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Implementing Combined FEFO and FIFO Methods in Inventory System (Case Study: UD Ilham Pilly Beef Merchant)

Ilham Ramadhan [1]*, Ari Usman[2], Sarudin[3]
[1,2,3]Informatics Engineering, Faculty of Engineering and Computers,
Universitas Harapan Medan, Indonesia

Abstract. Stock inventory is an important aspect of supply chain management. The success of the company's operations in maintaining stock availability and avoiding losses due to damage or expiration of goods is very dependent on the use of the right method of managing inventory. The purpose of this study is to combine the FEFO (first expired first out) and FIFO (first in first out) methods in the UD. Ilham Pilly Beff Merchant stock inventory system to avoid losses due to expired goods and increase stock rotation because the FEFO and FIFO methods are operational management in determining inventory. The results of this study are that the system that has been designed can facilitate managers in the process of collecting data on incoming and outgoing goods so that the risk of managing product stocks can be minimized and with an inventory system that has been built.

Keywords: FEFO, FIFO, Inventory System
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INTRODUCTION

A stock inventory system is one of the essential aspects of supply chain management [1]. The success of the company's operations in maintaining the availability of stock items and avoiding losses due to damage or expiration of goods is highly dependent on the use of appropriate methods in managing inventory [2]. The FIFO method (first in first out) is a method that regulates the sale or use of stock with the principle; the first item inventoried will also be the first item issued [3]. In other words, newer stock will remain in the warehouse, while older stock will be used or sold sooner. On the other hand, the FEFO (first expired first out) method is a method that organizes the sale or use of stock based on the principle that the first expired item must be used or sold first [4]. By using both methods, companies can avoid losses due to expired goods and ensure the use of stocks with the shortest shelf life.

Both FEFO and FIFO methods have advantages and disadvantages. The FIFO method can be a good stock rotation, but it does not consider the expiration of goods. Meanwhile, the FEFO method can ensure the sale or use of goods with the shortest shelf life, but can result in low stock rotation and loss of profit due to stock sales. Research by [5] deployed an e-commerce application system for product stock management. The apps can be more effective because the first products sold are the first stock products that come in and the stock products with short expiration periods first. However, the e-commerce application created does not yet have new report management features that make it easier to use.

Study by [6] used the FIFO and FEFO Methods to measure the Efficiency and Effectiveness of Patent Medicine Inventory 2020-2021 at RSU Mitra Paramedika Sleman. Analysis of the inventory turnover ratio shows that the level of effectiveness and efficiency generated in 2020 is 63.78% and 2021 is 68.50%. This study also explains that measuring the level of effectiveness and efficiency with the FIFO and FEFO approaches is not only used in manufacturing companies, but can also be applied to health agencies.

[1]*Corresponding author.
Email addresses: 1st author email (last name), 2nd author email (last name), 3rd author email (last name)
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UD Ilham Pilly Beff Merchant is a trading unit engaged in selling beef since 2017 in Medan. Its business activities include inventory stock management in order to prepare customer requests so that they are always available. This trading unit is run on a micro scale.

Based on the description above that the management of stock of goods requires a method so that it can run effectively and efficiently, if it is not managed properly, it will have an impact on several aspects involved. The results of research that has been conducted by previous researchers reveal that the use of the FIFO and FEFO methods is very important and effective in cooperatives and hospitals in order to create efficiency in managing stock items, so that in this study an analysis of existing stock data will be carried out, develop a model or algorithm that combines the FEFO and FIFO methods, and implement it in the stock inventory system at UD Ilham Pilly Beef Merchant.

METHODS

System Analysis

System analysis is performed to observe and determine the needs required in system development. System analysis includes system specification analysis and system architecture analysis. The system developed is web-based using Laravel 9 software. Program yang di jalankan menggunakan perangkat keras (hardware) yang mempunyai spesifikasi Prossesor Intel® Celeron® CPU 1037U @ 1.80GHz @, Memory 8.00 GB. Sedangkan perangkat lunak yang digunakan dengan spesifikasi operating system Windows 11 Profesional, Xampp Versi 3.2.4, Composer Versi 2.1.9 digunakan untuk mempermudah proses pemograman PHP dan berbentuk aplikasi yang diinstall di perangkat.

Design System

This research uses the FIFO and FEFO methods to build an inventory system of UD Ilham Pilly Beef Merchant products.

1. Metode FIFO

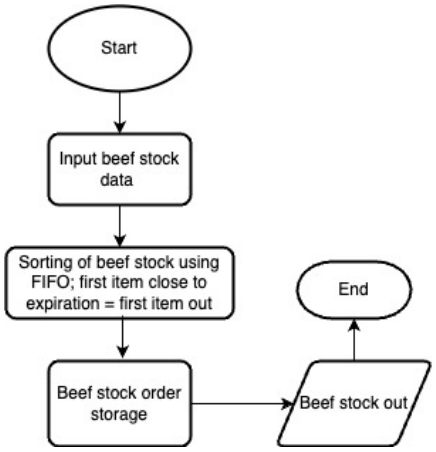

Figure 1. FIFO method on system

FIFO (First In First Out) is one of the inventory management methods by using the stock of goods in the warehouse according to the time of entry [7]. The stock that first enters the warehouse is the stock that must first leave the warehouse. The reason is so that the first inventory can be immediately sold or utilized so that it is not quickly damaged because it is stored in the warehouse for too long. The application of this method is considered very easy and relevant to the physical flow of stock in the storage warehouse.

The FIFO method is usually also used to determine the Cost of Goods Sold (COGS) [8], because this method involves the assumption that the product is the oldest stock item recorded in the company's asset inventory. In essence, the method of determining the cost of a product is adjusted to the concept that the cost of incoming stock items must be equal to the sales results of the old/first incoming stock items. So, the company will use the old stock as the first product to be sold. This research uses the FIFO method in

developing a stock inventory system. The way the FIFO method works in the system can be seen at Figure 1.

2. Metode FEFO

FEFO (First Expired First Out) is a method of managing goods by removing or utilizing goods that have the closest expiration date first. The closer the expiration date is, the faster it will leave the warehouse. This management method is fairly effective because it can prevent the storage of stock that is almost expired for too long. It can also avoid potential losses because you can utilize all your inventory effectively. This research uses the FEFO method in developing a stock inventory system. The way the FEFO method works in the system can be seen at Figure 2.

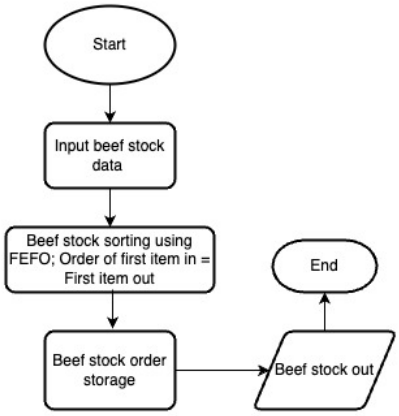

Figure 2. FEFO method in system

a. Stock Inventory System Design Process

Figure 3 is stock inventory system design. There are seven layers of system, these are login, dashboard, operator, product customer, transaction and report.

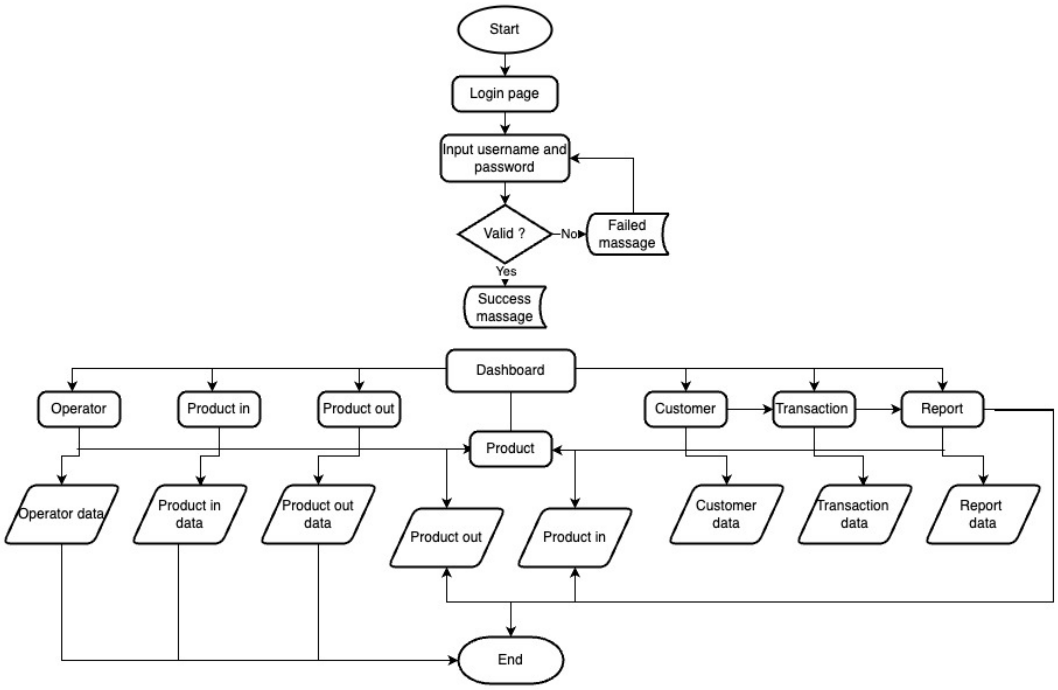

Figure 3. Stock Inventory System Design Process

b. Business Process

Figure 4 shows the flow of business processes by the system. The stages includes

- Task of admin is as operator
- Admin login
- Entry to dashboard page
- Entry to database
- Process input, edit and delete supplier, customer and operator data
- Perform the input process of incoming and outgoing goods using the FEFO and FIFO methods
- Operator go to login page
- Entry to dashboard page
- Entry to database
- Input data product in and product out
- Export product in and product out report.

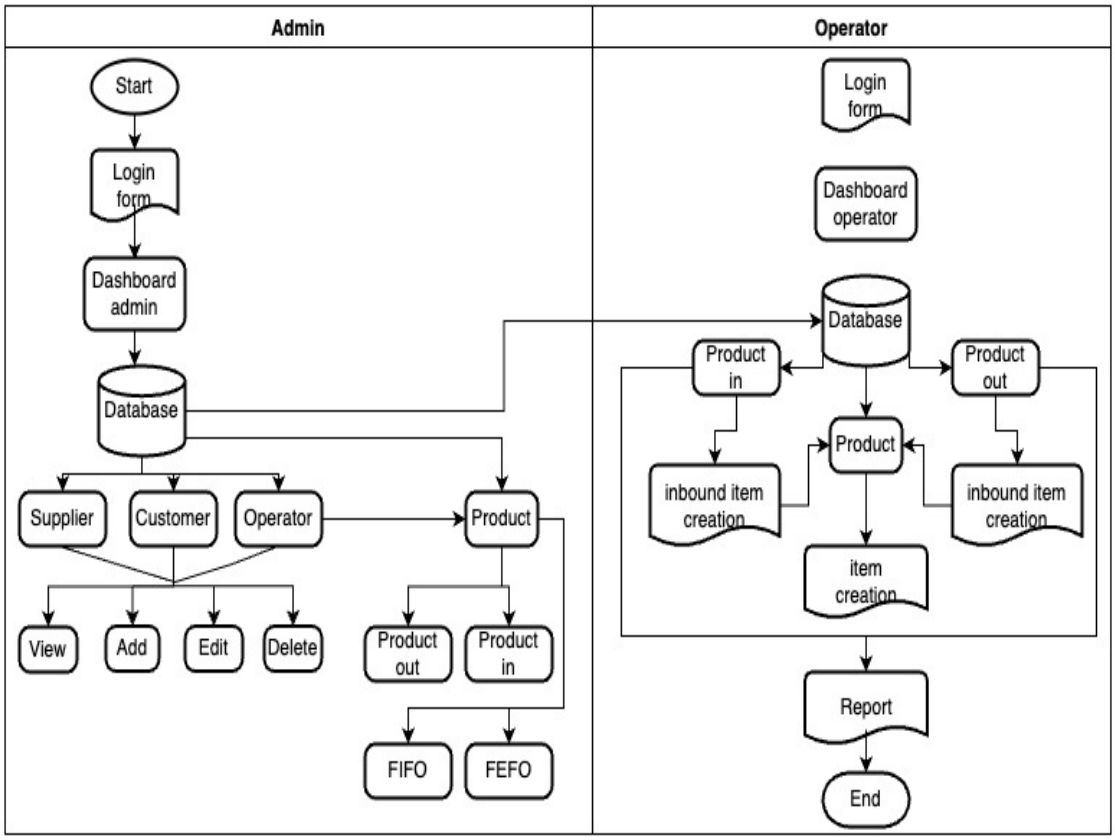

Figure 4. Business process of system

3. User Interface Design

There are 12 pages in the developed system; including the homepage as login access, admin dashboard page, input product page, product, product in, product out, supplier, operator page, customer page, report, and transaction.

4. Database Design

To support Implementing Combined FEFO and FIFO Methods in Inventory System at UD Ilham Pilly Beef Merchant, this study provides 19 tables of data in the database system. Each table has a relationship with one another. The table of data and the relationship can be seen at Figure 5.

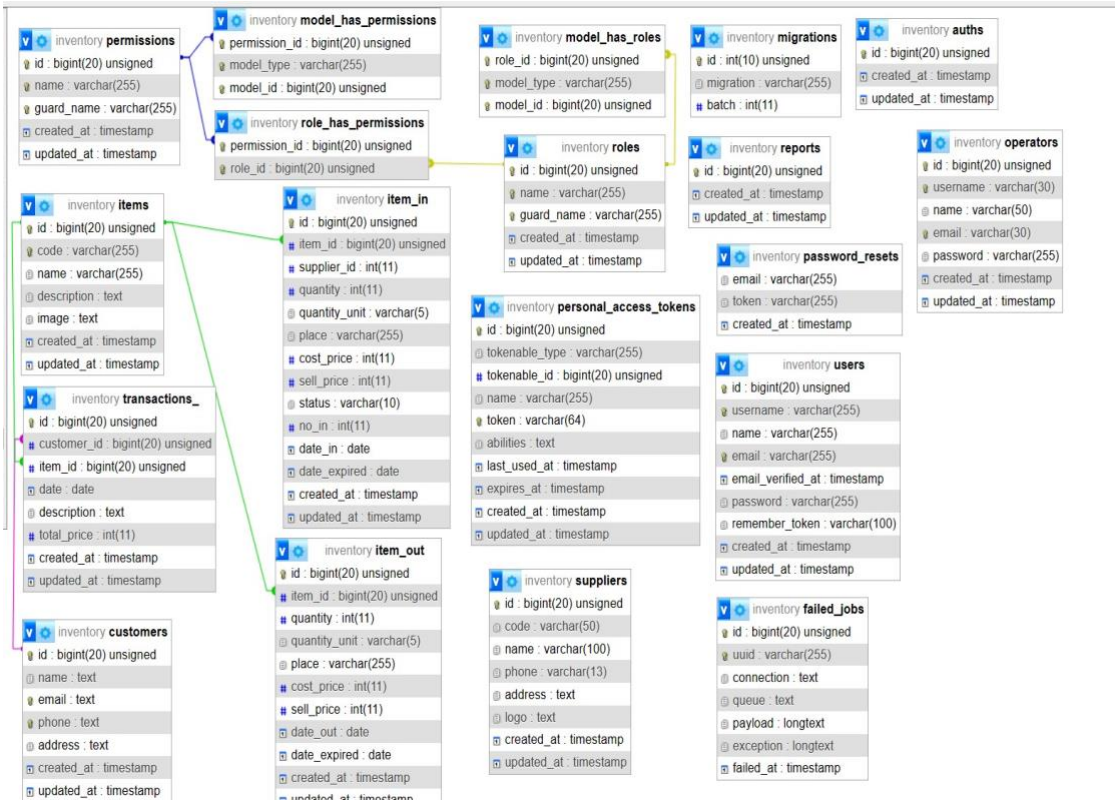

Figure 5 Database relationship

RESULT AND DISCUSSION

There are 12 pages that have been successfully developed. These are the homepage as login access, admin dashboard page, input product page, product, product in, product out, supplier, operator page, costumer page, report, and transaction.

The initial display is the login page. Each user role is asked to input a username and password in order to enter the application. This section is also equipped with checking, validating and verifying processes. The initial page can be seen in Figure 6.

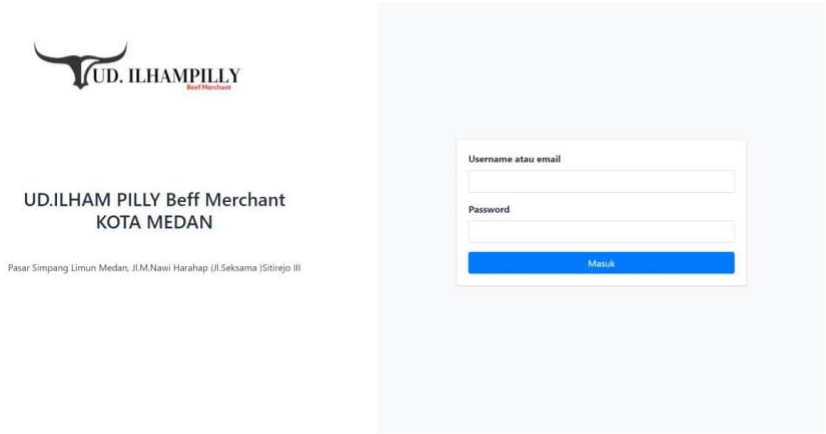

Figure 6 Home page

If logged in as admin, after the user login is successful then it will be directed to the dashboard page (Figure 7). The page contains information on business name, goods, incoming goods, outgoing goods, suppliers, operators, customers, reports, transactions, FEFO results and FIFO results.

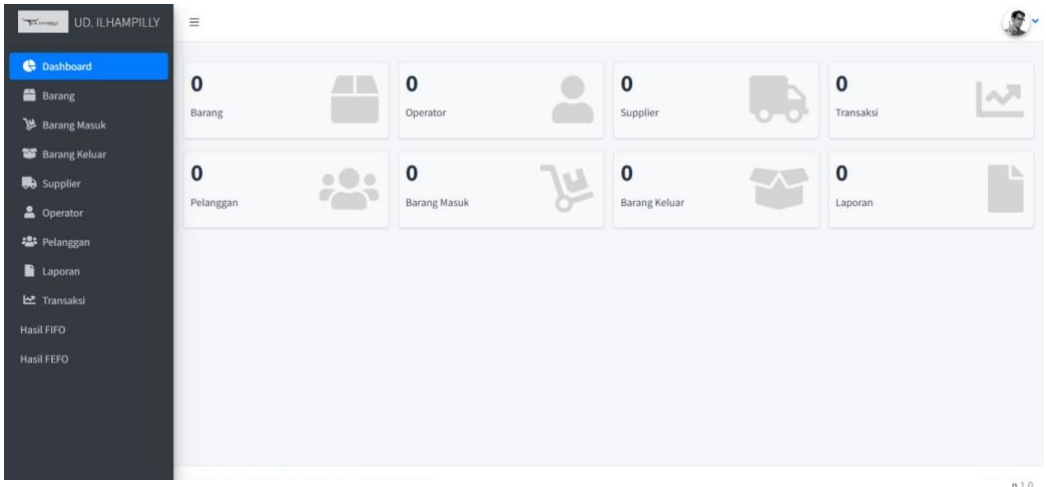

Figure 7 Admin dashboard

Product page is a display where users can add, edit, delete item data (Figure 8) and display a list of items that have been added to the system. Bottom add goods to add goods by inputting the item code, item name, and description.

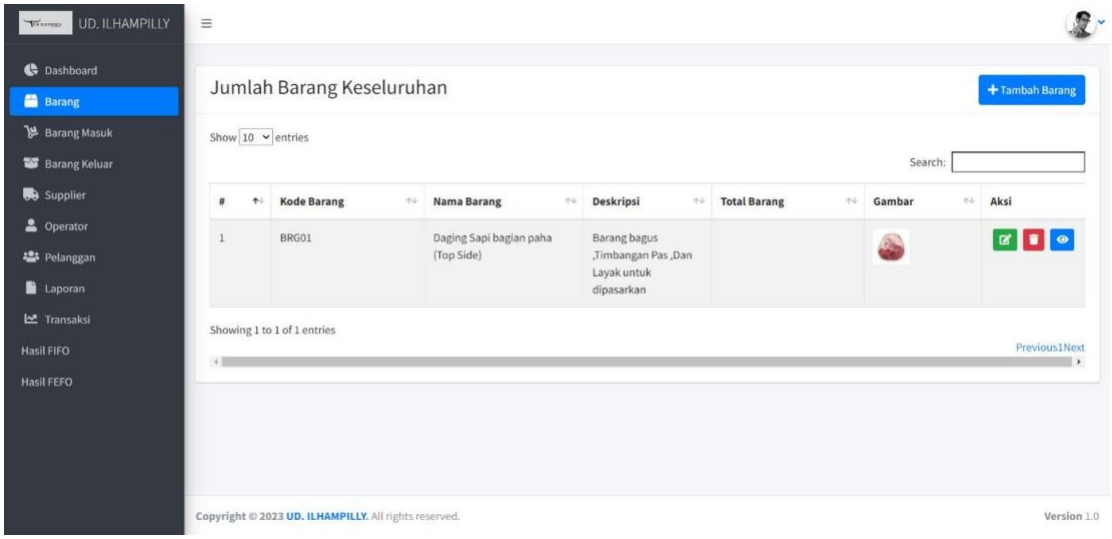

Figure 8 Product page

Product in and product out page is an extension of the product page. Both pages add goods in and goods out by inputting the name of the item, storage place, supplier, quantity of goods, cost price, status, date in/date out and expiry date. Product in page allows for data to be edited and deleted.

The supplier page provides supplier information. Figure 9 is a screenshot of the supplier page. The available features include adding incoming goods by inputting the supplier code, supplier name, phone number and supplier address. Supplier information can also be edited and deleted.

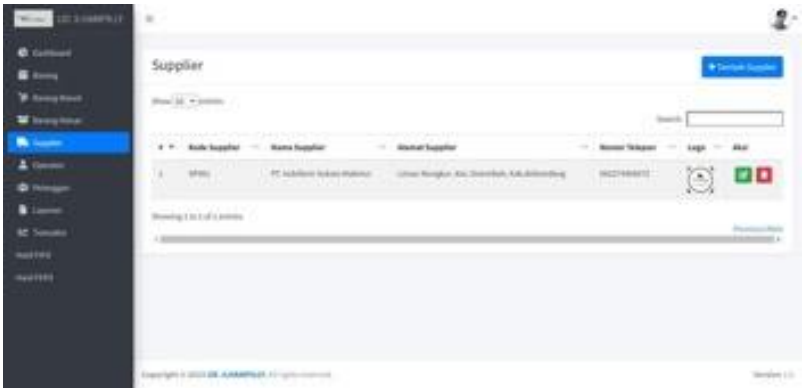

Figure 9 Supplier page

One of those who play an important role in managing stock is the operator. The operator becomes a user role on this system. On the operator page, there is an operator description menu. The operator description contains a table by adding operator data by inputting username, email, and full name. If the operator data has been inputted, the incoming operator data can be edited and deleted.

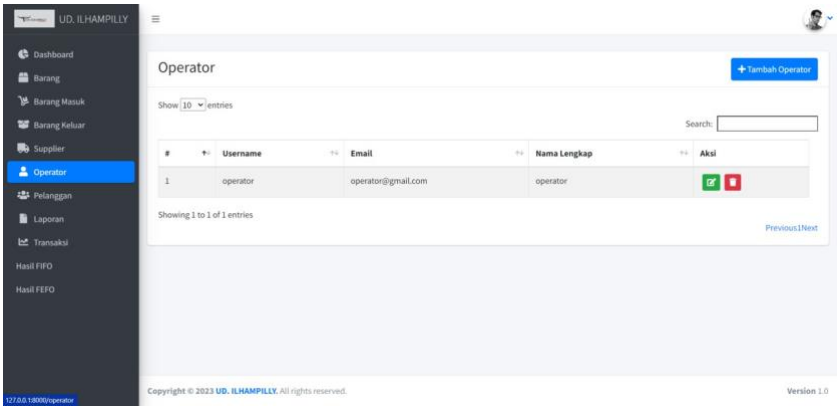

Figure 10 Operator page

Another user role that plays an important role is the customer. So that a special page is given. The customer page display has a customer information menu. Customer information contains a table by adding incoming goods by inputting full name, email, telephone number and address which can be seen in Figure 11. If customer data has been inputted, incoming customer data can be edited and deleted. Display of the edit and delete customer data page.

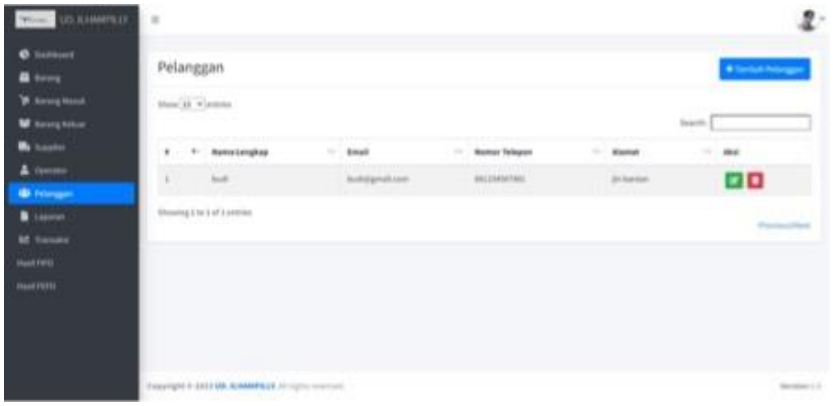

Figure 11 Customers page

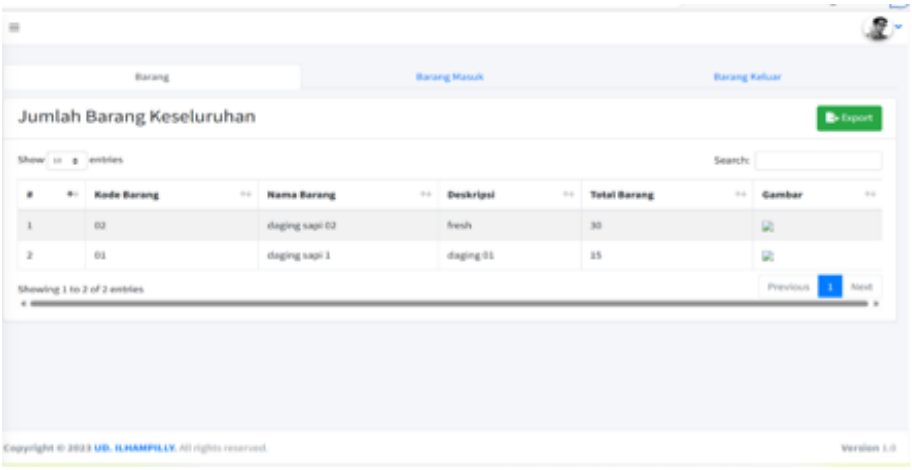

Figure 12 Report page

One of the most important things is the report on business activities. The developed system accommodates this by providing a report and transaction page. The report page contains a report on the total number of goods Figure 12. The transaction page contains transactions for incoming goods and outgoing goods along with information on the date of entry and date of expiration. Transaction page can be seen in Figure 13

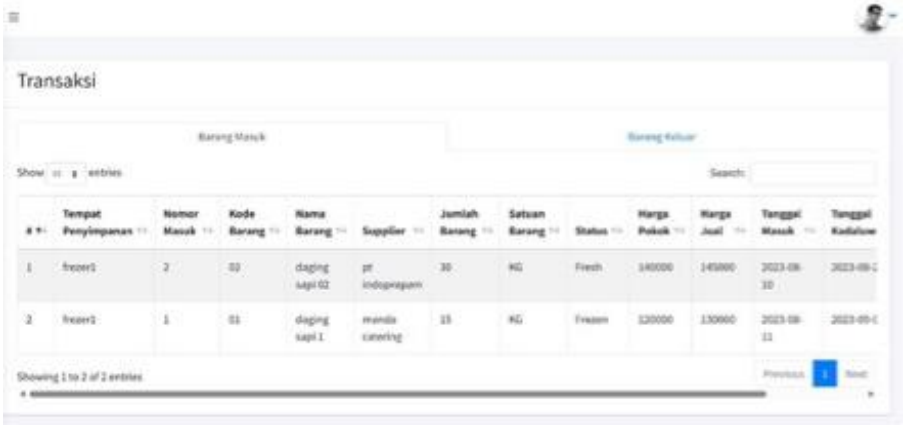

Figure 13 Transaction page

The last page that is deployed is the display page of the results of the combination of the FEFO and FIFO methods. The page contains stock items or inventory items that can be seen from the order of incoming goods and the date approaching expiration. On the FEFO page display contains stock items or inventory items that can be seen from the expiration date.

Figure 14 Page of combination FEFO and FIFO methods

CONCLUSION

This study shows that the effect of using a combination of FEFO and FIFO methods in a stock inventory system can improve stock management more efficiently. Both methods have their own effectiveness advantages in ensuring that items with a longer expiry or stock life are used earlier, while also minimizing the accumulation of unused items. The use of a combination of FEFO and FIFO helps in influencing the optimization of stock inventory. By prioritizing the use of goods that expire first, UD Ilham Pilly can reduce the risk of loss due to expired goods. In addition, the use of FIFO helps maintain the quality of goods because goods that have been in longer will be used faster. The combination of FEFO and FIFO can help improve customer service by ensuring that the goods sold are always in the best condition and not expired. Customers will feel more satisfied with quality products and will not experience the disappointment of receiving expired products. The stock inventory system after implementation using a combination of FEFO and FIFO methods has good performance in applying to the system.

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