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Web-Based Management Of Perfume Distribution At Aishalina Fragrance Business Using The Economic Order Quantity (EOQ) Method

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Abstract - The perfume industry in Indonesia has shown significant growth in line with the increasing consumer demand for beauty and fragrance products. One of the emerging businesses in this sector is Aishalina, a small and medium enterprise (SME) that focuses on the production and sale of affordable perfumes. However, Aishalina faces several challenges in its distribution process, including suboptimal inventory management, delivery delays, and inefficiencies in supply chain management. To address these issues, this study proposes the implementation of a web-based information system integrated with the Economic Order Quantity (EOQ) method. This system aims to automate the distribution process, monitor stock levels in real-time, and determine the optimal order quantity to minimize inventory-related costs. With a more efficient distribution system, Aishalina is expected to improve service speed, maintain product availability, and enhance customer satisfaction. The results of this study indicate that the implementation of a web-based information system using the EOQ method significantly contributes to improving operational efficiency and increasing the competitiveness of Aishalina in an increasingly competitive market.

Keywords: Perfume distribution, web-based information system, Economic Order Quantity (EOQ), inventory management, Aishalina SME.

INTRODUCTION

The perfume industry in Indonesia has shown rapid growth, driven by increasing public awareness of personal appearance and body fragrance as part of self-identity. This development presents significant opportunities for small and medium-sized enterprises (SMEs) to innovate in producing high-quality and affordable fragrance products. One such SME operating in this sector is Aishalina Fragrance, which focuses on the production and distribution of local perfumes.

However, despite promising market opportunities, Aishalina faces several operational challenges, particularly in distribution management and inventory control. The main issues include delayed product deliveries, inefficient stock management, and the absence of an integrated information system to support real-time distribution processes. In the era of digitalization and heightened market competition, these problems can significantly impact customer satisfaction and business sustainability.

Table 1.1 Monthly Product Sales Data

No	Toko	Jumlah	Produk Terjual	Tidak Terjual
1	Bengkulu	800 Botol	680	120
2	Padang	1200 Botol	1100	100
3	Bukit Tinggi	700 Botol	600	100
4	Payakumbuh	960 Botol	55	905
5	Pesisir Selatan	1200 Botol	1200	0
6	Pariaman	1000 Botol	600	400

Sumber : Usaha Parfum Aishalia

An analysis of monthly sales data (Table 1.1) reveals imbalances between the number of products distributed and those

sold in various regions. For instance, in the Payakumbuh area, only 55 out of 960 bottles distributed were sold, indicating a sales rate of just 5.7%—a clear sign of inefficiency in distribution planning. On the other hand, regions such as Pesisir Selatan achieved a 100% sales rate, demonstrating the potential of a more targeted distribution approach. This disparity highlights the need for a system capable of more accurately analyzing demand.

These conditions indicate a significant gap between Aishalina's operational needs—requiring speed, accuracy, and distribution efficiency—and the current manual, disorganized methods. To bridge this gap, a systematic solution is necessary to digitally integrate the entire distribution process.

One proposed solution is the implementation of a web-based distribution information system integrated with the Economic Order Quantity (EOQ) method. EOQ is a widely-used inventory management technique that helps determine the optimal order quantity, minimizing total ordering and holding costs. For example, with hypothetical values such as an annual demand (D) of 10,000 units, ordering cost (S) of IDR 500,000, and holding cost per unit (H) of IDR 1,000, the EOQ can be calculated as follows:

$$EOQ = \frac{\sqrt{2DS}}{H} = 21000 \times 500000$$
$$= \sqrt{10000000} = 3162\ unit$$

This EOQ value can be technically integrated into the web-based system to enable automated restocking notifications, calculation of minimum stock levels, and demand forecasting based on sales history. Consequently, Aishalina can avoid overstocking or understocking issues and accelerate the distribution process.

The urgency of implementing such a system lies in the growing necessity for digitalization and automation in business processes, particularly to keep pace with rapidly changing market dynamics. The developed information system serves not only as a technical tool but also as a strategic asset for enhancing SME competitiveness in the perfume industry.

On the other hand, another significant challenge that must be addressed is the need to maintain product quality throughout the distribution process. A robust information system will enable Aishalina to ensure that every step in the supply chain is carried out according to high standards — from sourcing quality raw materials to safe packaging and delivery. As a result, the company not only meets customer needs but also builds trust and loyalty toward the Aishalina brand.

With all the advantages it offers, the implementation of a web-based perfume distribution information system at Aishalina Perfume is not merely a technical innovation but a strategic move that can strengthen the company's competitive position in the perfume industry. In the long term, this system will help Aishalina continue to grow, adapt to market changes, and achieve greater business goals while providing a better experience for customers. Hence, Aishalina will not only be seen as a perfume provider but also as a leader in service quality and innovation in an increasingly dynamic market.

This application is expected to help automate the distribution process, reducing the time and effort required for manual tasks. The integrated system allows Aishalina to monitor stock levels in real-time, enabling timely actions to avoid overstock or stockouts

Based on the description above, it is expected that this system will facilitate a faster and more accurate process in determining perfume distribution. Therefore, the author is interested in conducting a study entitled: "Perfume Distribution Management in Aishalsina Perfume Business Based on Web Using Economic Order Quantity (EOQ) Method."

METHODOLOGY

A. Definition of Management

According to Firmansyah & Mahardika, management is the art and science of planning, organizing, arranging, directing, and supervising human resources to achieve predetermined goals. Hasibuan defines management as both a science and an art of organizing the utilization of human resources and other available resources effectively and efficiently to accomplish an objective. The aim of management can also be interpreted as the effort to optimize the use of all available resources to achieve the established objectives [1].

B. Definition of Distribution

According to Ni Nyoman Juli Nuryani & Desi Handayani, distribution is the process undertaken by marketers to deliver the products they sell to specific locations—target markets—aimed at maintaining product stock availability for consumers. Distribution refers to the marketing channels used by manufacturers to deliver their products to industries or consumers. Distribution involves entities such as producers, distributors, and consumers or industries. Another definition by Widodo explains distribution as a marketing effort aimed at optimizing the delivery of goods and services from producers to consumers in accordance with their needs—considering type, quantity, price, location, and timing [2].

C. Software Engineering

Software Engineering is a discipline that focuses on methods for developing software, including creation, maintenance, development management, and more [3].

Software is a computer program accompanied by documentation, such as requirement specifications, design models,

and user manuals. A computer program without associated documentation cannot be considered software. Software is often referred to as a software system—meaning a set of interconnected components working together to achieve a specific goal.

Software Engineering involves applying engineering principles to develop economically valuable, reliable, and efficient software using machines. Many software systems go unused because they fail to meet user needs or due to non-technical issues such as user resistance to transitioning from manual to automated processes or user inability to operate computers. Thus, Software Engineering is necessary to ensure the software developed is usable and meets user requirements [4].

SDLC (Software Development Life Cycle) is the process of developing or modifying software systems using models and methodologies applied by developers in previous systems. The phase discussed in this research is the design phase, which involves translating analysis into a model language such as UML [5]. This research uses the Waterfall Method.

a. Waterfall Method

The Waterfall Method was developed in the 1970s and is known for being simple and easy to understand. This approach emphasizes completing each phase before moving on to the next. It is often used in projects with clear requirements and minimal mid-development changes.

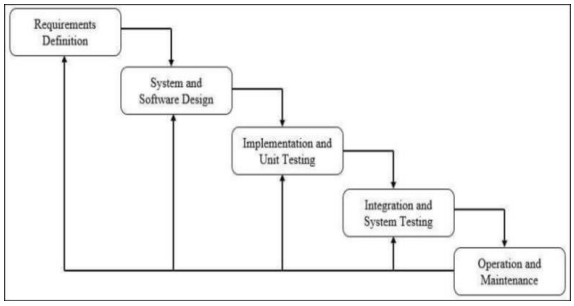

Fig 1 Waterfall Method

The Development Stages Are as Follows:

1. Requirements Definition

   Before starting any technical work, communication with the customer is essential to understand and achieve the intended goals. The result of this communication is project initialization, such as analyzing the problems faced, gathering the necessary data, and helping define the software's features and functions. Additional data collection can also be obtained from journals, articles, and the internet.

2. Software and System Design

   This stage involves designing and modeling the system architecture, focusing on data structure design, software architecture, user interface design, and program algorithms. The objective is to gain a comprehensive understanding of the overall system to be developed.

3. Implementation and Unit Testing

   This stage is the process of translating the design into code or a machine-readable form. After coding is completed, testing is conducted on the system and the code that has been written. The goal is to identify and fix any potential errors.

4. Integration and System Testing

   This stage includes planning activities that involve estimating technical tasks, identifying potential risks, determining the resources needed to develop the system, defining deliverables, creating a project schedule, and tracking the system development process.

5. Maintenance

   This is the stage where the software is delivered to the customer, followed by regular maintenance, bug fixes, system evaluation, and further development based on user feedback to ensure that the system continues to operate and evolve according to its intended functions.

D. Unified Modeling Language (UML)

Unified Modeling Language (UML) is a collaboration of methodologies such as Booch, OMT (Object Modeling Technique), OOSE (Object-Oriented Software Engineering), and others. It is currently the most widely used methodology for system analysis and design using object-oriented techniques, adapting to the widespread use of object-oriented programming (OOP). UML is the standard language for writing software blueprints, used for visualization, specification, construction, and documentation of software system components [8].

E. Website

A website can be defined as a collection of pages that contain digital data information in the form of text, images, animations, audio, video, or a combination of all of these, which is provided through an internet connection so that it can be accessed and viewed by people all around the world. Website pages are created using a standard language called HTML. This HTML script is interpreted by a web browser, allowing the content to be displayed as readable information for users. In general, websites are categorized into three types: static, dynamic, and interactive websites[6].

F. Definition of PHP

PHP is an open-source, server-side language used to create dynamic websites. PHP can be embedded into HTML and is typically used in conjunction with MySQL databases on Linux/Unix servers. PHP is currently one of the most popular programming languages. PHP complements HTML by enabling the creation of dynamic applications that allow for data manipulation and processing. All syntax written in PHP is executed entirely on the server, while only the output is sent to the browser.

G. Unified Modeling Language (UML)

Unified Modeling Language (UML) is a graphical language used to visualize, specify, construct, and document the components of object-oriented (OO) software development systems. UML provides a standardized blueprint for describing systems, including business process concepts, class structures in specific programming languages, database schemas, and the components required in a software system. In this design, four UML diagrams are used: Use Case Diagram, Activity Diagram, Sequence Diagram, and Class Diagram.

1. *Use Case Diagram*

The use case diagram is used to describe the features that can be accessed by the users and to illustrate the interactions between one or more actors and the system being developed. This diagram also serves as a tool for verifying whether all the functionalities described in the use cases have been implemented within the system. The use case model functions to represent the functional requirements and to describe the behavior of the system in response to external interactions. A use case focuses on what the system does, not how the system performs those actions. System behavior, as illustrated in a use case, refers to how the system acts and reacts to inputs, which can be observed externally and tested. Therefore, use cases play a crucial role in the system analysis and design process, as they provide a clear understanding of the system's responsibilities in various user scenarios.

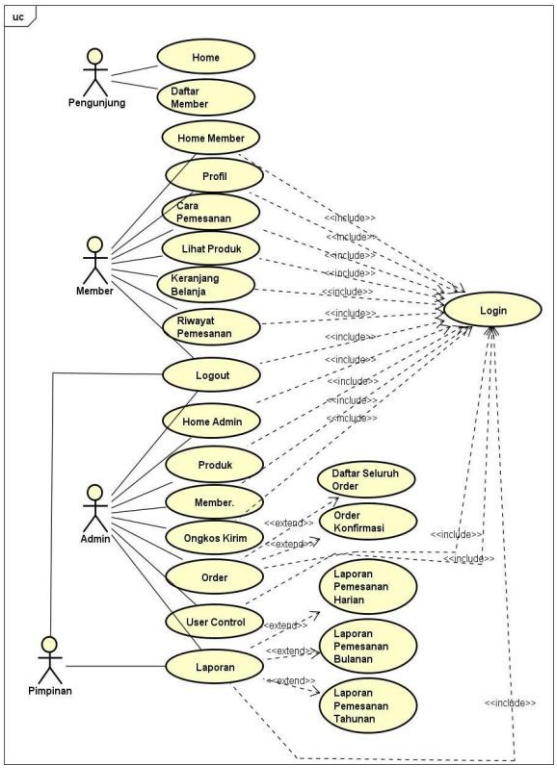

Fig 2 *Use Case Diagram*

2. *Class Diagram*

Class diagrams represent the existence and relationships of classes within the logical design of a system. A class is a specification that, when instantiated, produces an object, and it forms the core of object-oriented development and design.

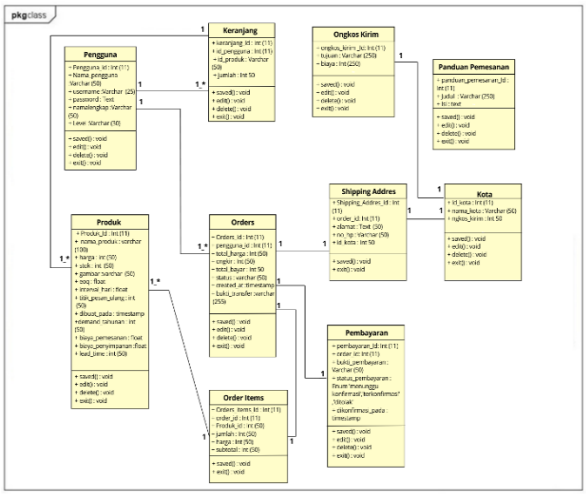

Fig 3 *Class Diagram*

I. RESULTS AND DISCUSSION

A. Results and Discussion of the Design

Based on the design and implementation stages discussed in the previous chapter, this chapter presents the results of the implementation of those stages.

1. Login Page

On this page, customers log into the system by entering their username and password. If the login is successful, they will be directed to the customer dashboard page; if the login fails, they will be returned to the login page.

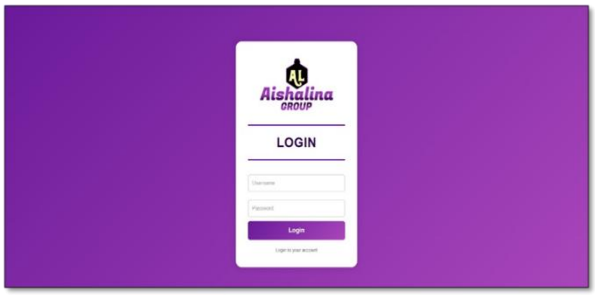

Fig 4 login Page

2. Main Customer Page Menu

On this page, the main menu available to the customer is displayed, which includes the following options: Profile, How to Order, View Products, Cart, and Order History.

Fig 5 Main Customer Page Menu

3. Customer Profile Page

This page displays the customer's profile data. Customers are able to edit their profile information on this page.

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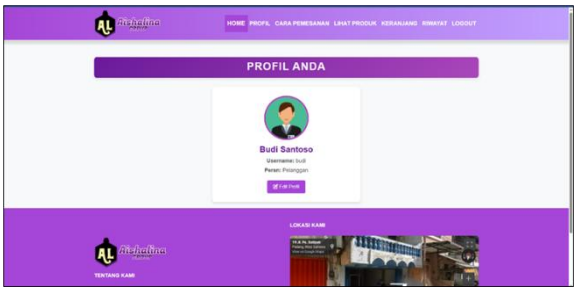

Fig 6 Customer Profile Page

4. How to Order Page

This page displays information on how to order products. Customers can only view the ordering instructions on this page.

Fig 7 How to Order Page

5. Product Viewing Page

This page displays product information. Customers can add products to their cart for checkout later.

Fig 8 Product Viewing Page

6. Shopping Cart Page

This page displays the products that have been added to the customer's shopping cart.

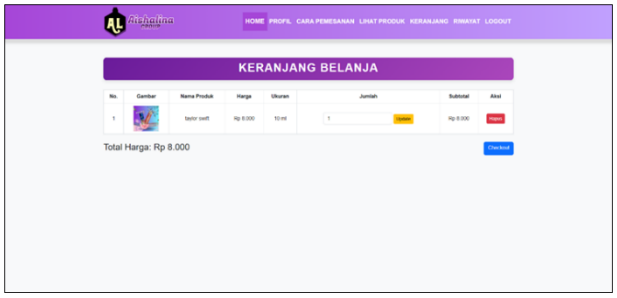

Fig 9 Shopping Cart Page

7. Order History Page

This page displays the customer's product order history, including orders that are awaiting payment, currently being processed, or already completed.

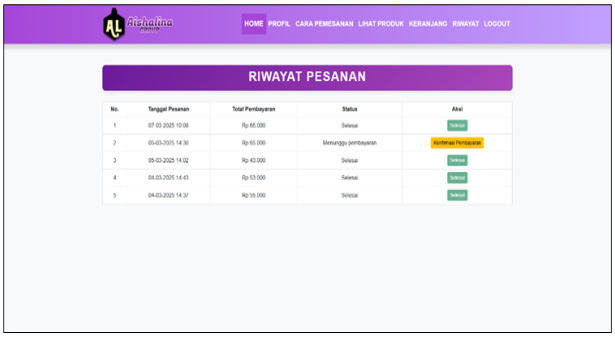

Fig 10 Order History Page

8. Admin Login Page

On this page, the admin logs into the system by entering a username and password. If the login is successful, they will be redirected to the admin dashboard; if not, they will be returned to the login page.

Fig 11 Admin Login Page

9. Admin Dashboard Page

This page displays the main menu options available for the admin to manage the system. The available menus include:

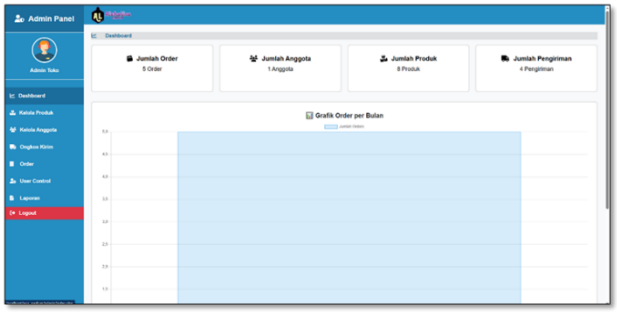

Fig 12 Admin Dashboard Page

10. Manage Products Page

This page displays product data. The admin can add new products, edit existing product information, or delete products from the system.

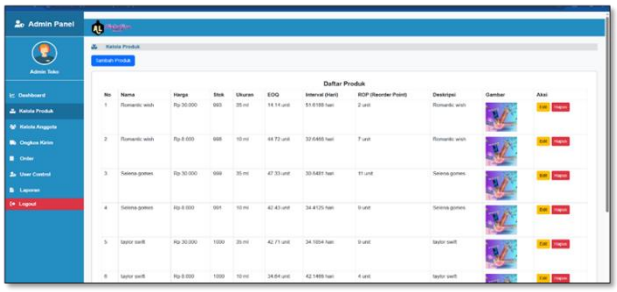

Fig 13 Manage Products Page

11. Manage Members Page

This page displays member data. The admin can add new members, edit existing member information, or delete members from the system.

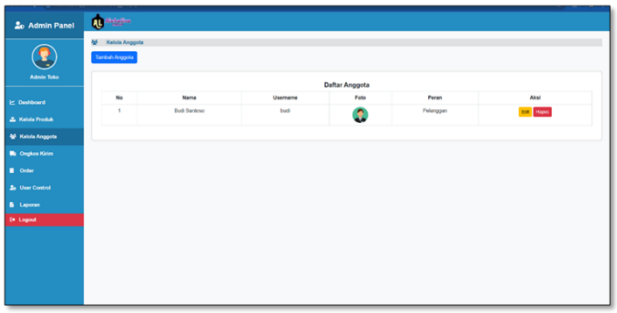

Fig 14 Manage Members Page

12. Shipping Cost Page

This page displays the shipping cost data for each city. The admin can add new shipping costs, edit existing ones, or delete them from the system.

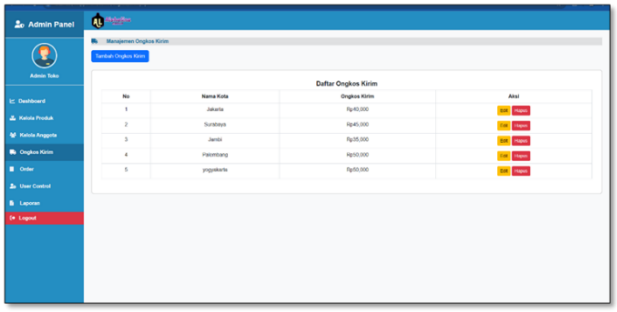

Fig 15 Shipping Cost Page

13. Order Page

This page displays product order data from customers. In this menu, the admin can update the order status, whether the order is being processed or has been delivered.

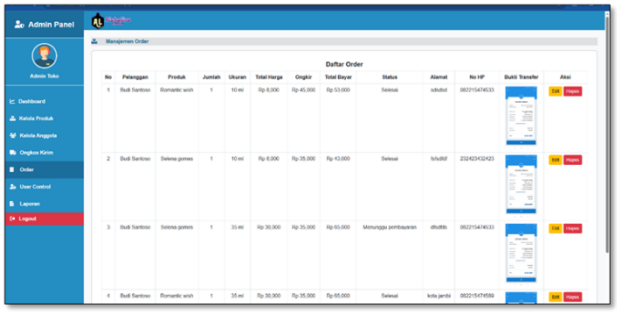

Fig 16 Order Page

14. User Control Page

This page displays the user data of the system. The admin can add, edit, and delete users.

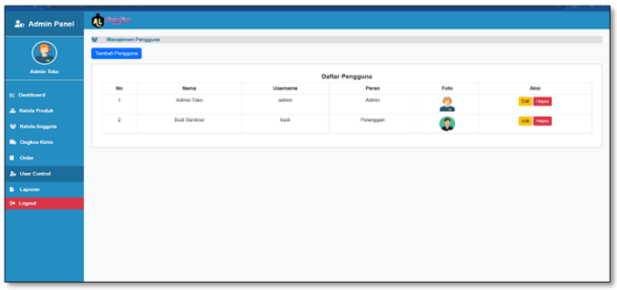

Fig 17 User Control Page

15. Report Menu Page

This page displays sales report data. The admin can print the report, and it can be filtered by date and month.

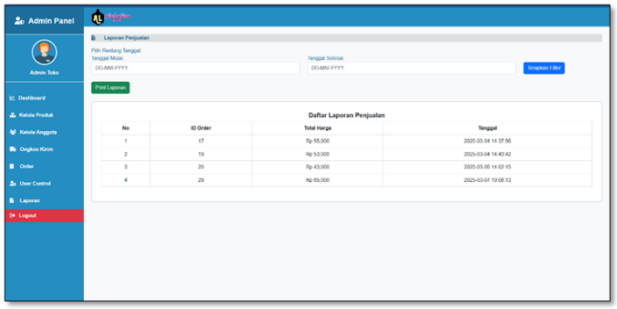

Fig 18 Report Menu Page

TESTING

After implementation, testing is performed on the system with the aim of identifying any errors or shortcomings in the system. The system testing on this website is carried out using the Black Box method. In this test, the focus is on functional requirements and whether the output meets the expected results or not. The Black Box testing method is used by creating cases that try all functions using the software to see if it meets the required specifications. The following are some of the processes that will be tested:

1. Login Page Testing

Table 2 Login Page Testing

No	Scenario	Expected Result	Test Result	Conclusion
1	Username: [empty], Password: [empty], then press Login	Cannot proceed with the login process because both fields are empty.	Display message "Please fill out this field" on the username and password form.	Valid
2	Username: admin, Password: [empty], then press Login	Cannot proceed with the login process because the password is empty.	Display message "Please fill out this field."	Valid
3	Username: admin, Password: admin111, then press Login	Cannot proceed with the login process because the password is incorrect.	Display message "Login failed! Incorrect username or password!"	Valid

4	Username: admin, Password: admin123, then press Login	Login successful, user is redirected to the admin dashboard.	Login successful and user is directed to the admin dashboard.	Valid

2. Testing the Shopping Cart Page

Table 3 Testing the Shopping Cart Page

No	Scenario	Expected Result	Test Result	Conclusion
1	Adding a product to the cart	Product is successfully added to the cart.	Product appears in the cart list.	Valid
2	Removing a product from the cart	Product is removed from the cart.	Product disappears from the cart list.	Valid

3. Testing the Checkout Page

Table 4 Testing the Checkout Page

No	Scenario	Expected Result	Test Result	Conclusion
1	Proceed to checkout without filling out the form, then click "Complete Purchase"	Unable to proceed with the payment.	Message displayed: "Please fill out this field."	Valid
2	Proceed to checkout after filling out the form, then click "Complete Purchase"	Successfully redirected to upload transfer proof page.	Redirected to the upload transfer proof page.	Valid
3	Upload transfer proof without selecting a file	Unable to proceed with the payment.	Message displayed: "Please choose a file."	Valid
4	Upload transfer proof with a selected file	Transfer proof uploaded successfully.	Message displayed: "Transfer proof successfully uploaded. We will verify your payment."	Valid

4. Product Management Page Testing

Table 5 Product Management Page Testing

No	Scenario	Expected Result	Test Result	Conclusion
1	Add new product without filling out the form, then click "Add" button	Unable to proceed with saving process	Message displayed: "Please fill out this field."	Valid
2	Fill out the form and click "Add" button	Successfully added and redirected to product page	Message displayed: "Product successfully added."	Valid

5. Member Management Page Testing

Table 6 Member Management Page Testing

No	Scenario	Expected Result	Test Result	Conclusion
1	Add new member without filling out the form, then click "Add" button	Unable to proceed with saving process	Message displayed: "Please fill out this field."	Valid
2	Fill out the form and click "Add" button	Successfully added and redirected to member page	Message displayed: "Member successfully added."	Valid

6. Shipping Cost Management Page Testing

Table 7 Shipping Cost Management Page Testing

No	Scenario	Expected Result	Test Result	Conclusion
1	Add new shipping cost without filling out the form, then click "Add" button	Unable to proceed with saving process	Message displayed: "Please fill out this field."	Valid
2	Fill out the form and click "Add" button	Successfully added and redirected to shipping cost page	Message displayed: "Shipping cost successfully added."	Valid

7. User Control Management Page Testing

Table 8 User Control Management Page Testing

No	Scenario	Expected Result	Test Result	Conclusion
1	Add new user without filling out the form, then click the "Add" button	Unable to proceed with saving process	Message displayed: "Please fill out this field."	Valid
2	Fill out the form and click the "Add" button	Successfully added and redirected to user page	Message displayed: "User successfully added."	Valid

CONCLUSIONS

Based on the research conducted, the author can draw the following conclusions:

1. The perfume distribution system at Aishalina Fragrance Business is still carried out conventionally, leading to challenges in managing raw material and finished goods inventory, as well as inefficiencies in the delivery process.
2. Inefficiencies in inventory recording and distribution have caused delivery delays and difficulties in meeting customer demand optimally, potentially reducing customer satisfaction and the company's reputation.
3. The implementation of a web-based information system can serve as an effective solution to improve the efficiency of perfume distribution by enabling real-time monitoring of stock and delivery processes, thereby reducing the risk of delays and recording errors.
4. The use of the Economic Order Quantity (EOQ) method in the system helps Aishalina determine the optimal order quantity, reducing storage and ordering costs while ensuring stock availability in line with market demand.
5. Through the implementation of a web-based information system and the EOQ method, it is expected that Aishalina Fragrance Business can enhance operational efficiency, accelerate distribution processes, increase customer satisfaction, and strengthen competitiveness in the perfume industry.

In implementing the web-based perfume distribution information system using the Economic Order Quantity (EOQ) method at Aishalina Fragrance Business, there is still room for further development. Therefore, the following suggestions are provided to enhance the system's effectiveness and support future business growth:

1. The developed web-based system should be equipped with an automatic notification feature to alert users regarding low stock levels, shipping schedules, or new order requests, in order to ensure smoother operations.
2. The system should include a real-time shipment tracking feature, allowing customers and management teams to monitor product delivery status and anticipate possible delays.
3. The EOQ method in inventory management should be optimized regularly by considering market demand trends, storage costs, and ordering costs, to minimize operational expenses and improve stock management efficiency.

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