. Communication

A. Analysis Problem

In this phase, an interview was conducted with the owner of the coffee bean distributor, Mr. Ahmad Sholehudin, to find out what kind of system Coffee Suppliers are and what features are in the sales web application.

B. Solution

Based on the problems faced by Coffee Suppliers There are several solutions offered, such as requiring an integrated system that can provide stock of goods, accurate recording of goods, ease of finding and managing inventory of goods in stores, sales transactions with computerized sales notes, and managing employee information.

C. User Requirement

Functional Requirement:

1) Admin:
   - Manage item types
   - Manage your listing
   - Manage supplier lists
   - Manage user lists
   - Manage the purchase of goods

2) Sales Staff:
   - Manage Sales Transactions

3) Manager:
   - Manage item type reports
   - Manage item list reports
   - Manage supplier list reports
   - Manage user list reports
   - Manage item purchase reports
   - Managing Sales Transaction Reports

3.2. Quick Plan

Plan and design quickly. UML diagrams are developed during the modeling step after the intended system requirements are known. To start, the designer draws use case diagrams, activity diagrams, class diagrams, and database linkages.

A. Use Case Diagram

In Figure 3 of the presented use case diagram, three distinct actors are depicted, each assigned specific roles within the system. A prerequisite for engaging with the system involves the actors logging in. Among these actors, the system administrator holds significant control over crucial components, including the list of goods, suppliers, users, and commodities available for purchase. The administrator is endowed with the authority to add, edit, or remove any menu items through an administration tool accessible on the administrator page, thereby exercising comprehensive control over the system's key functionalities.

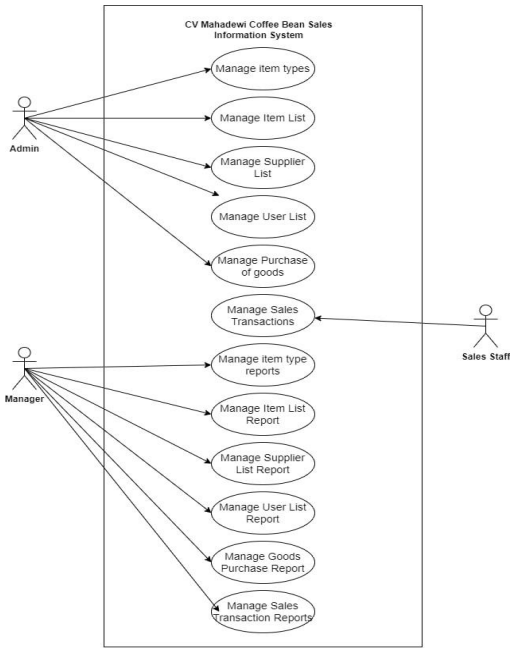

Figure 3. Use Case Diagram Coffee Bean Sales Information System

Three actors, each of whom plays a certain role, are shown in Figure 3 of the use case diagram above. Before using the system, these actors can log in. The administrator of this system has control over the list of goods, the list of suppliers, the list of users, the list of goods, and the list of commodities that may be purchased. The administrator can add, edit, or remove any menus from the administrator page using this administration tool.

B. Activity Diagram Admin

Figure 4 illustrates an activity diagram specifically designed for the management of a catalog of goods types. Within this framework, the administrator is empowered to input new data for item types and make modifications to the existing item type information. Subsequent to the addition or alteration of activities, the pertinent data undergoes a saving process, ensuring its persistence within the system. This depiction highlights the streamlined and interactive nature of the system, emphasizing the administrator's capability to actively contribute to the maintenance and evolution of the goods types list through data input and modification activities.

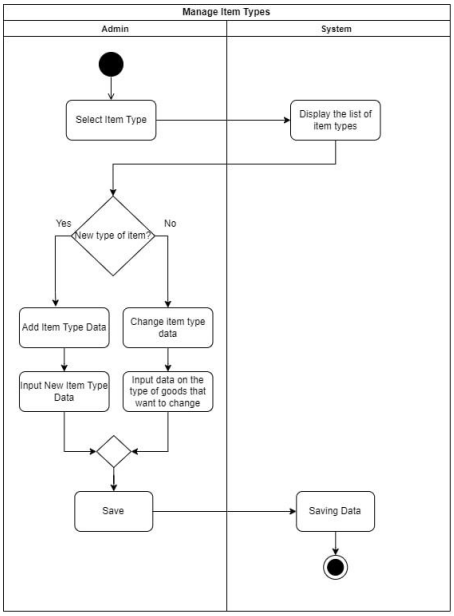

Figure 4. Activity Diagram Admin

Figure 4 is an activity diagram for managing a list of types of goods. In this list of item types, the admin can enter new item type data and can also change existing item type data. When the activity is added and changed, the data will be saved in the system.

C. Activity Diagram Sales Staff

Figure 5 presents an activity diagram dedicated to the administration of the goods list. Within this operational scope, the administrator assumes responsibility for overseeing the addition of new items and implementing changes to existing items. Notably, the data inputted during these management activities undergoes storage within the system. This stored item data holds significance as it directly correlates with the upcoming sales transactions, elucidating the critical role played by the administrator in ensuring that the goods list is accurate, up-to-date, and seamlessly integrated into the broader system to facilitate efficient sales transactions.

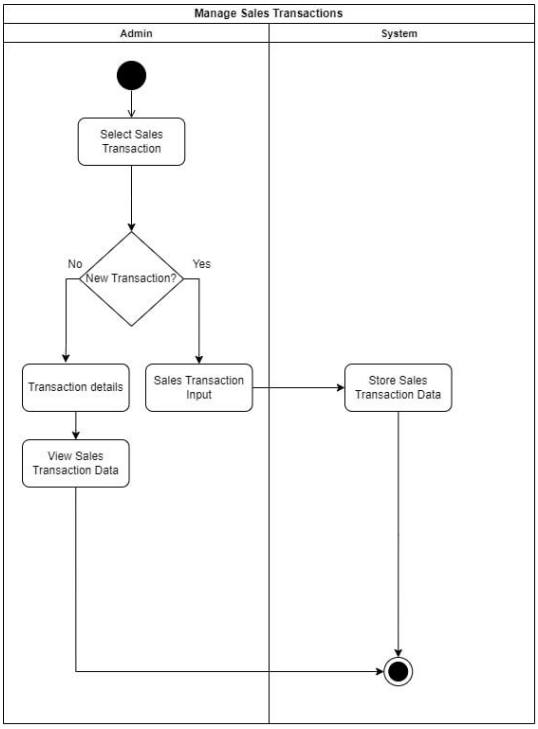

Figure 5. Activity Diagram Sales Staff

In Figure 5, there is an activity diagram for managing the list of goods. In managing this item list, the admin manages new items and changes to existing items, the data that has been entered will be stored in the system. This item data relates to the sales transaction that will be carried out.

D. Activity Diagram Manager

Figure 6 portrays an activity diagram dedicated to the administration of reports pertaining to types of goods. This diagram illustrates the system's capability to exhibit various types of goods, allowing for the visualization of data. Furthermore, the displayed data can be readily formatted for printing, enabling the generation of item type reports. This functionality underscores the system's versatility in not only presenting information visually but also facilitating the documentation and dissemination of comprehensive reports on the various types of goods stored within the system.

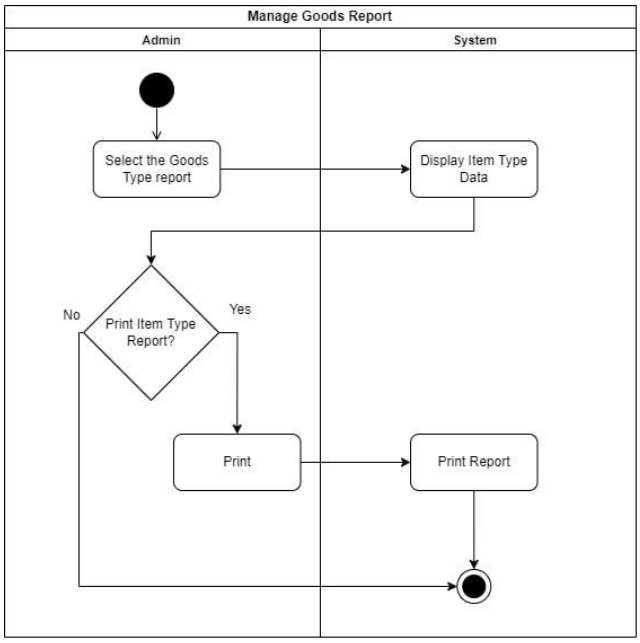

Figure 6. Activity Diagram Manager

In Figure 6, there is an activity diagram for managing reports on types of goods. This activity shows that it can display the types of goods in the system and the data displayed can be printed as an item type report.

E. Class Diagram

The class diagram in Figure 7 comprises four categories: administrators, who can manage goods, incoming goods, and suppliers. Transactions are detailed and involve single or multiple items, each linked to a specific item type. The diagram utilizes (+) for public access and (-) for private access, enhancing clarity and security.

Figure 7. Class Diagram

The class diagram shown in Figure 7 is broken down into four categories: administrators, one or more administrators can manage one or more goods, one or more incoming goods, and one or more administrators can manage one or more suppliers. Every transaction has a detailed transaction, and every detailed transaction contains a single item or multiple things. Every item has a single item type. (-) and (+) symbols can be seen in the class diagram. When an item is marked with a (+) sign, it is public, meaning anybody with access to the object can

access it. When an item is marked with a (-) sign, it is private, meaning it can only be in one class itself.

F. Database Relationship

Figure 8 illustrates the relationship between tables in a phpMyAdmin database. This relationship is defined by connections between tables, established through foreign keys, acting as secondary keys for each table.

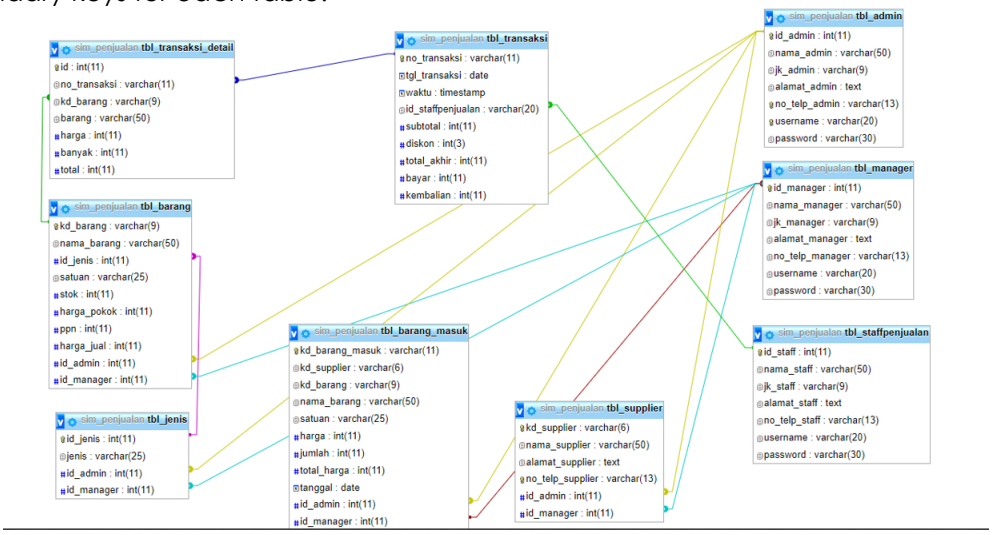

Figure 8. Database Relationship

Figure 8 shows a phpMyAdmin database relationship. Each table's connection to the other is described by this relationship. The connection between one table and another is made using a foreign key, which is a secondary key for each table.

3.3. Construction of Prototyping

In this phase, the creation of web views is carried out using HTML, PHP, CSS, and Bootstrap programming languages.

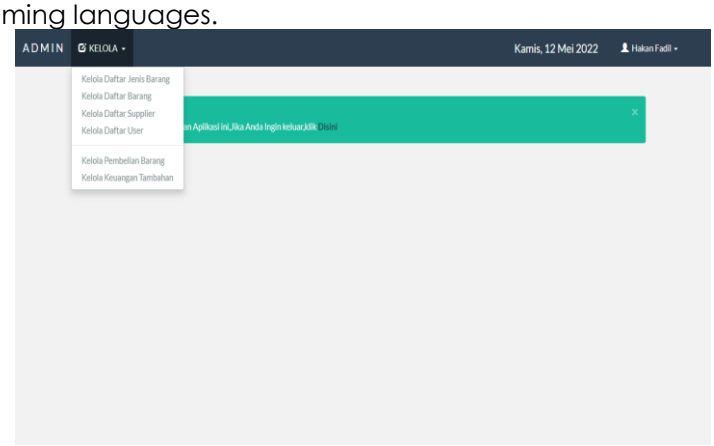

Figure 9. Administrator Dashboard

In Figure 9, the page has a manage menu in which there are several sub-menus such as manage the list of types of goods, manage the list of goods, manage the list of suppliers, manage users, and manage the purchase of goods that can be used by administrators.

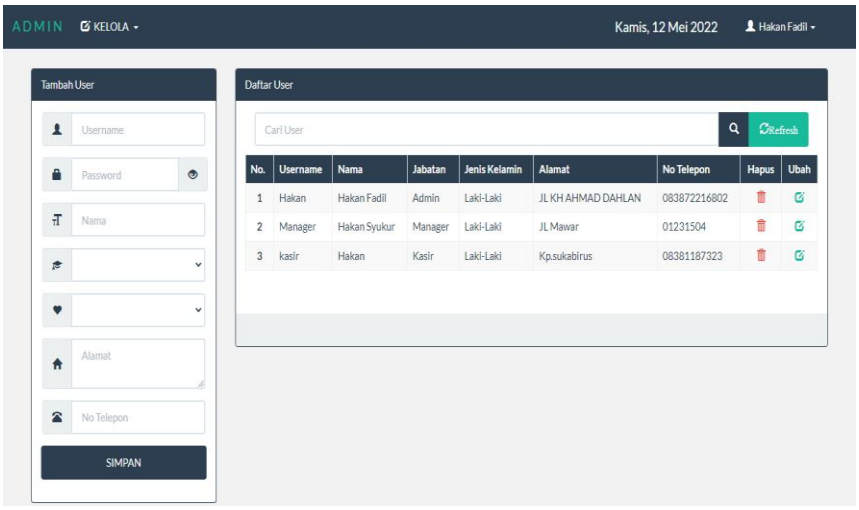

Figure 10. Manage User List

In Figure 10, Page for managing the list of users. On that page, the administrator can add a list of users, delete the list of users, and edit the list of users.

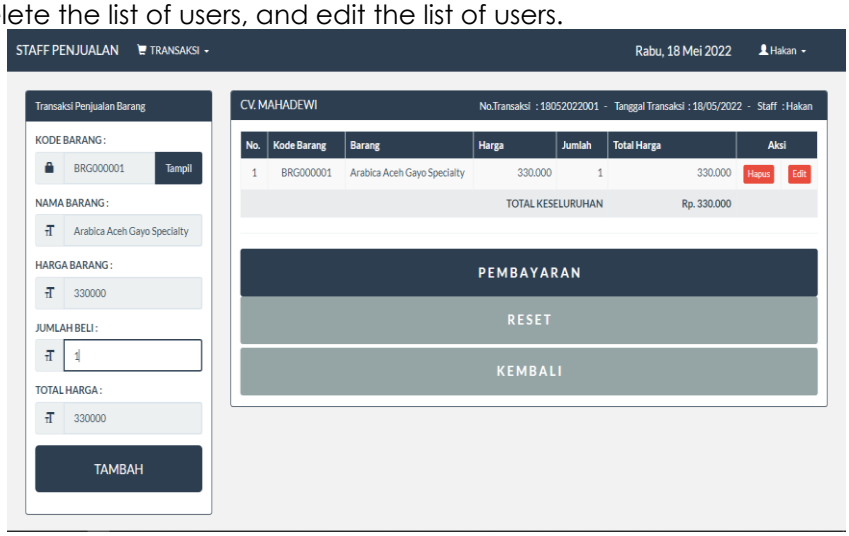

Figure 11. Transaction Input Page

In Figure 11, Transaction input page, on this page sales staff can input transactions by entering the item code, item name, and quantity. After the additional purchase details will appear, in the purchase details the sales staff can delete if the purchase is not made and can change the purchase if there are changes.

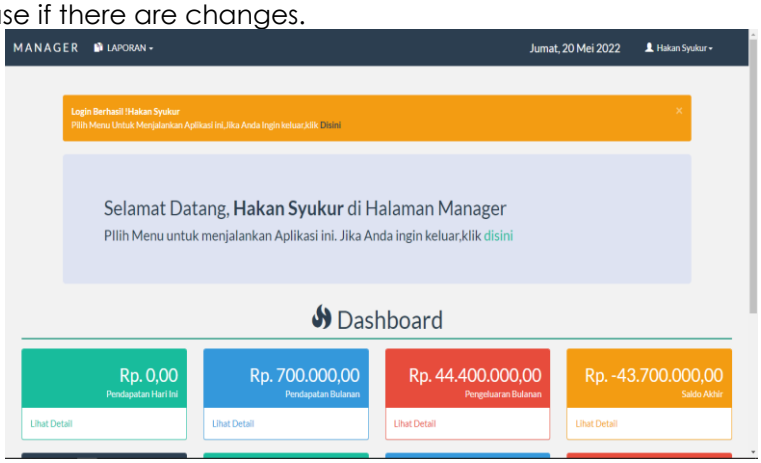

Figure 11. Dashboard Manager page

In Figure 11, Manager dashboard page, on that page a manager can find out daily income, monthly income, and monthly expenses. In addition, there is a report menu where managers can print reports according to the desired menu.

3.4. Construction of Prototyping

Prospective users or current users are requested to test out the features of the developed system; this is helpful when the system is put to use in the future. As a result, it is important to extend several testing systems in compliance with UAT requirements using the black box method.

Table 1. UAT Sales Staff

Sales Staff				
Examiner Name		Mrs. Firdha		
Test Date		18 May 2022		
No	**Test**	**Testing Process**	**Expected results**	**Status**
1	Admin Login	- Input username and password - click the login button	- if the username and password are correct then you will enter the admin page. - If the username and password are incorrect an alert will appear.	PASS
2	CRUD item types	- Select the Manage Item Types menu. - Type the name of the category of item you wish to look for - Press the search button	- If it is successful, it will display the type of item that was previously entered; - if it is unsuccessful, an alert stating "data not found" will appear.	PASS
3	CRUD Supplier	- Choose Manage Supplier Type from the menu. - Type the supplier's name into the search box - Press the search button	- If it is successful, it will show the suppliers that were previously entered; - if it is unsuccessful, a message stating "data not found" will appear.	PASS
4	Search for users	- Select the Manage User Type menu. - Type the user's name into the search field - Press the search button	- If it is successful, the user input that was previously entered will be displayed; if it is unsuccessful, an alert stating "data not found" will appear.	PASS
5	*CRUD purchasing goods*	- Choose Manage Purchasing Items from the menu. - Enter the details of the product purchase - Select the "Save" option	- If successful, the message "data saved successfully" will be displayed and will appear on the item buy list page. - If you do not provide the item's name, a message will appear requesting information about purchasing the item.	PASS

From the Admin login procedure, CRUD item type, CRUD Supplier, User search, and CRUD item purchases, it can be inferred that the Admin UAT testing was successful. Overall, as indicated by a "PASS" status for each test case, the table demonstrates that the tested feature is functioning as intended. For system usability and dependability, this is a successful conclusion.

Table 2. UAT Manager

Manager				
Examiner Name		Mr. Ahmad Sholahudin		
Test Date		20 May 2022		
No	**Test**	**Testing Process**	**Expected results**	**Status**
1	Login manager	- Input username and password - click the login button	- if the username and password are correct then you will enter the admin page. - If the username and password are incorrect an alert will appear	PASS
2	Edit profile manager	- Select a profile - Enter the profile information to be changed - Click the save changes button	- If successful, the alert 'data changed successfully' will be displayed and will appear on the profile page - If you do not enter profile information, an alert prompting you to enter profile information will appear	PASS
3	Print item list	- Select the item list report menu - Click the print button.	- If successful, a page will be displayed containing information regarding the list of items.	PASS
4	Print supplier list	- Select the supplier list report menu - Click the print button.	- If successful, a page will be displayed containing information regarding the supplier list.	PASS
5	Print monthly purchase list	- Select the monthly purchase report menu - Select month and year - Click the print button.	- If successful, a page will be displayed containing information regarding the list of purchases of goods for one month.	PASS
6	Print daily sales transactions	- Select the monthly purchase report menu - Select the transaction date - Click the print button.	- If successful, a page will be displayed containing information regarding the list of sales transactions in one day.	PASS
7	Print monthly sales transactions	- Select the monthly transaction report menu - Select month and year - Click the print button.	- If successful, a page will be displayed containing information regarding the list of sales transactions for one month.	PASS

After creating a website-based application and carrying out a User Acceptance Test, an analysis will be carried out regarding the comparison before and after using the system. The following is a comparison table of the results of the analysis that has been implemented.

Table 3. Design Analysis Results

Category	Before System	After System
Recording stock of goods	Before the system existed, recording of incoming stock of goods was carried out conventionally	After the system is in place, recording stock data will be stored in a database which can reduce the possibility of data loss.
Sales transactions	Before the system existed, sales transactions were still carried out conventionally, which allowed sales transaction data to be lost.	Once a sales transaction system is in place, sales staff can manage transactions using a computerized system and the data will be stored in a database.
Report management	Before the system existed, management of transaction and goods reports was carried out conventionally, which allowed for errors and data loss.	Once the system is in place, report management can be done using a computerized system and can print reports according to the data in the database.

The implementation of the system in the categories of stock recording, sales transactions, and report management has resulted in significant positive changes. Before the system was implemented, these processes were carried out conventionally, prone to errors and data loss. However, with the system, stock data is stored in a database, reducing the risk of recording errors and making accessibility easier. Sales transactions can be managed well through a computerized system, preventing data loss, and report management becomes more efficient with the ability to print reports based on data in the database. This move has brought great benefits in improving the overall efficiency and accuracy of business operations.

4.0 CONCLUSION

The designed sales information system has several features such as recording goods and stocks, recording suppliers, recording purchases of goods, and sales transactions. The feature of recording goods and stocks records all coffee bean products sold and displays the number of available stocks. The supplier recording feature records all supplier information needed when purchasing goods. The recording feature of purchasing goods helps record when goods are coming from suppliers and the stock will automatically increase when the purchase of goods has been input into the system. The selling transaction feature helps the process of selling goods that can be input into the system. To ensure system functionality, User Acceptance Tests are performed. The results show an average score of approximately 98% for Admin and 97% for Manager. The system has satisfactorily met user needs and passed the functionality evaluation, based on this score. Systems can be improved and made more successful in addressing changing user and company needs from the help of this implementation and testing.

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