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Design Of A Stock Management Information System Using The First In First Out (FIFO) Method In One Of The MSMEs In Bandung

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Abstract

The stock management process is essential for SMEs, as one SME in Bandung employs a manual approach that often requires considerable time and data collection. The swift progression of technology facilitates the presentation of information with ease, speed, and efficiency. Manual stock management can be converted into a computerised system referred to as stock management information systems. A technology-driven stock management system will enhance efficiency by supplanting the manual system with a systematic approach. This project aims to analyze and develop a web-based stock management information system suitable for a small to medium-sized enterprise in Bandung.

The research conducted is descriptive and utilises a qualitative methodology. The inventory management approach employed is FIFO (First In First Out), whereas the system development methodology adheres to the Waterfall SDLC model. Flowcharts, entity relationship diagrams, and data flow diagrams underpin the design. This stock management system is constructed with PHP as the programming language, Visual Studio Code as the code editor, XAMPP as the web server, and MySQL as the database. The implementation of the FIFO approach in inventory management is expected to resolve problems associated with dim sum being stored for extended periods in the warehouse, resulting from the prior flow of items, thereby enhancing the accuracy and efficiency of stock management. This research should be further developed into a mobile application to provide user access via cellphones.

Keywords : *Stock Management Information System, First In First Out (FIFO)*

INTRODUCTION

The inventory system is an application that facilitates the management of data related to items stored in storage rooms or warehouses. (Sumaryanto et al., 2022) Small and medium-sized enterprises that lack an inventory system encounter numerous difficulties in managing their stock data. For example, a small and medium-sized enterprise in Bandung continues to utilise a manual approach for documenting inventory data. Given that inventory management is crucial for SMEs, implementing a technology-driven inventory system will be significantly more efficient and effective than manual approaches. Manual data gathering is inefficient, requiring considerable time to accurately compile extensive stock data, which often results in data redundancy. Moreover, entering stock data is laborious as fresh information must be generated with each data collection. Consequently, this inventory system is essential for entrepreneurs initiating their enterprises, since it addresses stock data processing challenges and streamlines reporting on available products.

Furthermore, dim sum stock possesses a limited shelf life, enduring one day at ambient temperature and 30 days when frozen. Therefore, a system capable of precisely managing inventory levels is crucial to avoid the accumulation of surplus dim sum in the warehouse. The FIFO (First In, First Out)

method effectively resolves this issue by ensuring that the initial dim sum items stored in the warehouse are the first to be sold, thereby preventing excessive storage that could result in overcrowded spaces and a deterioration in the quality of dim sum, concerning both ingredients and expiration dates. The business procedure at Grill Dimsum commences when a customer acquires dim sum, after which the outlet staff swiftly communicates the pricing of each item. Upon depleting a dim sum variety, the staff documents the item and notifies the SME owner in Bandung, facilitating the reordering of the out-of-stock variant.

Design

Design is a process of defining an object to be created using multiple methodologies, encompassing a detailed explanation of its components and constraints encountered throughout production (Rahayu et al., 2025).

System

A system is defined as a collection of interconnected and associated components that collectively constitute a unified entity. (M. R. Putra & Prawiro, 2024)

A system is an assemblage of interrelated and interacting processes that execute an activity to get a specific outcome. (Abed et al., 2023)

System Characteristics

According to (Murmu et al., 2023), the following are system characteristics that distinguish one system from another:

1. System Components: A system consists of several components that interact with each other and work together to form a single unit.
2. System Boundary: The area that separates the system from other systems or the external environment.
3. System Environment: The external environment of the system includes all factors outside the system boundaries that affect its operation.
4. System Interface: The medium that connects one subsystem to another.
5. System Input: The part of the system that receives input data.
6. System Output: The result of system operations that process energy into useful or useless output, depending on its purpose.
7. System Processing: The system has a processing part that converts input into output.
8. System Goals (Objective): Every system must have a goal or target to be achieved

System Type

According to (Roziqin & Kusuma, 2021), there are several types of systems as follows:

1. Open Systems
   These are systems that are influenced by the external environment. For example, systems within one organization are influenced by systems within other organizations.
2. Closed Systems
   External environmental factors do not influence these systems. For example, laboratory systems must be protected from contamination by outside air.

Information

Information is data that has been processed into a more comprehensible format for the

recipient, facilitating current or future decision-making (T. A. E. Putra et al., 2024).

Supply

Inventory is categorised into two groups according to the nature of the company: trading companies and manufacturing companies. In a trade enterprise, inventory is a current asset comprising goods acquired for resale or use in the business. Consequently, a trading corporation possesses solely one category of inventory: finished items, commonly referred to as merchandise. Conversely, a manufacturing firm's inventory constitutes a current asset comprising raw materials, work-in-progress items, and finished goods designated for sale or further processing (Afrina et al., 2023).

Figure 1. Inventory

Inventory Recording Methods

Kusmanto (2024) identify three categories of inventory recording methods:

1. First In, First Out (FIFO)
   This strategy posits that the inventory entering the warehouse initially will expire first, necessitating its precedence in exiting. Thus, the ending inventory using this method is valued at the most recent purchases. Firms in the food and beverage sector are ideally positioned to employ this strategy, given their frequent engagement with perishable goods.
2. Last In, First Out (LIFO)
   This strategy posits that the inventory entering the company last will be the first to be dispatched. Concurrently, the existing inventory will continue to be housed at the warehouse.
3. Mean Approach
   This method disregards the sequence of product receipt; instead, it calculates the average price of all goods, encompassing both initial inventory and subsequent acquisitions. The weighting element employed is the volume of products acquired.

   This research selects the FIFO method for inventory management, as it is appropriate for dim sum raw ingredients, which have a limited shelf life of one day at room temperature and 30 days when frozen.

MySQL

MySQL is a database server application that can rapidly receive and transmit data, accommodate multiple users, and utilize standard SQL (Structured Query Language) commands.

PHP Native

PHP, an acronym for Hypertext Preprocessor, is a programming language

designed for developing dynamic web pages (Utami et al., 2018).

There is a need for a data stock management system, underpinned by information technology, that delivers rapid and efficient data management designed explicitly for dim sum products. FIFO (First In First Out) underpins the company's methodology for processing and managing dim sum inventory, ensuring the oldest stock is prioritised for release to maintain quality.

METHOD

This study employs a descriptive research method with a qualitative approach, aiming to gather current information. It emphasizes the identification of a problem and the current circumstances, analyzing and scrutinizing them comprehensively. This methodology utilises descriptive analysis to present the stock management information system by scrutinising the inventory procedures at Grill Dimsum. This study seeks to comprehend the functioning of the stock management information system at Grill Dimsum. Descriptive research analyzes data solely at a descriptive level, meticulously examining and presenting facts to facilitate comprehension and informed decision-making.

a) System Development Life Cycle (SDLC) Waterfall

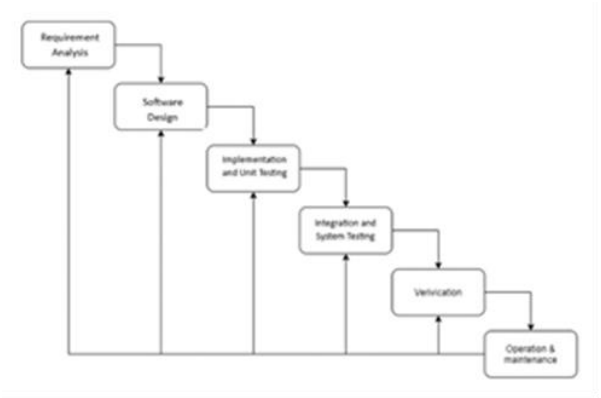

Figure 2. SDLC Stages

The System Development Life Cycle (SDLC) is a methodology for software development that employs proven models and well-tested stages (Pratama et al., 2020).

b) First In First Out (FIFO)

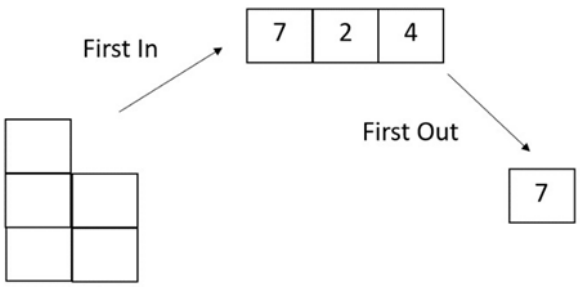

Figure 3. FIFO Method Flow

The FIFO approach adheres to the idea that the earliest received products are the first to be dispensed (Harnovinsah, 2023). This study employs the FIFO approach in the stock management information system by organizing incoming dim sum stock according to entry date, thereby facilitating user identification of the dim sum that should be prioritized for use or sale to customers.

RESULT AND DISCUSSION

a) Running System

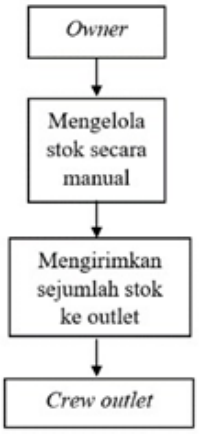

Figure 4. Running System

The owner autonomously handles and delivers the product without communicating with the outlet workers, thereby increasing the likelihood of miscommunication. This may result in scenarios where the inventory dispatched to the outlet is inadequate for sales requirements, or there is an overabundance of goods. The dim sum stock dispatched to the outlet must correspond with the moment it initially enters the storage facility. This prevents unpleasant problems, such as the degradation of stock quality owing to expiration or the stiffening of dim sum from prolonged freezing.

b) Proposed System

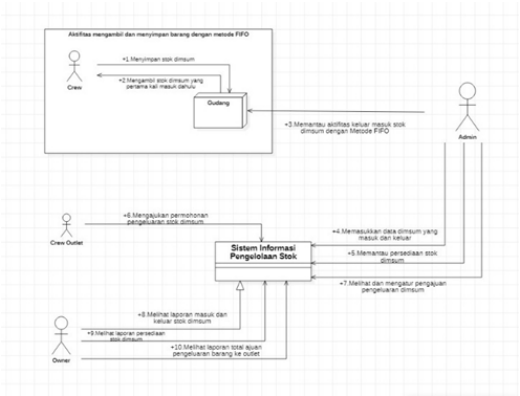

Figure 5. Proposed System

The suggested stock management system utilising the FIFO method will prioritise the dim sum inventory that arrives at the warehouse first. At the same time, newly received goods will be designated for later release. This method can resolve problems such as the degradation of dim sum quality due to extended storage, spoilage resulting from insufficient prior detection, and inconsistencies between documented inventory and actual conditions in the storage facility, which arise when stock is released based on historical practices without prioritization or other factors.

The implementation of this FIFO stock management system is anticipated to enable the owner of Grill Dimsum to manage dim sum inventory more effectively, reducing prior errors, improving stock management efficiency, and optimising operational activities, as management will no longer be exclusively centralised with the owner but will involve three stakeholders: the outlet crew, the administrator, and the owner.

c) Flowchart

1. Login

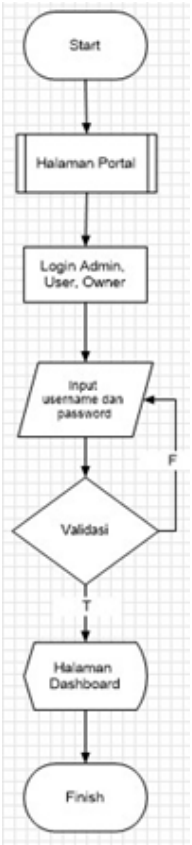

Figure 6. Login Flowchart

2. Admin Main Menu

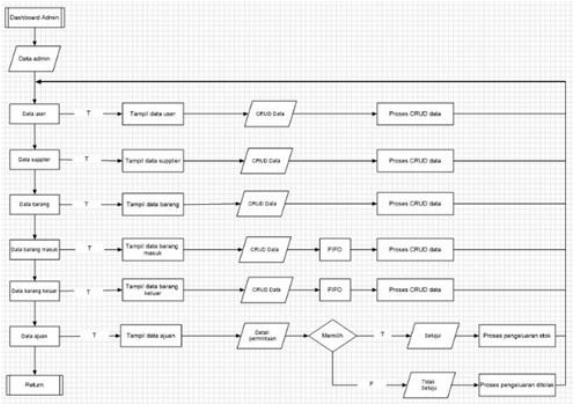

Figure 7. Admin Main Menu Flowchart

3. Main User Menu

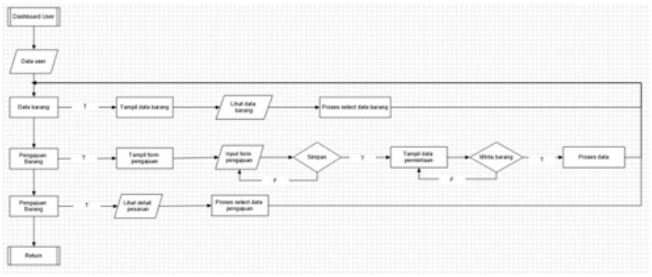

Figure 8. Main User Menu Flowchart

4. Main Menu Owner

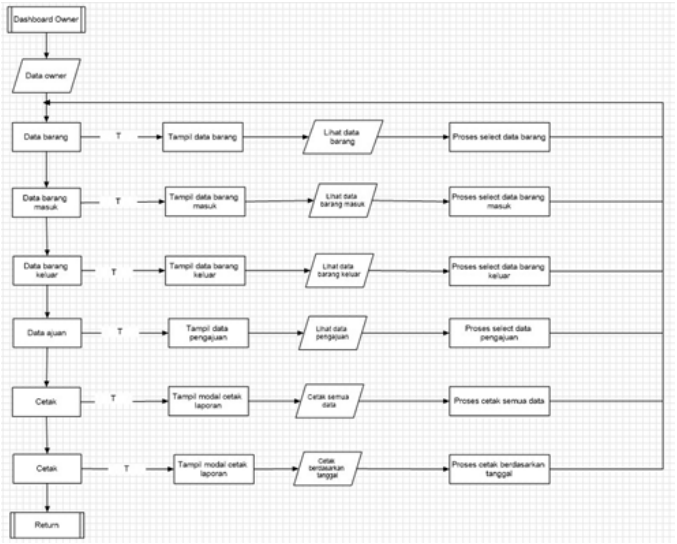

Figure 9. Owner Main Menu Flowchart

5. Logout

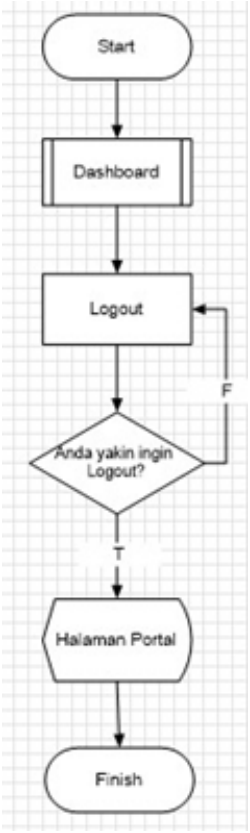

Figure 10. Logout

d) Entity Relationship Diagram

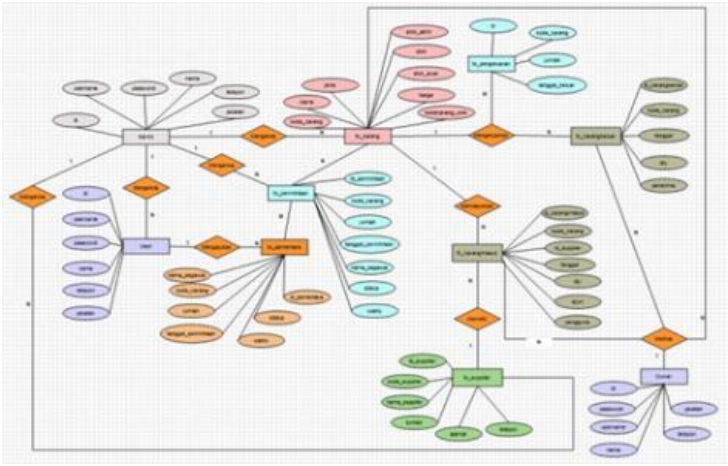

Figure 11. Entity Relationship Diagram

e) Data Flow Diagram

1. Data Flow Diagram Level 0

Figure 12. Data Flow Diagram Level 0

2. Data Flow Diagram Level 1

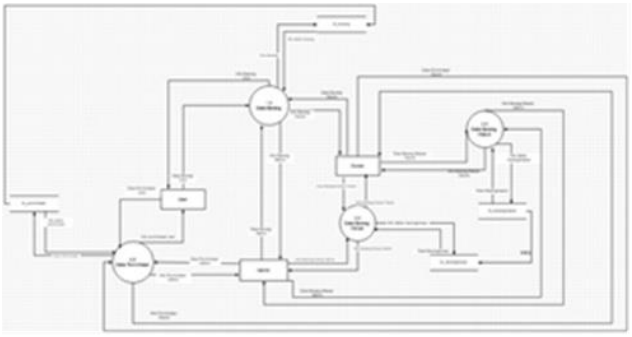

Figure 13. Data Flow Diagram Level 1

3. Data Flow Diagram Level 2
   - Process 1.0

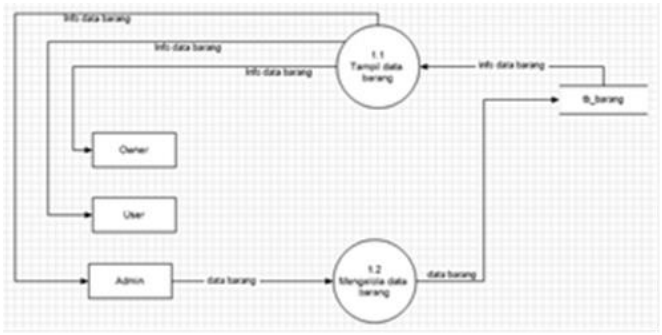

Figure 14. Data Flow Diagram Level 2 Process 1.0

   - Process 2.0

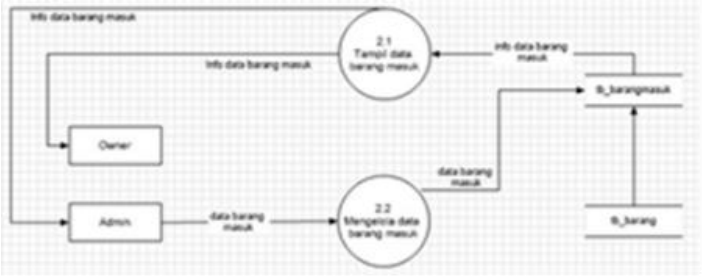

Figure 15. Data Flow Diagram Level 2 Process 2.0

- Process 3.0

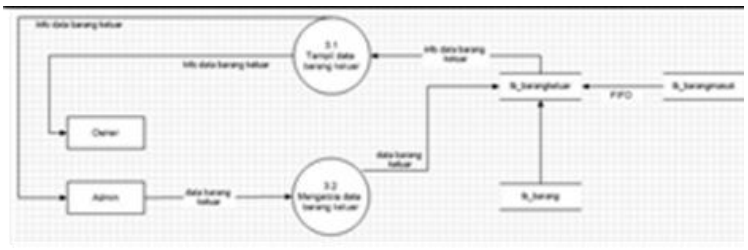

Figure 16. Data Flow Diagram Level 2 Process 3.0

- Process 4.0

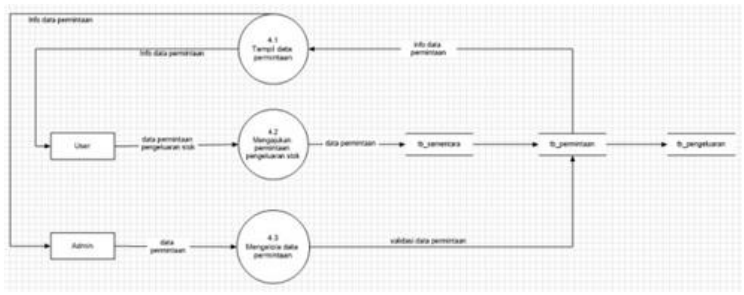

Figure 17. Data Flow Diagram Level 2 Process 4.0

f) Relationships Between Tables

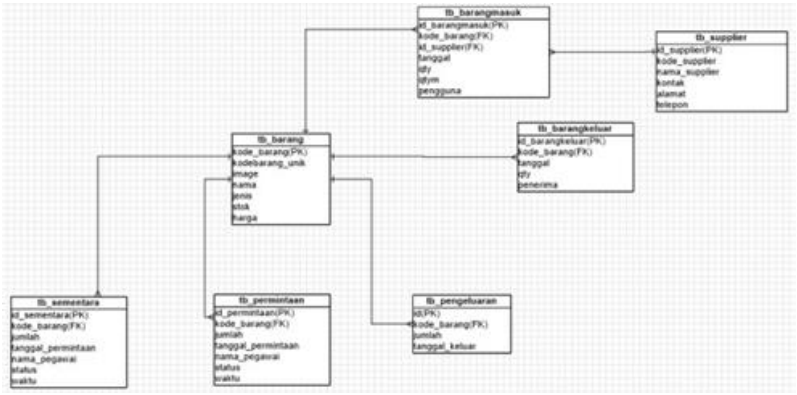

Figure 18. Relationships Between Tables

g) Menu Structure Design

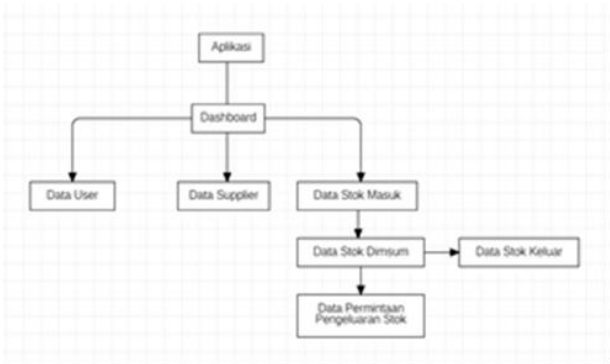

Figure 19. Menu Structure Design

h) Functional Requirements Analysis

Table 11. Functional Requirements Analysis

No.	Functional Requirements	Responsibilities
1.	User	a. Login/Logout Function b. View the dashboard c. View dim sum stock data d. Make stock release requests
2.	Owner	a. Login/Logout Function b. View the dashboard c. View and monitor dim sum stock data d. View and monitor incoming stock data e. View and monitor outgoing dim sum stock data f. View stock issuance request data g. Reports
3.	Admin	a. Fungsi login/Logout b. Pengelolaan data user c. Pengelolaan data supplier d. Pengelolaan data stok dimsum e. Pengelolaan data stok dimsum masuk Pengelolaan data stok dimsum keluar Pengelolaan data permintaan pengeluaran stok f. Laporan

i) System Implementation

1. Portal Page

Figure 20. Portal Page

2. Admin Login

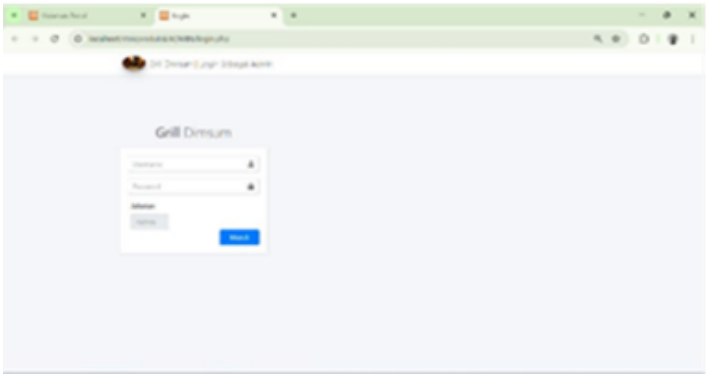

Figure 21. Admin Login

3. Managing User Data

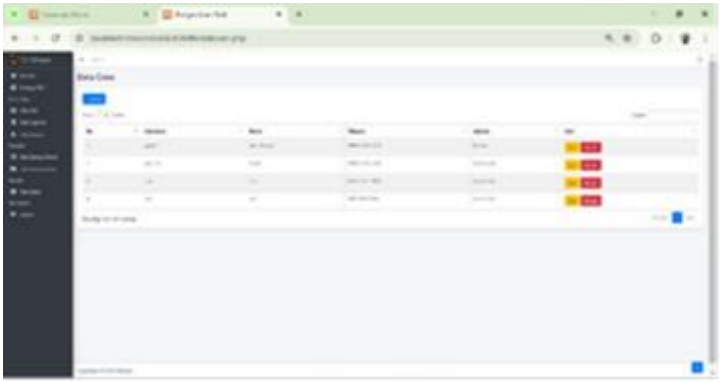

Figure 22. Managing User Data

4. Managing Supplier Data

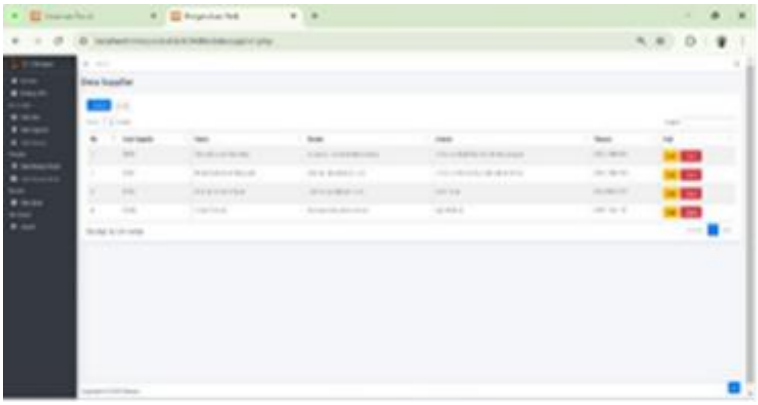

Figure 23. Managing Supplier Data

5. Managing Goods Data

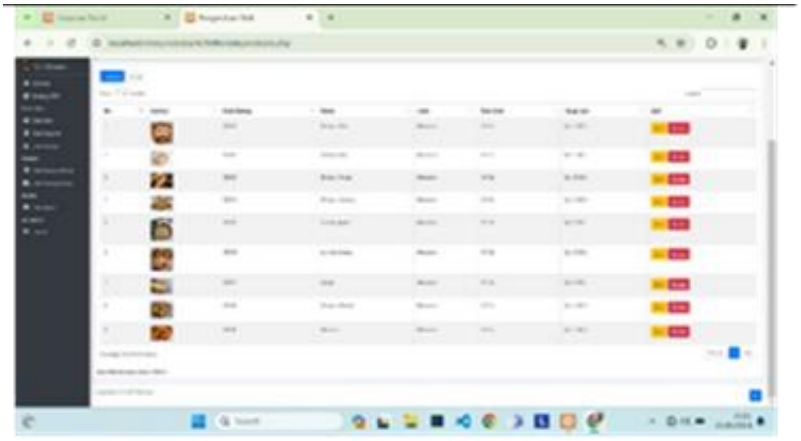

Figure 24. Managing Goods Data

6. Managing Incoming Goods Data

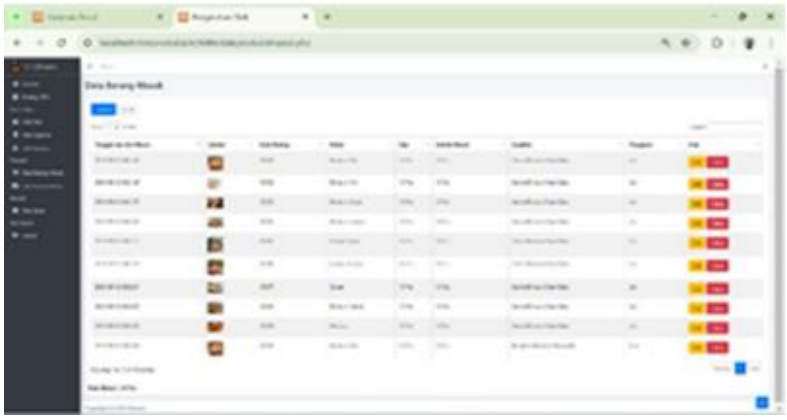

Figure 25. Managing Incoming Goods Data

7. Managing Outgoing Goods Data

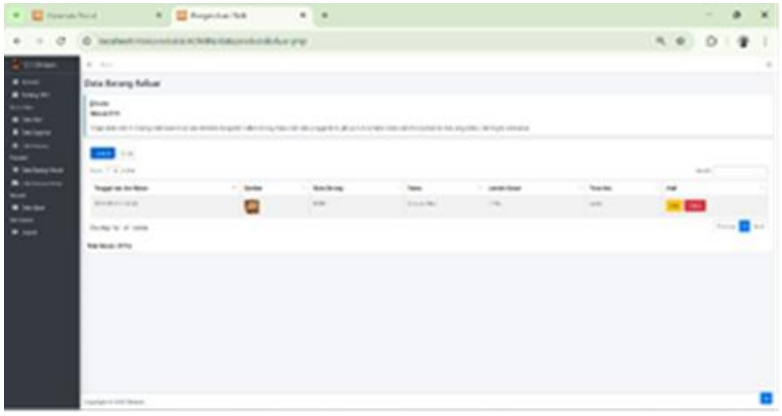

Figure 26. Managing Outgoing Goods Data

8. Managing Request Data

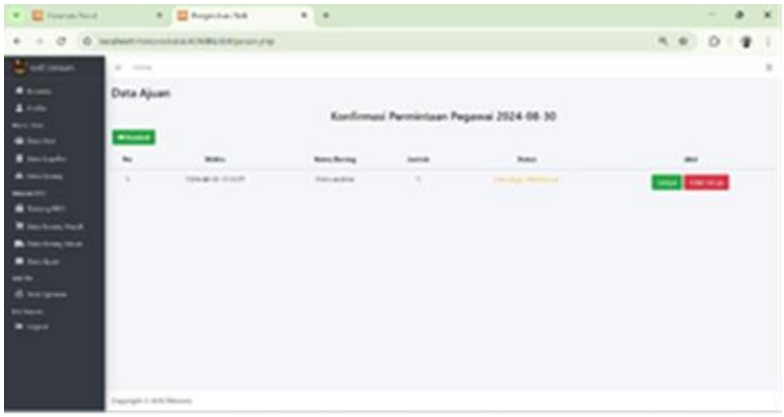

Figure 27. Managing Request Data

9. User Login

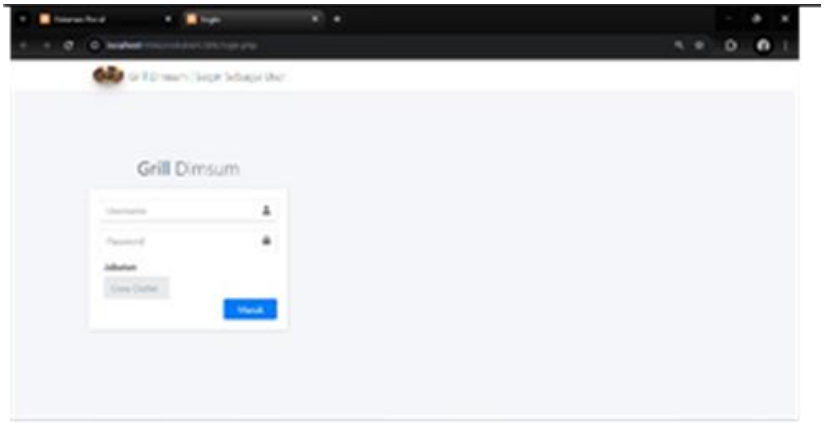

Figure 28. User Login

10. Submit a Stock Release Request

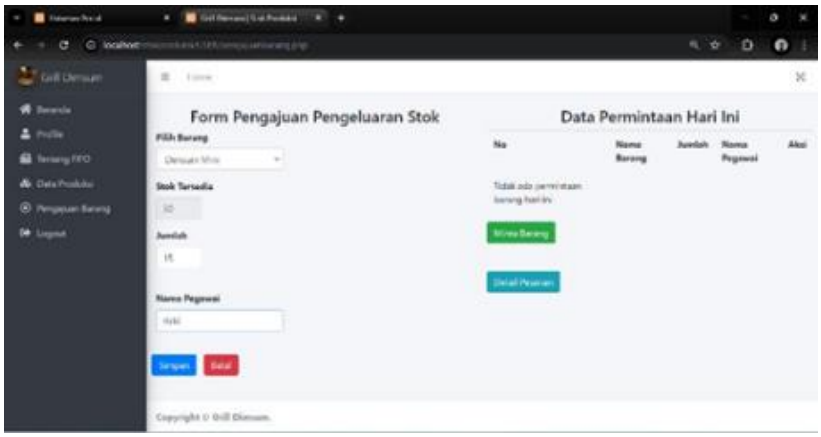

Figure 29. Submit a Stock Release Request

11. Owner Login

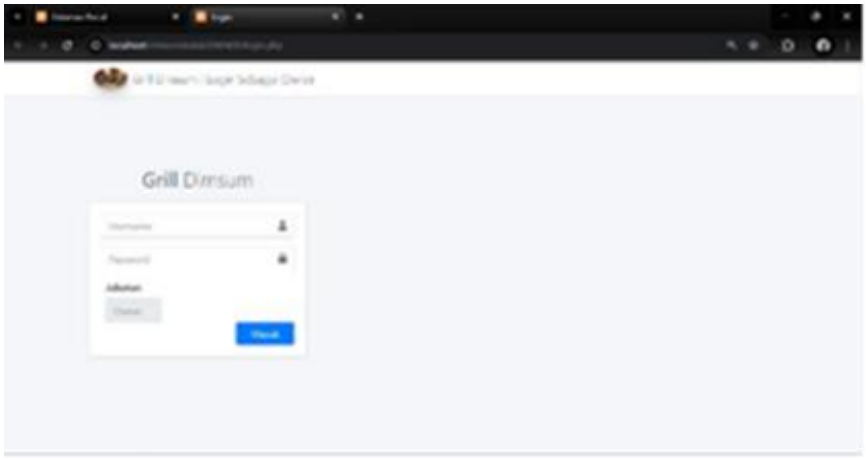

Figure 30. Owner Login

12. Report

Figure 31. Report

Figure 32. Logout

CONCLUSION

This study's findings will aid Grill Dimsum in inventory management, facilitate storage operations, and minimise paper consumption at a small to medium-sized enterprise in Bandung. The Stock Management Information System provides rapid and precise inventory data and reports, customized to operational requirements,

thereby reducing stock surpluses and deficiencies through an enhanced data processing system.

This Stock Management Information System enhances the prior stock management system by defining three user roles, thereby improving the efficiency of the stock management process and mitigating prevalent difficulties, such as human error and data duplication. The implementation of the FIFO method in this Stock Management Information System mitigates quality degradation of dim sum resulting from extended storage in the warehouse or freezer, while simultaneously enhancing stock management efficiency.

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