INVENTORY MONITORING WEB APPLICATION USING THE RAPID APPLICATION DEVELOPMENT MODEL

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Abstract

Warehousing is an activity of a type of goods managed by a company with the aim of selling. however, the meaning of inventory can also change depending on what industry is involved in it. Cosmetic Modern is a business engaged in the field of cosmetic beauty which as a business sells products such as skincare, beauty equipment. In the activity of managing inventory data, the recording process is still carried out in a unique way, namely by using any media as a place to write, it can be cardboard, a piece of paper. with this it raises problems including inaccuracy when recording because it takes a long time and must be checked again after being recorded. As well as the business owner must deliver the note to the head of the Warehouse because the place of business and the warehouse are not in one place but outside the place of business. The purpose of this research is to help business owners to find solutions so that the processing and recording of inventory data can run simultaneously to facilitate business processes. The Rapid Application Development method, which consists of business modeling, data, business processing, application development and in the end, continuous application trials is literate with a working time of 60 until 90 days to speed up the development process by utilizing existing software or frameworks. The results of this study indicate that this warehousing management application can help and meet business needs by recording goods and knowing which category goods fall into and solving problems that commonly occur in business. With the presence of a software-based Inventory Monitoring application that moves directly, it can be connected to the inventory database connected to the modern cosmetic shop business. This application with a website system can reduce the problems of the head of the warehouse and store manager and owner in carrying out their duties to manage inventory, product data collection and final reports. Not only that, for the use of the application it is easier to see the stock of goods in stores that are related to one another, it is hoped that the Inventory Monitoring Application based on all mobile devices can be directly connected to the store's inventory database.

Keyword: *Warehousing, Inventory Monitoring, Website, RAD.*

1. INTRODUCTION

The rapid development of trade between businesses is in its current position, especially in terms of the business era, making information very important in its role to support operations to achieve the goals desired by the owner of an entrepreneur [1]. Currently, technology in the field of computers continues to develop so that the ability of computers to help humans and solve problems is increasing rapidly, besides being used to store data computers can also process data and present data that is easier to understand. In business, information technology is used to facilitate business processes, increase productivity, and allow it to continue to adapt to market changes. Technology is the main media facilitator for business activities, Technology provides convenience and speed in carrying out various business activities such as marketing, sales, data management, and so on as in managing data investment goods where the availability of goods will be better organized by using technological advances such as the use of computers that support and adequate. On the other hand, it will be very surprising if the investment of data management is done in the old-fashioned way, namely manually or with bookkeeping [2], [3], [4].

Modern Cosmetics is a business engaged in the provision of beauty goods, as a modern cosmetic business owner in managing the recording of incoming and outgoing goods is still done the old way, namely with a piece of paper or media with a smooth surface that can be written. Sometimes business owners also forget the price because they do not record the price of new goods because old goods have increased the price of goods, not only that to fill empty items in the storefront the owner must bring the piece of paper to the warehouse and travel far enough to get there to pick up and check the availability of the item and the activity carried out is not good if the piece of paper is lost and not found due to storage difficulties or the owner This effort forgot to save. Recording goods still using a piece of paper makes it difficult for certain level users or owners, as well as warehouse users who process goods to be responsible, this with the old method also makes it difficult to find out the amount of stock of goods and what has been able to provide benefits for the business

and what does not provide benefits for this business. So that from the above problems there are often errors in recording goods and calculating goods caused by *human error*.

This research is motivated by the concept of warehousing Information Systems to support business processes, as well as providing information in the form of appropriate and integrated reports for each area in the company, The solution in this study will be assisted by a *Rapid Application Development Method*, namely the development of information systems in a relatively short time. The application of the RAD method in the implementation of warehouse information systems can produce a system that op [5], [6]. Researchers seen from the results of functional testing or black box, that is, all functional systems have worked according to the company's business processes, using the RAD method. This system is expected to be completed in approximately two months. The use of inventory [7], [8]. *Monitoring* is to ensure sufficient inventory and ensure that inventory is always available in quantities according to needs, as well as minimize the risk of loss or loss of goods. This will help entrepreneurs maintain a good reputation in the eyes of customers and improve previous business processes. With the help of the website becomes a solution to overcome time and distance constraints in remote operation. In this previous pandemic situation, [9], [10] *the website* is also a safe alternative to carry out various activities that previously could only be done directly. For example, with the website, one can facilitate remote operations by overcoming time and distance constraints and providing a safe alternative to carry out various activities that previously could only be done directly, to help that all users certainly use internet access. [11], [12]

Researcher wants to provide a solution to design a web-based goods supply system in modern cosmetics using the Website as a medium of information that is easy to use anytime and anywhere. The program designed with a website-based aims to facilitate as a business in monitoring, controlling, and managing goods supply data for faster and more precise accuracy. To solve problems with high difficulty and relatively short processing time and also insufficient costs, moreover this as a business in the market and information systems that do not have such a large space and will be made with a small team, it is intended to use the [5], [13], [14]. *Rapid application Development* method In the design of this item supply system. The purpose of this study is to help speed up business processes, namely the timeliness of delivery of goods from warehouses to stores, providing information related to goods in, out, returning damaged goods to suppliers so that the design of a goods supply system is made. It is hoped that after the completion of this web-based monitoring application can help and facilitate warehouse heads, store managers and as businesses in controlling the stock of goods in the warehouse and can produce reports on stock supply data in accordance with business needs. The benefits of this research can also minimize errors or delays in requests in the process of recording stock goods in the system design that has been made. The use of precise and accurate monitoring of goods supply data can produce information according to the needs of store managers and owners to input goods inventory data more easily, because the proposed system is web-based that can be accessed simultaneously in one place anywhere and anytime without time limits.
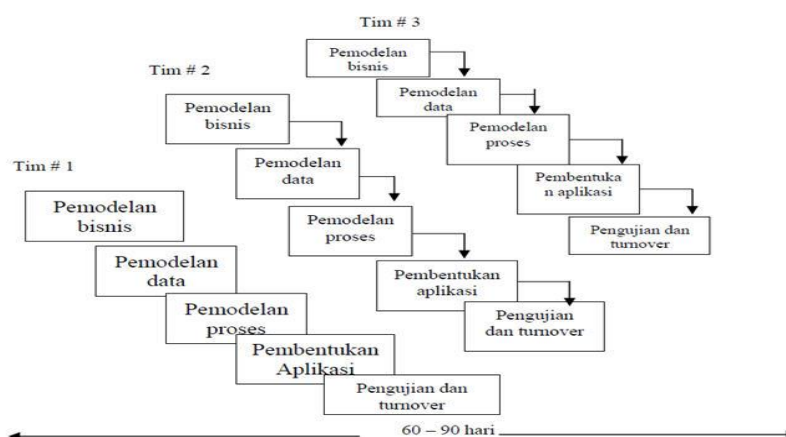
2. RESEARCH METHODS

Figure 1. Method Rapid Application Development [18]

Techniques in data collection are used to obtain data needed in making systems. Here are the data collection techniques used:

Interview or interview is a method of collecting data that is carried out physically by interacting through sources, namely using an interpersonal communication model that involves two people in a conversation needed according to the

topic of conversation. In this study, several in-store interviewees were interviewed. The goal is to know and identify *stakeholder* needs for the needs of the application design system to be created [15] .

Monitoring or observation is a method that is often used to collect activities, information or data related to the way that supervises and analyzes phenomena that occur at the observation target. Research conducted on modern cosmetic stores aims to obtain information to be included in the Planning stage to create a web-based application which categorizes products, goods information, and arrives at the way of business activities such as FIFO and FEFO [16].

The stage of data collection with the library study method is the activity of collecting information and data which as a resource can come from various reliable sources such as journals, *e-books*, magazines, manuscripts, and other electronic documents. After completing the study, the researcher must also write a research report and then conduct a search for new literature. Where research results can be published as articles in scientific publications [17].

Software development methods are also required in this research. Step-by-step programming methods help and facilitate the planning and development of new systems. The R*apid Application Development* method or RAD method used in this study is a software development method that emphasizes the short, short, and fast system development cycle. [19] In the Figure.1 is the stage of the RAD method, which can be explained as follows:

2.1. Business Modeling, in modeling activities carried out modeling business functions is one of the information components that must be made because the information is any process related to business activities. Software developers work closely with business owners to identify business needs that must be achieved by the system to be developed[20].

2.2. Data Modeling, Present what data is needed based on business process activities and describe their attributes and relationships with other data. In this event, researchers use software to create data models that represent data structures that will be used by the system, namely ERD explains the visualization of relationships between entities, ERD helps developers to visualize relationships between entities or objects in an information system. Thus, developers can more easily understand how data is interrelated and interconnected [21] .

2.3. Process Modeling, Software developers create business process models that describe how data is processed in the system. This business process model can be a data flow diagram (DFD) or a use case diagram. At this stage researchers use structural modeling not using OOP [22].

2.4. App Development, At the design stage of making the application, researchers use a bootstrap framework that is supported by operating with php and Xampp in accordance with the design that has been made. It is expected that using a website development [23] *framework* can simplify and speed up the development process because it provides basic structure and functionality that is ready to use and this web-based application is in accordance with the work, which is around 60 to 90 days of work.

2.5. Testing, when the application is ready, researchers will conduct a testing phase using *black box* testing to find out whether this application is suitable for use and operating properly or less. This testing will be carried out by the owner of the business to be tested, when the owner has tried and has a sense of excitement about the feature, the developer or researcher himself will improve the component and then retest the owner [24]. The RAD Method enables rapid software development and prioritizes early application delivery to users. This method also allows users to provide feedback at every stage of development, so that developer researchers can identify problems and make improvements in a timely and accurate manner. With a faster and iterative development approach, RAD can help reduce the cost and time involved in application development.

3. RESULT AND DISCUSSION

3.1 Business Modeling

Business modeling steps to achieve a specific goal or objective. It involves identifying goals, determining the resources needed, setting a timeframe, and determining the steps needed to achieve the goals. The following is a plan of needs needed when creating a system to be developed based on the results of interviews with these sources or stakeholders:

1. Functional Needs

This need aims to tell the flow of information that is run on the system until knowledge is obtained how this system can work properly, so that functional needs explain what must be done by the system. *Login / Register :* Aims to ask users to register and log in, with the presence of the website can ensure the security of data as well as personal and user information. This can help prevent unauthorized access to user accounts and minimize the risk of fraud or cybercrime, and the benefit to business owners is that having an account can gain additional benefits such as accessing content that is not available to visitors without logging in, tracking their activity on websites, or setting user preferences. Main Dashboard Page: The first view seen by users when they log into an application or menu available there. The function of the main dashboard is to provide users with relevant and important information about their activity, performance, or status within the application. Master of Incoming Goods: This page serves to record goods that enter the warehouse or storage area. On this page, information such as item name, quantity, date of entry, and origin of goods are recorded. By recording

incoming goods, the inventory management system can calculate the amount of stock available and update stock information automatically. Outgoing Goods Master: This page serves to record goods that come out of the warehouse or storage area. On this page, information such as item name, quantity, exit date, and delivery destination are recorded. By recording outgoing items, the inventory management system can calculate the amount of stock left and update stock information automatically. Return Item Master: This page serves to record the goods returned by the party responsible for the goods ordered by the supplier. On this page, information such as item name, quantity, return date, and reason for return are recorded. By recording returned items, the inventory management system can calculate the amount of stock remaining and update stock information automatically. Req Goods: This page serves as a place to submit requests for procurement of goods or materials by departments or units in the company. On this page, information such as the type of goods, quantity, and reason for procurement are recorded. Using this page, departments or units that need goods or materials can submit procurement requests to superiors or authorized parties for approval. Goods Approval: This page serves as a place to approve or reject applications for procurement of goods or materials submitted by other departments or units in the company. On this page, information such as item type, quantity, price, and department filed are recorded. On this page, your employer or authority can evaluate the request and give approval or rejection. Print Report: This page aims to find out the level of availability of printed goods by date can also help business owners monitor the level of stock availability of their goods. For example, business owners can see how many products are sold in each period of time and determine if they need to order more items to meet demand. Sales & Supplier page: Hin a management system or business application that serves to display the list of sales or sales recorded in the system Sales list page can also be used to simplify the process of tracking certain sales transactions. For example, if there are complaints from customers related to a sales transaction, management can easily find information related to the transaction through the sales list page.
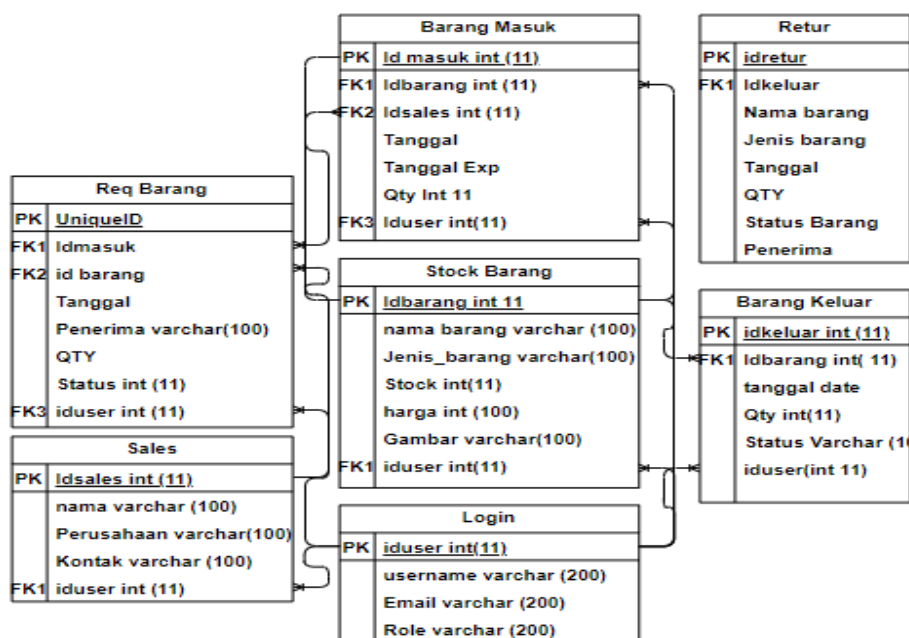

Figure 2. Entity Relationship Diagram Cosmetic Modern

2. Non-Functional Needs
needs to describe other characteristics or qualities of the system in addition to the functions to be performed. Non-functional needs are usually related to the performance, information, control, or usability of a system [25] . Performance: The system design that is made can display all product list data and item search quickly Information: In searching data related to goods information becomes easier to see and search due to the integration between data stored in modern cosmetic inventory databases. Control: The interrelation of all data can be managed properly with the presence of web pages that are not seen by customers (Backend) System Use: User interface and activities of the system provide ease of operation.

3.2 Data Modeling

ERD (Entity Relationship Diagram)
Figure 2 shows the relationship of entities to each other in the database design, based on the image that.
Attached above is the formation of a relationship between the set of stock goods and the set of req goods, incoming goods. Furthermore, outgoing goods form a relationship with the id of goods and for the set of logins connected to all elements such as incoming goods, outgoing, sales lists, price lists, stock goods, returns, req item. By utilizing visualization between entities, it is expected to identify errors or inconsistencies in the design of the system or database before implementation is carried out. By looking at the ERD, the study can ensure that all entities or objects are properly connected and that no relationship is missed or redundant**.**

3.3 Process Modeling

Data Flow Diagram (DFD)
One of the diagrammatic techniques in system analysis and design is used to describe the flow of data in an information system. DFD shows how data enters and is managed by the system, how data is processed and stored, and how data exits the system. It can be concluded that this Data Flow Diagram is technically diagrammatic used as describing the flow of data in information systems and DFD helps clarify, simplify system complexity and assist in system design and facilitate visual communication, it is hoped that by understanding the requirements of the proposed system can make designs that are in accordance with business needs .
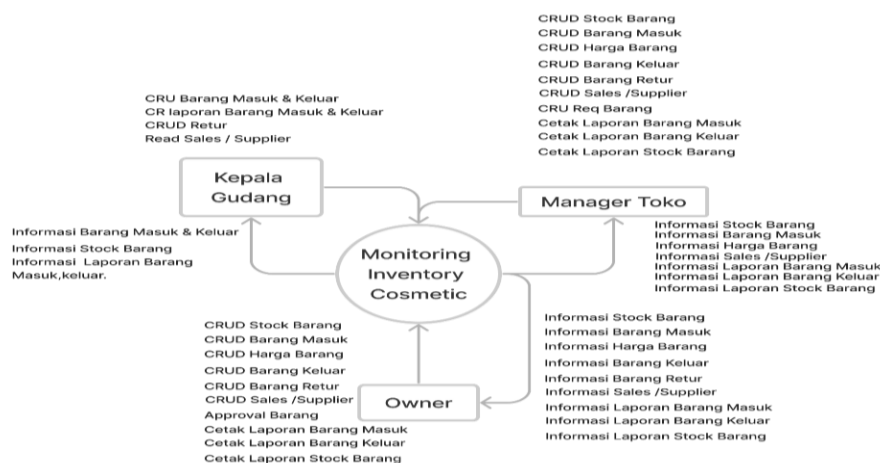
Figure 3. Data Flow Diagram Cosmetic Modern

Figure 3 Displaying the context diagram of the results of the system design proposed web-based inventory monitoring application in the diagram, there are 3 main entities, namely owner, store manager, warehouse head with each entity having its own activities and roles. Owners can carry out CRUD activities on stock data on goods, incoming goods, outgoing goods, returns for goods, suppliers and users as well as reporting stock of goods, incoming goods, outgoing goods and returns of goods and approval of goods then store managers can carry out activities such as CRUD stock data of goods, incoming goods, outgoing goods, returns of goods, suppliers, requests for goods and users as well as reporting stock of goods, incoming goods, outgoing goods and returns of goods and finally for the head of the warehouse can carry out activities such as CRU Incoming and outgoing goods, Create Read reports of incoming and outgoing goods CRUD Returns, Read Sales or suppliers.

3.4 App Development

In the early stages of making applications using the RAD method, researchers will analyze user needs and design system designs. The researcher will also determine the needs and specifications of the application, as well as create a project plan. After that, researchers will make a prototype of the application and show it to the owner and other users. This prototype will be the basis for researchers to produce the final version of the application. During the development process, researchers will use the iterates development model, which is to produce incremental versions of the application and integrate new features with each iteration. This allows researchers to correct errors and take input from clients and end users at every stage of the iteration. Thus, RAD allows researchers to produce applications that are faster and more responsive to business needs. One of the main advantages of the RAD method is its ability to speed up application development time. In this method, software developers can produce applications quickly because they utilize an iterative development model and collaboration with clients and end users. This allows researchers to produce applications that are

better and better suited to user needs. In addition, RAD also allows researchers to work on this project for 60 to 90 days or in 12 weeks. In this method, researchers can easily adapt the application to the changing needs of a business or organization. This can be done because RAD uses an iterative development model that allows researchers to take input and changes at each stage of the iteration along with the stages and schedule of work in the table Schedule of Working Activities.

Table 1. Schedule of Working Activities

Activities	October 2022				November 2022				December 2022						
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Business Modeling	█					█					█				
Data Collection		█					█					█			
Process Modeling			█					█					█		
App creation				█					█					█	
Testing					█					█					█

Figure 4 bar gam displays the Main Page, which is the stock of goods page where when the user has logged in according to his role, this role will be directed to the main page to see the list of goods and the amount of stock available, not only that there is an item search feature according to category: item name, type of item and also the user can change and delete the category of goods that you want to delete or change accordingly, Each user will be able to see notifications such as notifications of successful entry items, notification warnings where the stock of these items begins to run low, and if it is red then there is a notification that the stock is empty every notification of buoyant with each other simultaneously.
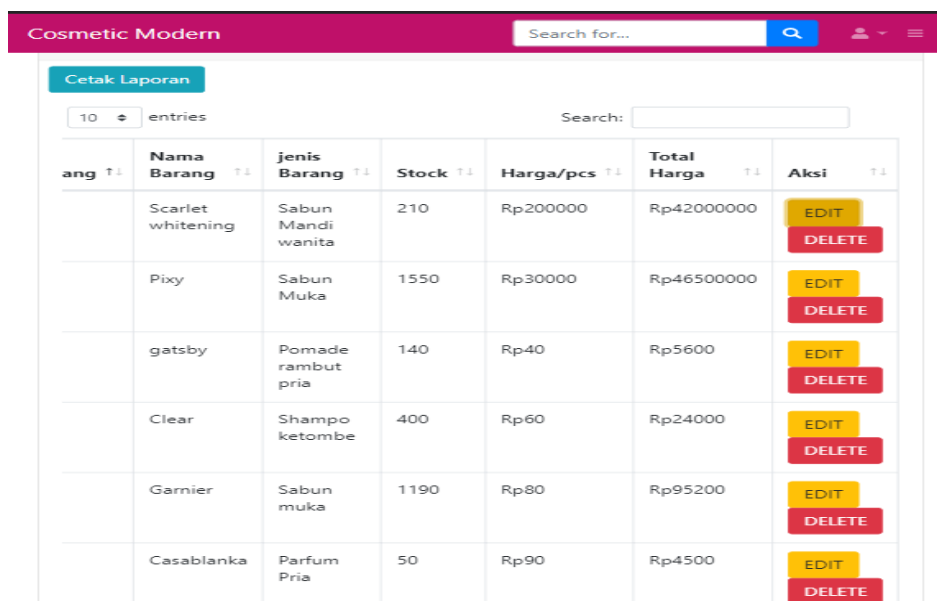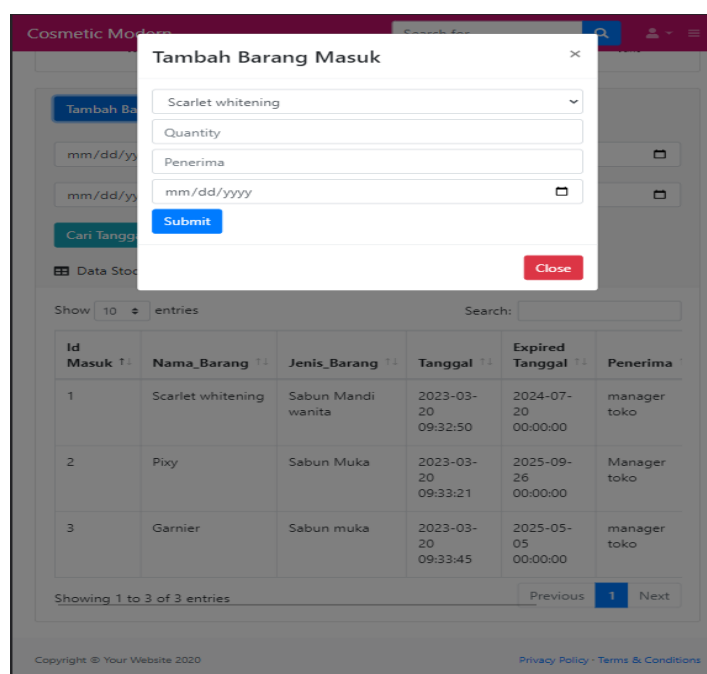

Figure 4. Stock Main Page

Figure 5. Item Price

In **Figure** 5 displays the price list page of goods based on incoming goods in the stock warehouse, users can add the value or price of each product according to their business needs so that users can find out the price of the product, not only that users can delete the price list or products that are no longer sold in the market and users can use the search feature by typing in the upper right corner can use sentences Such as: product name, product type.

Figure 6. Incoming Goods Page

In **Figure** 6 displays the incoming goods page, when the user wants to add goods to the warehouse stock page, first enter the name of the goods, type of goods, qty, expired and recipient of the goods not only that users who can access this page can print incoming goods reports according to the required period and also users can use search which functions as a search for goods according to the category of goods and types of goods and also users can Change the recipient QTY, the expiration date of the item.

Figure 7. Print incoming stock reports

In **Figure** 7 displays the printed page of the incoming goods report to provide information related to the results of what goods have entered the warehouse, print this report can be printed according to needs in certain formats such as: CSV, Excel, PDF and not only that in printing this report users can search for the name of the goods according to the name of the goods and the type of goods.

Figure 8. Req Item

In **Figure** 8 displaying the goods request page, the manager will ask for a request for goods to the owner, when asking for approval the owner will be redirected to the approval page where as a business can choose the approved goods or not so that the owner and manager get the same information about what items can be included in the product list and not, not only that this approval has a feature to search for goods based on the category of the name of the item, type of goods.
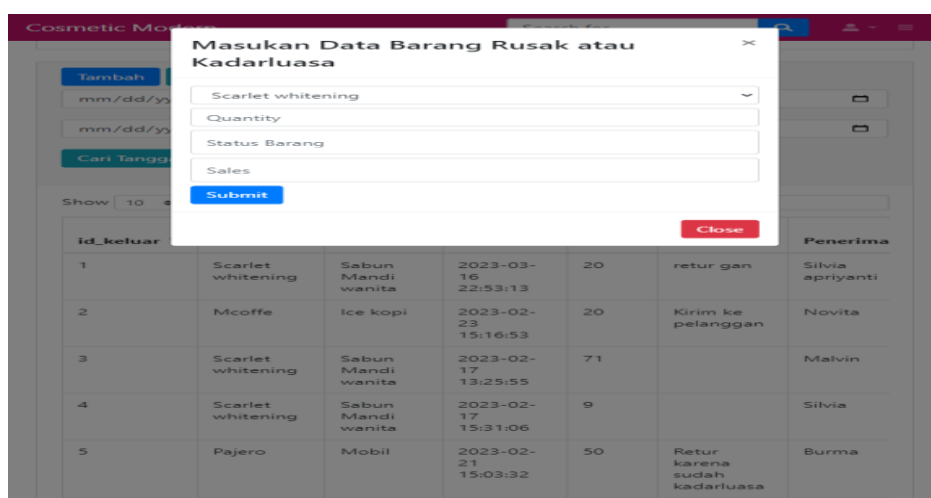
Figure 9. Approval Page

In **Figure** 9 displaying the approval page, the manager will ask for a request for goods to the owner, when asking for approval the owner will be redirected to the approval page where as a business can choose the approved goods or not so that the owner and manager get the same information about what items can be included in the product list and not, not only that this approval has a feature to search for goods based on the category of item names, type of goods.

Figure 10. Return Item Page

In **Figure** 10 Displaying the return item page, the user will add a return item if the item expires or is damaged which will be filled in by the user in the form is the user will choose the name of the item to be returned, the amount, status of the item and enter the name of the recipient of the return item, if already the user can contact through another application, namely WhatsApp to provide information related to the item you want to return. It should be underlined that this page is intended to state what items are returned and who is responsible for managing and contacting sales, not only

that users can search for dates according to the period they want to find, and users can print return reports according to their wishes.
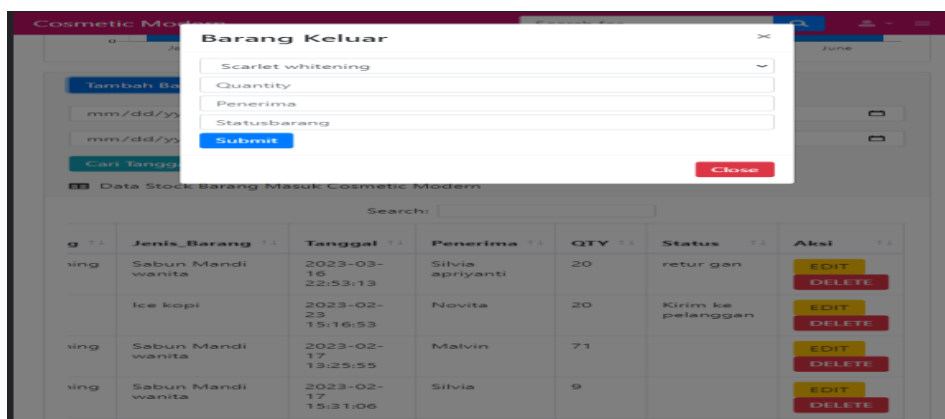

Figure11. Item Exit Page

3.5 Testing

Table 2. Results of System Testing with Black Box Testing

Test Case	Display as expected	Running Button Function	Corresponding Navigation Function	Positive Testing	Negative Testing
User Home Page	✓	✓	✓	✓	✓
Item Stock Page	✓	✓	✓	✓	✓
Approve Page	✓	✓	✓	✓	✓
Req Page	✓	✓	✓	✓	✓
Item Price Page	✓	✓	✓	✓	✓
Reports page	✓	✓	✓	✓	✓
Sales List Page	✓	✓	✓	✓	✓
Return Page	✓	✓	✓	✓	✓
Item Login Page	✓	✓	✓	✓	✓
Item Exit Page	✓	✓	✓	✓	✓
Item Exit Page	✓	✓	✓	✓	✓
Login page	✓	✓	✓	✓	✓
Logout Page	✓	✓	✓	✓	✓
Print Report	✓	✓	✓	✓	✓

In **Figure** 11 displays the outgoing goods page, the function of this exit page is to inform each user what goods come out of the warehouse and their status so that users one by another know the number of goods that come out and the recipient, not only that users can use the date search feature according to the period can also print outgoing goods reports according to needs and can search for goods according to the type of goods and the name of the goods and also can delete and change the category of the item.

Table 2 Displays the results of system testing using a Black Box Testing method. The purpose of black box testing is to test the functionality of a system or application without regard to its internal structure. In black box testing, testing is done by sending inputs to the system and checking the output produced, without knowing how it works or the code used in the

system. The results of the test show that the system is functionally ready and can meet the business needs that have been described in business modeling.

4. CONCLUSION

Conclusions can be drawn At the stage of needs analysis until testing, 3 roles were obtained, namely as entrepreneurs, store managers and warehouse heads, 10 functional needs and 4 non-functional needs were obtained. Furthermore, the data modeling stage obtained relationships between entities with each other and obtained 7 relationships based on the activity of the proposed business process. By using the RAD (Rapid Application Development) method, it is very suitable for use in systems that are not so large and complex and the stages in RAD facilitate system development because the stages are systematic and fast and repeated literacy is needed to ensure the needs are in accordance with the business processes that have been undertaken. The use of this method to realize an inventory information system can provide optimal results. The system can complement the importance in managing inventory data in and out, price lists reports for each transaction and also and can answer functional needs to obtain information. The rapid application development method involves website developers and owners, warehouse heads and store managers in developing inventory systems. Thus, the resulting inventory system can better suit business needs, and web users of this inventory monitoring application can also provide input on the features and functions needed, not only that the use of the website for the entire device will ensure users can access the website easily, no matter what device it will be use. This will help improve the user experience and expand the range of remote monitoring on this modern cosmetic inventory website. This system is created using the bootstrap framework and PHP programming language and the database uses MySQL as a database to support data storage so that users do not need a lot of books for recording and searching data as is possible in manual systems. Therefore, the design of inventory monitoring applications can help solve problems experienced by modern cosmetic store businesses, warehouse heads and store managers in managing inventory data in this storefront, as well as inventory monitoring website applications can help as modern cosmetic business owners In carrying out the process of managing inventory, remote monitoring so that it can facilitate ongoing business processes. The results of testing on the system using the black box testing method on units in the sales information system that were built showed results as expected which showed the functionality of the system had good results.

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