

Research Article

Sales Administration Information System and Management of Expired Products in Prosperous Grocery Stores

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Abstract

Grocery stores play a vital role in fulfilling people's basic needs, especially in urban and rural areas. However, in operational practice, grocery stores still often face classic obstacles such as inefficient sales management and difficulties in controlling stock items that are prone to expiration. With the support of increasingly sophisticated technology as it is today, information systems are an additional tool that can be used by businesses to market their goods and services online. This research aims to design and develop a website-based sales administration and expired product management information system, which can help problems in grocery stores. The system development method uses the Waterfall method, while the research uses qualitative methods with data collection techniques through interviews, observations and literature studies. The system is built using PHP, Laravel, MySQL, Javascript Bootstrap and applies the FIFO algorithm in managing stock items and system testing using Black Box Testing.

Keywords: Information Systems, Sales, FIFO, Waterfall, Black Box Testing, Expiry Management

INTRODUCTION

The development of the world of information technology and the internet in the current digital era has had a significant influence on people's consumption patterns. With the increasingly sophisticated technology that is today, Information Systems are an additional tool that can be used by businesses to market their goods and services online (Beynon-Davies, 2019). Administration is an activity carried out by two or more people formed in a predetermined common goal (Shafritz et al., 2022). Meanwhile, the sales system is very helpful for humans in finding and processing information. This sales information system is a procedure that implements, designs, records, calculates, documents, and information on a sale for management purposes and other purposes, from the start of sales orders to transactions (Yulianto & Fauzi, 2020).

Grocery stores play a vital role in meeting the basic needs of the community, especially in urban and rural areas. However, in their operational practices, grocery stores still often face classic obstacles such as inefficient sales management and difficulties in controlling stock of goods that are prone to expiration (Adedeji, 2020). These two problems have a direct impact on business profitability, customer confidence, economic losses, and business sustainability, especially in the midst of competition with modern minimarkets that are increasingly massive.

Prosperous Grocery Store is one of the Grocery Stores in the city of Surabaya. And the system used by the Prosperous Grocery Store is still manual, namely by using calculator media and writing transactions in a book. This system model causes several problems such as notebook damage or loss, prone to writing errors, inefficiencies in reporting, and lack of data integrity between sales and stock management. On the other hand, the absence of a system capable of monitoring product expiration dates in real-time has the potential to cause financial losses due to wasted stock.

In this study, algorithms such as FIFO (First In, First Out) were considered for their advantages in organizing and manipulating data relative to time and priority. The FIFO (First In, First Out) method is a method where the goods that enter first will be issued first, while the goods that are last entered will be issued at a later date. So the first inventory recording is to record the goods/supplies that come in first (Sembiring et al., 2019).

Based on these challenges, the Sales Administration Information System and Expired Product Management in Prosperous Grocery Stores is a strategic solution. This system is expected to help grocery store owners automate the sales process, monitor stock in real-time, and provide early warnings about products that are approaching expiration dates. Thus, stores can minimize losses, improve inventory accuracy, and allocate resources more effectively.

LITERATURE REVIEW

Information Systems

Information System is a system that brings together the needs of daily transaction processing and supports the organization's managerial function in strategic activities by providing reports to certain external parties. Information systems also involve the management of human resources, data, processes, work, and

results in the form of information for those who need it (Silva & Lima, 2018). Information system design is used to develop a new system, which can cover and solve problems that existed in the previous system in the new system (Dennis et al., 2015).

Sales

Sales is a human activity that directs to fulfill and satisfy needs and desires through the process of exchange. Sales is also an activity that aims to find buyers, influence and provide instructions so that buyers can adjust their needs. It can be concluded that sales is the transfer of ownership rights to goods or services carried out by the company as a main business in the hope of obtaining profits from these transactions (Aprilia, 2015).

FIFO

FIFO (First in, First out) is a method where the first entry must also be the first time it is issued or sold. Thus, the inventory recording contained in the report will be similar to the stock in the warehouse (Murmur et al., 2023). The FIFO method is used in the calculation of the cost of goods sold by giving priority to the value of the inventory purchased at the earliest (Tanaka & Respati, 2021).

Waterfall

The waterfall method is often called the waterfall method, this development model takes a systematic and sequential approach. It is called waterfall because the stages that are passed must wait for the completion of the previous stage and run in sequence. This development model is linear from the initial stage of system development, namely the planning stage, to the final stage of system development, namely maintenance (Sandborn & Wilkinson, 2007). According to Pressman, the development of applications with the Waterfall Method starts from the process of analysis, design, coding, testing, and support (Hidayati & Sismadi, 2020).

Black Box Testing

Blackbox Testing is a software testing technique that focuses on the functional specifications of the software. Blackbox Testing works by ignoring the control structure so that its attention is focused on the domain information. Blackbox Testing allows software development to create a set of input conditions that will train all the functional conditions of a program (Jaya, 2018).

Expired Management

Management itself has the meaning of managing, controlling, leading or guiding. Management is a science or art that regulates the process of utilizing human resources and other resources that support the achievement and goals effectively and efficiently (Rajest et al., 2023). While expiration is the final time limit for a food that can be used as human food. The expiration date is divided into two, namely best before and use by. Best before is the date listed is the limit of a product that is still suitable for consumption even though it has crossed the limit, but has decreased quality. Meanwhile, use by means that the product can no longer be consumed (Hossain et al., 2023).

METHODS

This study uses the Waterfall method. The waterfall method is used to control and manage risks in software development by breaking down each stage into well-defined stages and following a predetermined sequence. With this method, software development projects can be scheduled well and management can monitor development progress more easily (Al-Aidaros & Omar, 2017). The diagram of this research flow can be seen in figure 1.

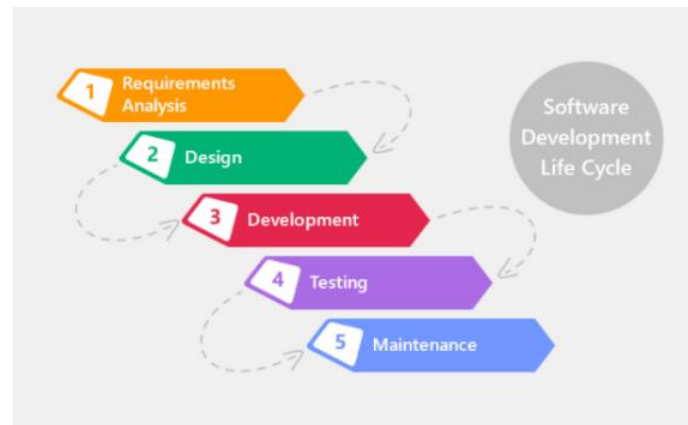


Figure 1. Waterfall Method Diagram

The explanation of each stage is:

1. Requirements Analysis

This first stage involves identifying and understanding the needs of store owners related to the system or application to be developed. The result of this stage is a requirements document that defines the features, functions and objectives to be developed on the system.

2. Design

At this stage, namely designing the system, it is carried out based on the needs document. System design consists of several aspects, including architectural design of user interface design, database design, and design of modules or system components. The goal of this stage is to produce a clear and comprehensive design for the system to be developed.

3. Development

After the design is complete, start implementing the design that has been made. The program code is created based on an approved design. The implementation phase involves coding, unit testing, and component integration on the system. The result of this development stage is that the developed application or

system can run according to the design that has been determined by the system designer.

4. Testing

At this stage, the system that has been implemented will be tested using *Blackbox Testing* to ensure that the system can function according to the requirements that have been set. Testing is done to identify and correct defects or errors in the system. Tests that can be carried out include unit tests, integration tests, functional tests, and performance tests. The goal of this stage is to ensure the quality and reliability of the system before it is launched.

5. Maintenance

Once the system has been tested and launched, the maintenance phase begins. Maintenance involves monitoring system performance, troubleshooting, and system upgrades if needed. Maintenance can include bug fixes, functionality improvements, and adjustments to changing user needs.

Data Collection

Stages or steps of primary and secondary data collection:

1. Observation

The researcher conducted a structured observation of the transaction recording process and expiration management in prosperous grocery stores before the web-based system was implemented

2. Interview

The researcher conducted interviews with store owners to obtain information about the transaction recording and stock management systems currently in use

3. Literature studies

Literature analysis from credible academic sources such as academic journals, *white papers*, *e-books*, and technical documentation related to websites.

RESULT AND DISCUSSION

System Design Design

The process of creating a design or system design according to the needs of the user using *UML*. The designs I use include, use case diagrams and activity diagrams.

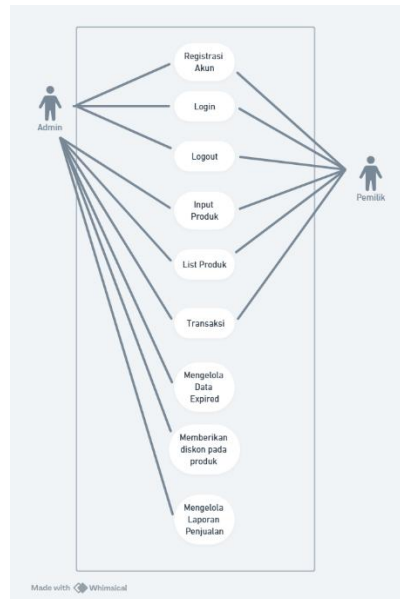


Figure 2. Use case diagram

In this use case, the admin acts as the manager of all menus and features, while the owner can only access the menu and features of registration, login, logout, product input, product lists, and transactions.

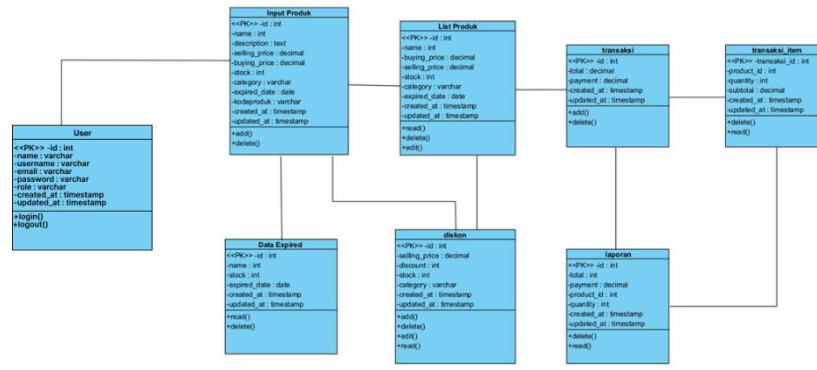


Figure 3. Activity diagram

In this activity diagram, it is used to model the static structure of a system. It consists of several flows, such as user, product input, product list, transaction, transaksi_item, expired data, discounts, reports. After creating a system design, then creating an interface design.

Website Implementation

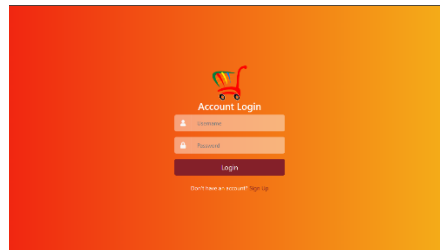


Figure 4. Login Page

On the login page, the Admin and Owner can log in using the *username* and *password* that has been created. When the login button is pressed, the data will be processed according to the input and the authentication process will be carried out.

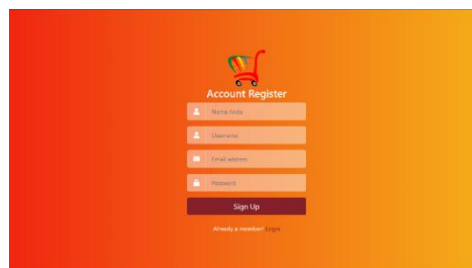


Figure 5. Register Page

On the register page, the owner will create an account first before going to the login page. The owner can fill in the Name, Username, Email, and Password, when the sign up button is pressed, the data will be entered into the database and the owner can already login.

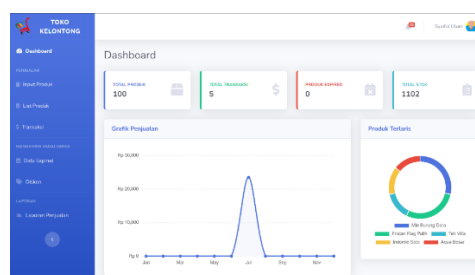


Figure 6. Dashboard Page

On the dashboard page, it will display data on total products, total transactions, expired products, total stock. And also display sales line graph data and pie chart of top-selling product data.

Figure 7. Product Input Page

On the product input page, admins and owners can add product data. Users can fill in the data of product name, category, selling price, purchase price, expiration date and description. There are some fields that are not required to be filled in by the user and are only used for additional information.

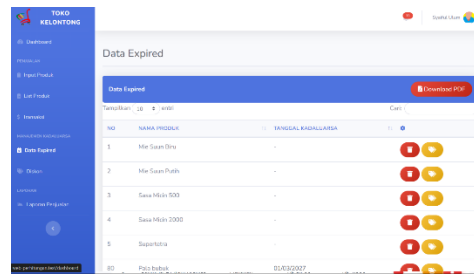
ID	NAMA PRODUK	KATEGORI	HARGA BELI	HARGA JUAL	STOK
74	Kacang ABC 63g	Bumbu	Rp 1.750	Rp 2.000	1
80	Kacang	Olus: Olus:tan	Rp 2.300	Rp 3.300	1
81	Bumbu Maja	Olus: Olus:tan	Rp 3.300	Rp 3.300	1
1	Indomie Ayam Bawang	Makanan	Rp 2.800	Rp 3.000	1
8	Santan 12.5 Pemanis	Makanan	Rp 3.700	Rp 4.000	1

Figure 8. Product List Page

On the product list page, admins and owners can search for data, edit data, delete data and use short filters and pagination. Users can also press the add product button and will immediately display the form on the product input page.

Figure 9. Transaction Page

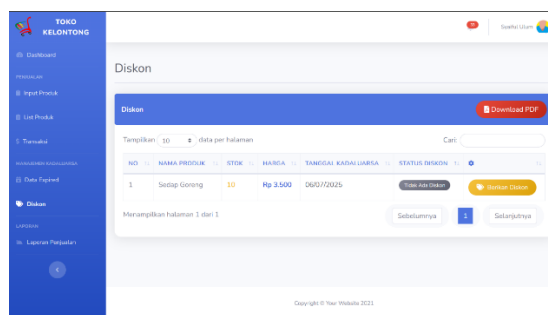
On the transaction page, admins and users can make a calculation of the total products purchased. Before making a payment or calculation automatically by the system, the user needs to first input the name of the product, after which the system will calculate the amount that must be paid by the buyer, after which the user presses the save transaction button and a notification will appear to print the receipt. In figure 4.38 it is an example of a transaction receipt.



ID	NAMA PRODUK	TANGGAL KADALUARSAA
1	Mie Sate Ono	-
2	Mie Sate Putih	-
3	Saus Mido 500	-
4	Saus Mido 1000	-
5	Saus Mido	-
6	Pasta Indomie	01/03/2027

Figure 10. Expired Data Page

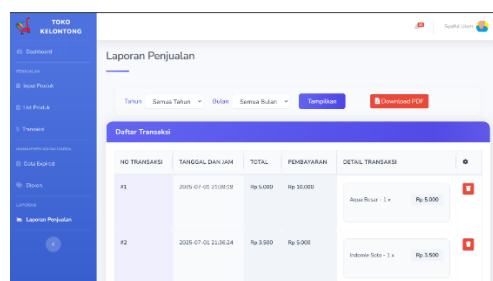
On the expired data page, it displays product data and expiration dates so that admins can monitor expiration dates through expired data not through product lists, on the expired data page the order of data can also be set according to expiration dates. After that there is also a delete button and a discount button. If the admin presses the discount button, then the system will redirect the admin to the discount management page.



ID	NAMA PRODUK	STOK	HARGA	TANGGAL KADALUARSAA	STATUS DISKON
1	Sate Goreng	10	Rp 3.500	06/07/2025	-

Figure 11. Discount Page

On the discount page, the admin can give discounts on products that are about to expire, if there are products that are about to expire, the admin will press the give discount button and a pop up will appear to fill in the discount percentage and the admin can also cancel the discount that has been active on the discount page.



NO TRANSAKSI	TANGGAL DAN JAM	TOTAL	PEMBAYARAN	DETAIL TRANSAKSI
#1	2025-07-05 21:08:18	Rp 5.000	Rp 5.000	Aceh Rice - 1 x Rp 5.000
#2	2025-07-05 21:08:24	Rp 5.000	Rp 5.000	Indomie Sate - 1 x Rp 5.000

Figure 12. Report Page

On the report page, admins can check transaction history and can filter the year and month of transaction history to be displayed and transaction data can be downloaded in PDF format and admin can delete the transaction data.

Blackbox Testing Results

Table 1. Blackbox Testing Results

No.	Features tested	Input	Expected results	Test Results
1	Login	Valid username and password	Log in to the Dashboard	Pass
2	Registration	Fill in the form name, username, email address, password	Successful registration and data stored in the database	Pass
3	Product Input	Fill in the data and press the Save button	Product data stored in the database	Pass
4	Product List	Search for product data, edit, delete product data, download pdf, press add product button	Product data can be searched, editable, deleteable and tables can be downloaded in pdf form as well as when the button is pressed it will lead to the product input page.	Pass
5	Transaction	Add products to do calculations, fill out payment forms, delete products in the transaction table	The system can search and add products to the counting table automatically, the payment form can be filled in and the change number	Pass

			will appear on the change form.	
6	Data Expired	Pressing the delete button and pressing the discount button	The data can be deleted in the database, and when the discount button is pressed it will redirect to the discount page	Pass
7	Discount	Pressing the give discount button, Filling in the discount percentage. Pressing the cancel discount button.	The discount button successfully displays a percentage giving pop up, the percentage pop up can be filled and the price has changed. The discount can be canceled and the price returns to normal.	Pass
8	Report	Year and month filter, Pressing the delete button,	Data can be displayed by month/year. Data can be deleted from the database.	Pass
9	Logout	Pressing the logout button	Exit the menu page and return to the login page	Pass

CONCLUSION

The web-based sales administration and management information system for expired products was successfully designed and implemented using the Waterfall method and built through several stages, involving Laravel, PHP, MySQL, Javascript and Bootstrap technologies. Based on the results of the system testing using blackbox testing and feedback from store owners, it can be concluded that the developed sales information and expiration management system has been successfully implemented. The system runs according to the owner's needs, successfully implements the FIFO algorithm, monitors product stock, provides discounts on expired products, and provides notifications on expired products. This proves that the system is able to increase efficiency and accuracy in grocery store operations. The pre-designed

features were successfully implemented in their entirety, and tests showed that the system's functionality ran according to the design predetermined design stage. This shows that the system has achieved its goals.

Bibliography

- Adedeji, A. E. (2020). *Fresh Food Products Inventory Control Management: the challenges in avoiding perishability at the retailers' shelf*.
- Al-Aidaros, H. A. A., & Omar, M. (2017). Software project management approaches for monitoring work-in-progress: A review. *Journal of Engineering and Applied Sciences*.
- Aprilia, S. (2015). Web-based product sales information system on Chanel Distro Pringsewu. *Jurnal TAM (Technology Acceptance Model)*, 4, 41-47.
- Beynon-Davies, P. (2019). *Business information systems*. Bloomsbury Publishing.
- Dennis, A., Wixom, B., & Tegarden, D. (2015). *Systems analysis and design: An object-oriented approach with UML*. John Wiley & sons.
- Hidayati, N., & Sismadi, S. (2020). Application of Waterfall Model In Development of Work Training Acceptance System. *INTENSIF: Jurnal Ilmiah Penelitian Dan Penerapan Teknologi Sistem Informasi*, 4(1), 75-89.
- Hossain, M. I., Faruk, M. O., Tuha, M. A. S. M., Mimi, S., Islam, K. R., Ali, M. S., & Sahabuddin, M. (2023). Comparative safety analysis of newly prepackaged backed food products and those approaching the expiry date in Bangladesh. *Heliyon*, 9(7).
- Jaya, T. (2018). Application testing with the blackbox testing boundary value analysis method (case study: Lampung state polytechnic digital office). *Journal of Information Technology Development (JPIT)*, 3(2), 45-46.
- Murmu, V., Kumar, D., Sarkar, B., Mor, R. S., & Jha, A. K. (2023). Sustainable inventory management based on environmental policies for the perishable products under first or last in and first out policy. *Journal of Industrial and Management Optimization*, 19(7), 4764-4803.
- Rajest, S. S., Shynu, T., & Regin, R. (2023). The effects of effective management of human resources on the overall performance of an organization. *Central Asian Journal of Mathematical Theory and Computer Sciences*, 4(1), 1-20.
- Sandborn, P. A., & Wilkinson, C. (2007). A maintenance planning and business case development model for the application of prognostics and health management (PHM) to electronic systems. *Microelectronics Reliability*, 47(12), 1889-1901.
- Sembiring, A. C., Tampubolon, J., Sitanggang, D., & Turnip, M. (2019). Improvement of inventory system using first in first out (FIFO) method. *Journal of Physics: Conference Series*, 1361(1), 12070.
- Shafritz, J. M., Russell, E. W., Borick, C. P., & Hyde, A. C. (2022). *Introducing public administration*. Routledge.
- Silva, M., & Lima, C. (2018). The role of information systems in human resource management. *Management of Information Systems*, 16, 113-126.
- Tanaka, G. M. P., & Respati, H. (2021). Cost of inventory calculation analysis using the FIFO and LIFO methods. *Journal of Business Management and Economic Research*, 5(4), 109-120.

Yulianto, H. D., & Fauzi, R. (2020). Design of Web-based Online Sales Information System. *IOP Conference Series: Materials Science and Engineering*, 879(1), 12007.