

Expired Medication Detection Information System Using the First Expired First Out Method (Case Study of One Pharmacy in Bandung)

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Abstract

A pharmacy is a facility where diverse pharmaceutical operations occur, including acquiring, formulating, and distributing medications. The utilization of information technology has experienced a substantial rise in the current digital age, particularly in the realm of healthcare. An integrated and readily accessible information system is required to oversee diverse operations in the pharmacy, including drug procurement, stock management, prescription services, and sales. This study aims to create an information system that may enhance drug procurement efficiency and monitor drug expiration in a pharmacy located in Bandung. Anticipated enhancements are likely to optimize the pharmacy's operational efficiency. The expiration of pharmaceuticals can be attributed to several factors, such as the absence of regular drug inspections due to staffing constraints, human mistakes, excessive drug procurement, and unpredictable patient demands. In order to tackle these problems, it is necessary to implement a system that can detect expired drugs. The purpose of this system is to streamline the management of drug inventory by monitoring and tracking expired drugs. It also implements the First Expired First Out (FEFO) strategy, which prioritizes the usage of drugs with closer expiration dates over those with longer expiration dates.

Keywords : Pharmacy, Expiration Detector, FEFO.

INTRODUCTION

A pharmacy is a facility dedicated to the various aspects of pharmaceutical operations, such as drug acquisition, storage, compounding, and dispensing. Additionally, it serves as a venue for dispensing pharmaceuticals, and its oversight falls under the purview of a pharmacist who possesses expertise in the pharmacy field.

With the advent of the digital age, there has been a significant rise in the utilization of information technology, particularly within the healthcare industry. Pharmacies have a vital function in dispensing drugs and other health-related products. Pharmacy administration encompasses a range of tasks, including drug procurement, inventory management, prescription services, and sales. An efficient and readily available pharmacy information system is

necessary to carry out these operations successfully. (Rahmadhani & Mustika, 2021)

Information systems are vital for facilitating operational activities in institutions or companies. (Pratiwi & Vathaprasit, 2023). The adoption of computerized systems is gradually replacing manual business activities, leading to an increasing utilization of computers in private firms, including pharmacies. (Fauzi & Wulandari, 2020).

Upon analyzing the data management system of a pharmacy in Bandung that offers a wide range of pharmaceuticals, both with and without prescriptions, it is apparent that the pharmacy encounters difficulties. A prevalent problem is the identification of expired medications, resulting in financial losses due to the pharmacy's constrained human and technology capabilities. Stockpiling and delayed

drug turnover are caused by excessive drug purchases, shifting illness patterns, and uncertain patient needs.

Efficient inventory management is vital for a pharmacy since it can regulate and ascertain stock quantities. An excessive amount of stock can result in idle capital and an elevated risk of drug damage. In contrast, an insufficient amount of stock can lead to shortages and a decline in medicine sales for the pharmacy.

At a pharmacy in Bandung, the drug data input system still needs to be computerized, relying on human bookkeeping or stock cards, resulting in a less effective and efficient performance. The drug data search process could be more laborious, resulting in calculation inaccuracies while registering medications and causing delays in stock reporting.

In order to tackle these problems, it is necessary to implement a system that streamlines drug inventory management, enhances drug procurement processes, and effectively manages expired medications. Hence, a recommended solution is to develop a web-based software system that can efficiently and precisely identify expired medications, thereby establishing a prompt, reliable, and traceable information system. This system's primary objective is to facilitate inventory management by monitoring and tracking the availability of pharmaceuticals, particularly those that have expired or are now out of stock. The pharmacy anticipates the system to produce automated and efficient reports on drug inventory, receipts, and dispensing.

Information System

As stated by Edhy Sutanta (Heriyanto, 2018), an information system is a cohesive assembly of interconnected subsystems that work together to integrate and collaborate to carry out duties related to data processing. The process entails receiving input data, subsequent processing, and generating output information to facilitate decision-making. (Sansprayada, Mariskhana & Aziz, 2020). This information is precious and has concrete impacts, bolstering a firm's operational, managerial, and strategic endeavors. An information system is a method of processing data that generates information to accomplish specified objectives. (Kesuma & Kristania, 2018) An information system encompasses four essential activities: Input, Process, Output, and Feedback. (Farell & Saputra, 2018).

FEFO (First Expired First Out)

The First In, First Out (FIFO) method controls inventory, in which the products received first are also the first ones to be taken out. The FIFO approach includes the FEFO (First Expired First Out) paradigm, prioritizing selling products with a closer expiration date. Consequently, products close to their expiration date are prioritized for sale, underscoring the significance of effectively handling products according to their expiration dates. First Expired, First Out (FEFO) is of utmost importance in retail environments, especially in pharmacies, where stringent laws dictate the proper management of expired items. (Sembiring, et.,al, 2019). This strategy guarantees that products with shorter expiration dates are prioritized for use or sale over those with longer expiration

dates, reducing the likelihood of losses resulting from expired goods.

Laravel

Laravel is an open-source framework for PHP that adheres to the model-view-controller (MVC) architectural pattern. Laravel, which is licensed under the MIT License and hosted on GitHub, is renowned for its substantial file size. The large file size of websites developed using Laravel is primarily due to default files such as 'vendor' that cannot be easily erased. Laravel necessitates an online connection for installation and acquiring libraries. It mandates a PHP version of at least 5.4 for proper execution (Ambriani & Nurhidayat, 2020). The fundamental components of Laravel encompass Artisan, Routing, Controller, View (Blade Templating), Middleware, Session, Migration, and Model.

White Box Testing

Refers to software testing where the software's internal structure, design, and implementation details are examined. This type of testing is conducted with knowledge of the internal workings of the software, allowing for a thorough analysis of the code and logic

White Box Testing is a system testing technique that is frequently used to assess systems in conjunction with Black Box Testing. In contrast to Black Box Testing, White Box Testing involves scrutinizing the computer code and modules to identify and analyze any faults or flaws. It entails examining the underlying code of a program or software without considering the user interface in order to detect and correct any defects. This approach aims to guarantee that the resulting output satisfies the designated criteria

by employing iterative compilation and code inspection (Anggi Andriyadi et al., 2022).

Ultimately, the necessity for information systems in institutions or corporations is apparent. The research outlined in this report, entitled "Expired Medication Detection Information System Using the First Expired First Out Method (Case Study of One Pharmacy in Bandung)" aims to solve these concerns by presenting a system equipped with certain functionalities to handle difficulties about drug expiration dates effectively. Drugs are stored in compliance with BPOM rules, using the First Expired First Out (FEFO) approach. This means that items with closer expiration dates are prioritized for sale or dispensing, regardless of when they were acquired. Items with longer expiration dates are kept in the warehouse.

METHOD

The research technique for creating an Expired Medication Detection Information System using the First Expired First Out (FEFO) method will employ a methodical approach to tackle the difficulties pharmacies encounter, specifically in managing and identifying expired pharmaceuticals. This study aims to optimize the efficiency of pharmacy operations and reduce financial losses caused by expired medications.

The study will utilize a case study design, focusing on a single drugstore located in Bandung. This design facilitates a comprehensive investigation into the particular pharmacy's procedures, difficulties, and prospects for identifying expired medication. The utilization of the case study approach enables a thorough comprehension of the

practical consequences and real-life implementation of the suggested information system within the operational framework of the pharmacy.

The data collection methods will encompass a blend of qualitative and quantitative methodologies. Pharmacy staff will be interviewed using a structured approach to obtain information about current practices, difficulties encountered, and desired features of an optimal information system. In addition, we will gather quantitative data on drug expiration dates, stock turnover rates, and financial losses to measure the effect of expired medications on the pharmacy's performance precisely.

The study will entail creating the Expired Medication Detection Information System using the First Expired First Out (FEFO) approach. The solution will be developed to effortlessly incorporate the pharmacy's current processes, effectively tackling the unique difficulties outlined in the case study. The development process will adhere to accepted software development practices, guaranteeing the system's efficacy, dependability, and user-friendliness.

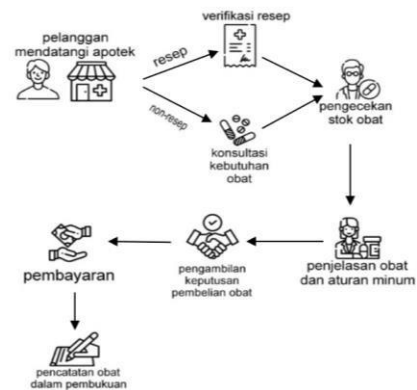
The concluding stage of the research will concentrate on assessing and confirming the constructed information system. This encompasses evaluating the system's precision in identifying and handling expired pharmaceuticals, its influence on inventory management, and its overall effect on the pharmacy's operational effectiveness. The feedback provided by pharmacy personnel and the analysis of system-generated reports will be utilized to enhance and improve the system for

efficient application in various pharmacy environments.

RESULTS AND DISCUSSION

a) Business Process Analysis

This Business Process Analysis aims to gain a comprehensive understanding of either the pharmacy management system or the existing pharmacy business process. The business process is shown by the following.



b) Proposed New System

i. Usecase diagram



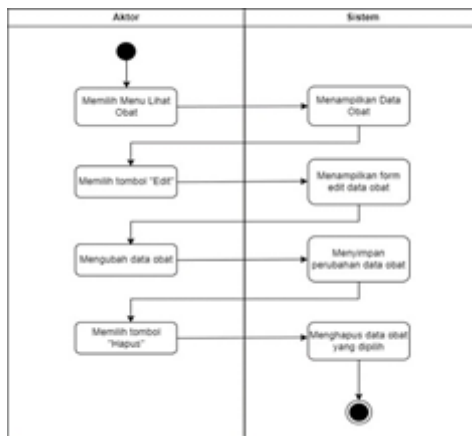
ii. Scenario Table

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Skenario Use Case Login	
Use Case	Login
Actor	Owner, Kasir
Pre-Condition	Aktor membuka aplikasi web
Post-Condition	Halaman dashboard ditampilkan oleh sistem
Main Flow Of Event	
Aksi Aktor	Reaksi Sistem
1. Membuka halaman web sistem pendeteksi expired obat	2. Menampilkan halaman form login
3. Memasukan Email dan Password	4. Validasi Email dan Password yang di input aktor
	5. Halaman utama atau dashboard sistem ditampilkan
Skenario Alternatif	
1. Memasukan Email dan Password (Salah)	2. Validasi Email dan Password yang di input aktor
	3. Menampilkan notifikasi Email dan Password salah
	4. Menampilkan Kembali halaman utama login

Field Name	Type	Length	Primary Key
id	bigint	20	*
namaObat	varchar	255	
sediaan_id	bigint	20	
stok	int	11	
category_id	bigint	20	
penyimpanan_id	bigint	20	
tgl_expire	date		
deskripsiObat	longtext		
hargaBeli	int	11	
hargaJual	int	11	
pemasok_id	bigint	20	
created at	timestamp		
updated at	timestamp		

iii. Activity diagrams



ii. Interface Design



System Implementation

The system implementation stage is the stage of describing an application system so that the application system is ready to operate.

Login Page Display



Home Page/Dashboard Display

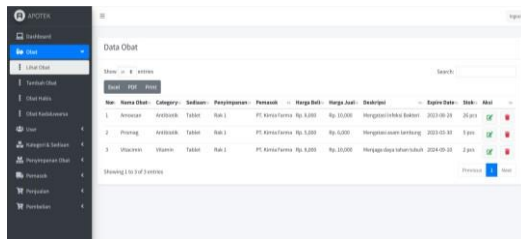


c) System planning

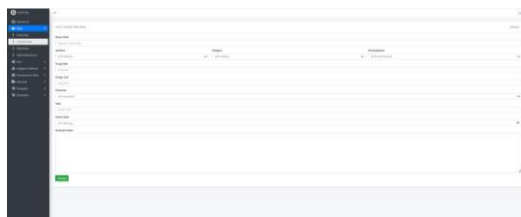
i. Database Design



Page Views View Medication



Add Medication Page View



Using this system can improve customer service efficiency as pharmacy personnel will have expedited access to pharmaceutical information, enabling them to deliver more comprehensive and secure services.

According to the results of this study, various suggestions might be proposed for future progress: The system should undergo regular examination and updates to align with pharmacy and drug regulations modifications.

Pharmacy staff should receive training on using the system effectively to optimize its advantages and guarantee precise data input.

By incorporating these suggestions, the system is anticipated to develop further and offer substantial advantages for pharmacists and patients. This technology is a pivotal advancement in enhancing efficiency and safety in the management of medications within pharmacies.

CONCLUSION

The Expired Medication Detection Information System, utilizing the First Expired First Out (FEFO) Method, aims to tackle expired medication problems in pharmacies. This system focuses on one pharmacy in Bandung and aims to mitigate the financial losses and health risks associated with expired medications. The testing and analysis results allow for the following conclusions to be derived:

The system accurately identifies pharmaceuticals nearing their expiration date and those that have already expired. The implemented First Expired, First Out (FEFO) mechanism guarantees that pharmaceuticals with earlier expiration dates are prioritized for sale or usage.

The system assists in managing medication inventory by automatically and accurately reporting information on the available stock, receipts, and dispensing. This helps prevent instances where there is either too much or too little stock.

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