

# An Intelligent System for Pharmacy Stock and Sales Management

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## ABSTRACT:

The intelligent web-based stock and sales management system to be used at Stella Tanganyika Pharmacy is a system that will be used to manage stock, sales, employees, and pharmacy expenses online. At present the existing system still uses the manual method and has several problems, such as limitations in updating drug data in real-time, taking long to get drug information when required, and long report generation. Therefore, an information system is needed that includes drug data management starting from purchasing drugs, drug sales, preparing drug stock reports, managing employees, as well as pharmacy expenses. The purpose of this project is to improve the old system by creating a computerized stock and sales management system for managing pharmacy data. The importance of this system aids the process of recording stock data, buying, or selling. The research methodology used in the development of the proposed intelligent sales and stock pharmacy management system may include phases such as preliminary studies, system design, system implementation, system evaluation, and system maintenance. The development of an intelligent stock and sales management system at Stella Tanganyika Pharmacy that is web-based which will be better and is hoped that it will facilitate the management of drug data, sales, employees, and expenses, and can overcome other problems.

Key Words: drugs, sales and stock management, React Js, MongoDB, Node Js, Express Js, HTML.

## 1. INTRODUCTION

An Intelligent Pharmacy management system will play a crucial role in ensuring the efficient and effective operation of a pharmacy. It encompasses various aspects, including Stock management, sales records, expense management, and profit calculation for every sale in a selected time frame. A well-managed pharmacy ensures the availability of essential medications, reduces errors, improves patients' satisfaction, and optimizes workflow [1]. In this guide, we will explore the key components of pharmacy management and discuss the best practices for running it successfully [2]. We will examine strategies for inventory management to prevent stock-outs while minimizing waste, techniques for providing excellent customer service, and tips for managing pharmacy staff and optimizing their productivity[3].

## 2. LITERATURE REVIEW

C. S. Salemi et. El (2007) [4], authors intend to claim that the users can access the medicine through their online portal, hence decreasing the outside discrepancies. The authors will be getting the data online; therefore, users will avoid going to the outside pharmacy and instead order medicines through the online portal. This way the author plans to decrease the discrepancies between outpatient and inpatient care with the use of computerized pharmacy data. However, the authors are suggesting that by just having pharmaceutical data available to clinicians is not sufficient to improve medication discrepancies, instead, the data should be printed and automatically be available to all physicians.

A. Lect et. El (2016) [5], authors intend to prove that users can access the data easily by just requesting it through the portal. The system also allows multiple users or multiple transactions at the same time without any harm to the data or an outsider attack. Through this research, the authors can

achieve the accuracy of the data and safety while issuing the particular medicine to the user. The authors are suggesting that there should be some barcode which upon scanning can provide more details about the medicines and also detect the expiry dates of the medicines.

W. D. W. T. Rathnayake et. al (2018) [6], the author presents the analysis of the Pharmacy Management System for the Central Pharmacy - Pokunuwita. The system involves manual entry upon arrival of new batches of drugs and drug movement out of the pharmacy for a certain period, e.g., every month. It will also give a report showing the list of products that will expire after a specified date before, new stock and sales of the pharmacy, and the list of stock ending details. The notification of SMS and email facility is available in the system. The clients can check the stock available details through the system and they can make a prescription after account creation. By logging into the system, they can view the status of their uploading. As a result, the Pharmacy Management System for The Central Pharmacy - Pokunuwita was able to generate positive results such that the administrator will be notified about the expiry dates of the medicines and out-of-stock details for a particular drug. The system will automatically generate the bill for the particular

transaction. Every employee working in the pharmacy can mark their attendance by logging into the system. The customers can check the availability of pharmaceutical products before coming to the pharmaceutical store. However, the Pharmacy Management System for The Central Pharmacy - Pokunuwita, has some limitations such as limited functionality of the system, security concerns, and much more.

I. H. M. Kalpa Chathuranga et. al (2020) [7], author presents a web-based Smart computerized pharmacy management system for Gamage Pharmacy which is in Homagama. By using this system, pharmacy staff will reduce the unnecessary time spent during work hours. The system will automate the whole pharmacy management process and provide effective management of stocks reducing wastage. This will increase the profit margin by a considerable amount. The author suggests that due to a lack of experience on the used development languages and tools more time must be spent on learning before the implementation. The Author had to learn some technologies from the beginning which was crucial in developing the system.

J. I. Teleronet. et. al (2021) [8], author presents research on the implementation of Operations Research Pharmacy Management Information System (PMIS) in the Pharmacy to smoothen business management to help involved parties succeed by monitoring their business. The scope of the study covers Sales Inventory, stock inventory, Purchases (Orders, Receipts), Payroll, Accounting, Financial Management, Sales Reports, and Pharmacy prescription books. PMIS is a Windows-based operating system application that

significantly assists the Pharmacy business operations and automates the entire process that the owner is helpful because of the installed inventory and others. The author came up with the desired output based on the operations research of the business process of the pharmacy business operation. These will reduce the complexity of the business process because they will automate the entire business process. However, the system is Windows-based. This means it cannot be accessible on another device which fixes the users to use only a single machine, hence it is not machine-independent.

### 3. METHODOLOGY

The intelligent pharmacy sales and stock management system is divided into two sections; the administrator section and the staff section.

#### 3.1 Staff section.

The staff section consists of the following fields:

- **Adding stock:**

In this section, the new stock that has been purchased which does not have any records in the database is added. It has input fields such as medicine name, quantity, selling price, buying price, expiry date, and item sold. After which the employee can submit the data and eventually save it in the pharmacy database.

- **Updating stock:**

In this section, if any changes to the stock that is already saved have taken place, here is where the changes are made. Changes such as changing quantity selling price, buying price, etc., take place.

- **Selling:**

In this section, by default, ten records will appear on the screen. If the staff is looking for a particular medicinal product, then he/she can search for it in the search bar. Once the product appears on the screen, the employee then clicks on it and it will be added to the purchase area. In the purchase area, the employee can either increase or decrease the quantity of the product or remove the product from the purchase list. Then the employee has to click on pay to submit the sales done. The receipt is also generated of the sale done and its pdf can be downloaded.

- **viewing stock:**

In this section, all the stock is made visible to the staff with fields such as name, quantity, sold by, buying price, selling price, and expiry date, the user can search for the item if he or does not see the item in the search field box area. There is also a less-than-input field where the employee can enter the

quantity that wishes to see if the quantity is less than that being specified in the input field.

### 3.2 Administrator section.

The Administrative section consists of the following:

- **adding and deleting employees:**

#### Adding employees.

Fields such as first name, last name, address, phone number, salary, and position are in place to capture the details of the employees working in the pharmacy.

#### Delete employee.

This simply erases employees' details from the database.

- **viewing and updating stock prices:**

#### Viewing stock.

In this section, all the stock is made visible to the staff with fields such as name, quantity, sold by, buying price, selling price, and expiry date, the user can search for the item if he or does not see the item in the search field box area. There is also a less-than-input field where the employee can enter the quantity that wishes to see if the quantity is less than that being specified in the input field.

#### Updating stock prices.

The administrator will have the ability to update the buying and selling price.

- **viewing sales:**

All the sales are made visible to the administrator who can search sales depending on date and product name. The profit from the sales can also be calculated accordingly.

- **viewing and adding expenses:**

All expenses that a pharmacy incurs can be recorded in the system for future reference and calculation of the pharmacy profits to get the net profit.

## 4. TECHNOLOGIES USED

The intelligent Pharmacy sales and stock management System consists of various backend and frontend programming languages namely:

The front-end programming languages enable us to make dynamic web pages while the back-end programming helps us with the creation of a database for the storage of user data and information. The Node server helps us establish a connection between the web pages and the database.

### 4.1 Front End:

#### Hypertext Markup Language (HTML):

HTML is a markup language used for creating and structuring content on the web. It is the standard language for building websites and web applications [9].

#### JavaScript (JS):

JavaScript is a programming language used for building interactive web applications. It is often used alongside HTML and CSS to add dynamic functionality to web pages [10].

**Cascading Style Sheets (CSS):** CSS is a style sheet language used for controlling the visual appearance of web pages. It is used to define the layout, color, font, and other design elements of a web page, and works in conjunction with HTML to create a complete website [9].

#### Bootstrap:

Bootstrap is a popular front-end library for building responsive websites. It includes a collection of pre-built CSS, and JavaScript components, such as navigation bars, forms, buttons, and models, that can be easily customized to create a unique website design [11].

#### React JS:

React JS is a library based on JavaScript used for building component-rich user interfaces. It is designed to make it easier to create reusable UI components and manage the state of a web application [12].

### 4.2 Back End:

#### MongoDB:

MongoDB is a popular NoSQL database used for storing and managing unstructured data. It uses a document-oriented data model, which means that data is stored in flexible and dynamic JSON-like documents instead of rigidly structured tables [13].

#### Node.js:

Node.js is a JavaScript runtime environment that developers use to run JavaScript on the back end. It provides a way to build scalable and high-performance web applications using JavaScript [14].

#### Express.js:

Express.js is a popular web framework for Node.js used for building web applications and APIs. It provides a set of tools and features that make it easier to build and manage web applications [15].

## 5. COMPARATIVE ANALYSIS

S.NO	NAME OF THE RESEARCH PAPER AND AUTHOR	TECHNOLOGIES USED.	DRAWBACKS
1.	pharmacy management system [16]	python, SQLite.	It should include more fields for managing stock status, sales status, issuing receipts after every sale, and much more.
2	Operations Research Design and Implementation of Pharmacy Management Information System [8]	Visual Basic.net MMSQL	The system is Windows-based. It cannot be accessible on another device which fixes the users to use only a single machine.
3.	Pharmacy management.[17]	MySQL, Python	The system lacks consistency, and billing errors
4.	Pharmacy Management System for The Central Pharmacy – Pokunuwita [6]	PHP, CSS, Bootstrap, JavaScript, MySQL	It has limited functionality of the system and security concern
5.	Designing a Web-Based Management Information System in the Kerupuk Puli Dua Bintang Cracker Industry in Tulungagung Regency.[18]	PHP, HTML, CSS, JavaScript, MySQL	This paper used so many programming languages which required different skilled engineers and personnel.

6.	The Drug Management Information System in Mulia Pharmacy Web-Based [19]	PHP, HTML, CSS, Bootstrap, JavaScript, MySQL	It has a language barrier problem since it was not designed in English.
7.	Smart Computerized Pharmacy Management System [7]	ASP.Net Core HTML, jQuery, CSS, IIS web server and MySQL	The lack of experienced developers led to more time for development since learning had to take place first.
8.	Pharmacy management system with Inventory Stock Alert System [5]	MySQL, python	The author only encourages only online system but it should be in the blended mode.
9.	A computerized pharmacy decision support system [20].	MySQL, python	The author is suggesting that patient-pharmacist counseling is essential only for guiding the stages of headache management.
10	Design and Implementation of a Computerized Drug Inventory Management Information System [21].	MySQL, HTML, JavaScript, CSS, jQuery, Ajax, ASP.NET	The author only encourages only online system but it should be in the blended mode and need frequent updates to their software.

## 6. CONCLUSION

Work done by previous authors related to pharmacy management systems has significantly contributed to the field of pharmacy management, enhancing the pharmaceutical processes. However, there is still room for further research, especially on the long-term impacts and scalability of these systems in resource-limited settings. Future studies should focus on addressing such gaps to elevate the growing field of pharmacy management systems and meet the evolving needs of pharmacist and their potential customers. To reduce the gaps, we are working on research on an intelligent sales and stock pharmacy management system. The system will create a significant difference in the management of the sales and stock of pharmaceutical products, which is crucial in this fast-growing pharmacy industry.

## 7. FUTURE WORK

Future work will be based on the different verifiable perspectives and shall attempt to enhance execution by utilizing different calculations by looking at the exhibitions.

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