



An Advanced System for Pharmacy Stock and Sales Management- Stella Tanganyika Pharmacy.

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Abstract- Stella Tanganyika Pharmacy plans to adopt a cutting-edge web-based system for managing its stock and sales. The application that will be used to digitally and online manage employees, sales, and expenditures related to pharmaceuticals. The existing system, which is still manual, encounters a number of issues, such as the inability to instantly update prescription data, a protracted wait period before receiving drug information, and a protracted procedure for creating reports, to mention a few. As a result, an information system must be employed to manage pharmaceutical data. This includes keeping track of daily expenditures for pharmacies, purchasing inventory, dispensing medications, and preparing stock reports. The primary objective of this project is to enhance the present configuration by creating a digitalized stock and sales management system. The research technique used during the development process may include stages like preliminary research, the development, implementation, assessment, and maintenance of systems. Employees will find the system handy since they may use it whenever and from anywhere as it will be web-based.

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

1. INTRODUCTION

In order to ensure that pharmacy operations are up to the needed standards of efficiency and effectiveness, an intelligent pharmacy management system will play a vital role. It will cover a range of topics, including managing inventory, keeping track of sales, managing expenses, and calculating profits for each sale within a specific time frame. The availability of pharmaceuticals is guaranteed, mistakes are decreased, patient satisfaction is increased, and workflow is optimized[1]. We shall examine the essential elements of pharmacy administration in this manual and go over the best operating procedures. We'll look at waste reduction

techniques for inventory management as well as management techniques for pharmacy personnel to maximize productivity.

1.1. Client Identification/Need Identification:

The client is a pharmacy that is plans to automate its operations from a manual system. This will improve stock management, sales records, expense records and uplift customer service delivery. The client needs a pharmacy management system whose user interface is user-friendly, secure, and efficient.

1.2. Identification of Problem:

The current manual management system is tiring, time-consuming, and error-prone. It is difficult to keep track of the stock levels, and this has led to overstocking or understocking of some products. Additionally, the current system does not provide a centralized point of the sales data, making it challenging to monitor the performance of the pharmacy.

1.3. Identification of Tasks:

The primary goals of the project are the user interface design, database schema development, front-end and back-end integration, and system functionality testing.

2. LITERATURE REVIEW

Salemi et al. (2007) [2] tries to portray that by just simply providing open access to the medical dispensing, and by just marketing will make a difference to the outside discrepancies. This is possible by making pharmacy services available by simply requesting medications or refills over a web portal, rather than having to physically pick up a prescription and take it to an outside pharmacy. This is just to show a connection and eliminate some of the disparities between outpatient and inpatient care. Thus, the computerized system will be used to process pharmacy orders per se. That is as far as the questions and hypothesis go in part D. In C, Salemi et al. (2007)[2] had in mind that a clinician having pharmaceutical data is not enough to

improve medication discrepancies. The very last step would be that pharmaceutical data is printed out or available electronically to all physicians.

Lect et al. (2016)[3] suggests that data accessible by only by request of a patient through the portal and accessed by just one user at that moment in time. Also, once the patient publishes the information, there must be no way of copying the information. Validated safety is important when medications are prescribed. The doctors should be concordant with the Medicaid list and database of prescribed medications. A barcode system could be used in order to make medications safer. For example, a doctor would be able to scan a medication for more information. This would also automatically bring up expiration dates of medications. When pharmacies fill prescriptions, they are contributing to medication safety. There is a push to make medications safer. Early prevention is key, and medication is not, always, easily caught. If medication is easily caught, many times, it may have worked out in favor of the patient who would have been assisted earlier. This could be a pharmacy-owner selling prescription drugs on the side and is required to sell only 50 prescriptions a day. A pharmacist may also bring in their own medications for personal use.

Rathnayake et. al (2018)[4] tried to make it possible that stock available details could be checked online and once an account was created in the system, a prescription could be made and users who logged in can see the status of their uploads. The front end was not designed in a complicated manner and the back end too for that matter. Transactions through the system can be programmed to receive system notifications through SMS, and email. An addition, while stocks available details can be verified and transactions recorded, date could also be alarmed. Only to send an email to the administrator of the website to notify the expiry date of stock. All the staff members working in the pharmacy has included under this application where they can make their attendance particular day by simply entering the system. Customers can see the available items available in the pharmaceutical item from anywhere before they come to the pharmacy to buy and also.

However, the Pharmacy Management System for The Central Pharmacy - Pokunuwita has some weak points such as limited functionality of the application, no middle-ware has been done such as transaction management, traversing the system, report generation and so on. Whilst, security, look-up table errors, system uses, connections are some other weak points of the system. I. H. M. Kalpa Chaturanga et.al., has presented the online smart computerized pharmacy management system was presented. As it presented on the paper the pharmacy staff will accelerate their work flow speedily without keeping any delay by wasting their unnecessary time loss on work hour.(I. H. M. Kalpa Chaturanga et.al., 2020 [5]) Based on the system, the entire pharmacy management process will be automated and stockage of the pharmacy will be managed digitally to avoid wastage in the business and more profit margin will be there. The said authors stated on their paper that they have less experience in dealing with their used development languages and tools and therefore, there will be required more learning time before they move to the implementation level. He/she had to learn from end to end the previous mentioned few

technology which the author dealt with to develop the system. (I. H. M. Kalpa Chaturanga et.al., 2020 [5]) J. I. Teleron et.al., presented on their paper the Operations Research Pharmacy Management Information Systems (PMIS) were implemented at respective pharmacies to evaluate the business management and provide feedback to participants to help them for the success. The system's implemented components include accounting, financial management, purchasing (orders, receipts), payroll, sales reports, and pharmacy prescription records. In order to assist pharmacy business owners in effectively managing pharmacy business operations and automating pharmacy procedures utilizing Windows-based operating systems, the pharmacy employed pharmacy information (PHI) systems. Based on the operations research, the author of the paper presented with the desire output from the solution of it that help the whole business process is converting and help the business to get rid of complexity from the system.(J. I. Teleron et.al., 2021 [6]) The said system uses windows-based and since the system cannot use Post Request else other devices cannot be use for that and so, the users are bounded to one machine since which the system is build up, hence the system is built toward machine independent.

3. METHODOLOGY

The administrator section and the staff section make up the intelligent pharmacy sales and stock management system.

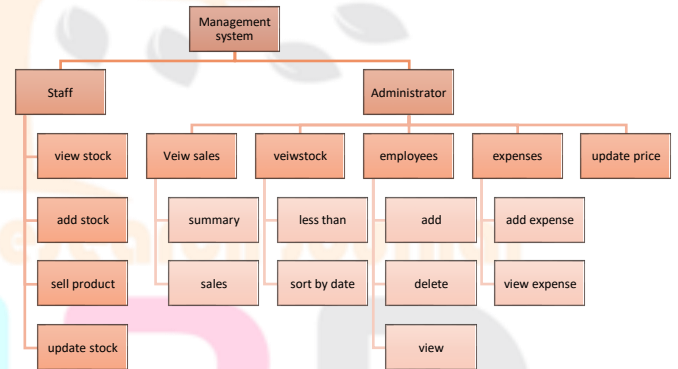


Figure 1:Flowchart.

3.1. staff section:

The following fields are part of the staff section:

3.1.1. Adding stock:

This part is where newly bought stock that does not yet appear in the database is entered. It features input areas for the name of the medication, the quantity, the selling price, the buying price, the expiration date, and the item sold by. The staff can then submit the information, which will eventually be kept in the pharmacy database.

3.1.2. Updating stock:

If there have been any modifications to the stock that has already been stored, they are made in this part. Changes are made, including adjustments to quantity, selling price, buying price, etc.

3.1.3. Selling:

Ten records will automatically show on the screen in this area by default. The staff member can use the search field to hunt for a certain pharmaceutical product. The item will be placed to the purchase area once the employee clicks it once it shows on the screen. The employee has the option of changing the product's amount, removing it from the buy list, or both in the purchasing area. The employee must then click "pay" to report completed sales. The produced receipt for the transaction is also available for download in pdf format.

3.1.4. viewing stock:

All stock is visible to the staff in this component, with fields for name, quantity, sold by, purchasing price, selling price, and expiration date. If the user cannot find an item, he or she may search for it in the search box field. Additionally, there is a less than input form where the employee may enter the number that they want to see that is less than what is entered in the field for input.

3.2. Administrator section.:

The Administrative section consists of the following:

3.2.1. Adding employees:

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

3.2.2. Delete employee:

This simply erases employee's details from the database.

3.2.3. Viewing stock:

In this section, all stock is visible to the staff with fields such as name, quantity, sold by, buying price, selling price, and expiry date, the user can search for an item if he/she does not see it 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 of the quantity less than that being specified in the input field.

3.2.4. Updating stock prices.

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

3.2.5. viewing sales:

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

3.2.6. 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 back-end and front-end programming

languages namely; The front-end programming languages enable us to make dynamic web pages while the back-end programming help 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 database.

4.1. Front End:

4.1.1. 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 [7].

4.1.2. 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 [8].

4.1.3. 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 [7].

4.1.4. Bootstrap:

Bootstrap is a popular front-end library for building responsive websites. It includes a collection of pre-built CSS, and JavaScript elements like buttons, forms, navigation bars, and modals, that can be easily customized to create a unique website design [9].

4.1.5. React JS:

React JS is a library based on JavaScript used for building component rich based user interfaces. It is designed to make it easier to build reusable UI components and control a web application's state [10].

4.2. Back End:

4.2.1. MongoDB:

Popular NoSQL database MongoDB is used to store and manage unstructured data. It makes use of a document-oriented data model, therefore information is kept in flexible and dynamic JSON-like documents instead of rigidly structured table [11].

4.2.2. Node.js:

Node.js is a Java Script runtime environment which developers use to run Java Script on the back end. It provides a way to build scalable and high performance web applications using JavaScript[12].

4.2.3. Express.js:

Express.js is a popular Node.js web framework for creating APIs and online applications. It offers a selection of features and tools that facilitate the creation and administration of web applications. [13].

5. RESULTS AND DISCUSSION

The implementation and creation of an intelligent system for pharmacy stock and sales management for Stella Tanganyika Pharmacy Management System was a success story and achieved its defined goals and objectives. The system has been designed and developed to digitalize the management of pharmaceutical operations at the pharmacy, including stock management, sales management, and employee management. The successful implementation of the system will increase the pharmacy's overall efficacy and efficiency, leading to greater client service and increased profitability. Figure [2] shows a page where either the administrator or staff can log in into the system with his/her UID and password created during the time of creation of an employee.

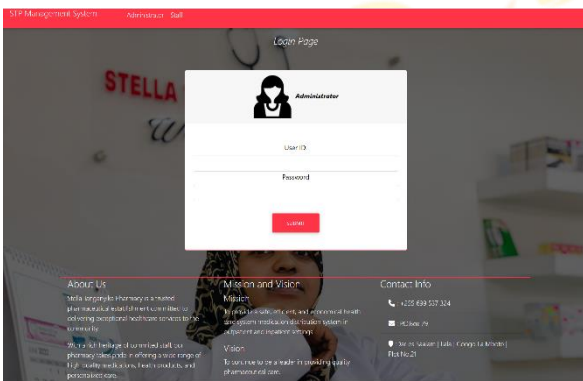


Figure 2: Login page.

After the staff has logged in, they can access sales, add, update and view pages where the sales page is where sales are made as shown in the figure below:

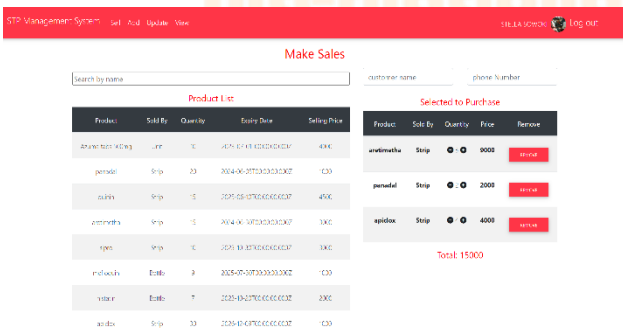


Figure 3: Sales page.

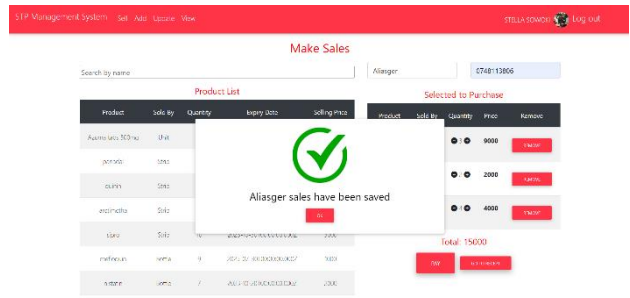


Figure 4: Sales confirmation.

Receipt creation:

Once the sales have taken place successfully. The staff can download and print the invoice for the customer.

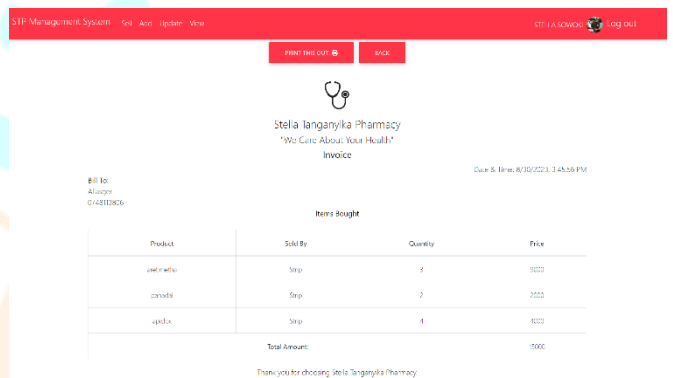


Figure 5: Receipt page.

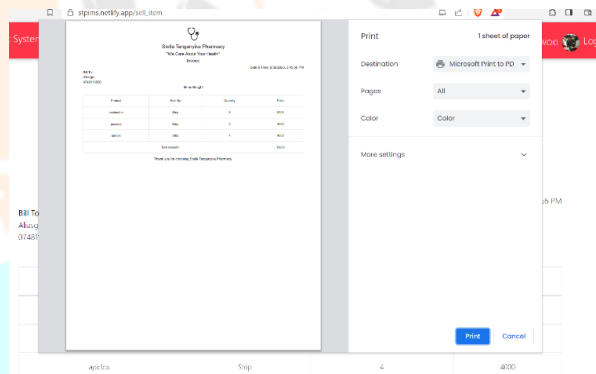


Figure 6: Print receipt.

Adding stock to the system is done in the add page and updating stock in the update page respectively.

Stock taking:

All product details are added in this page. Details like; product name, quantity, buying price, selling price and expiry date.

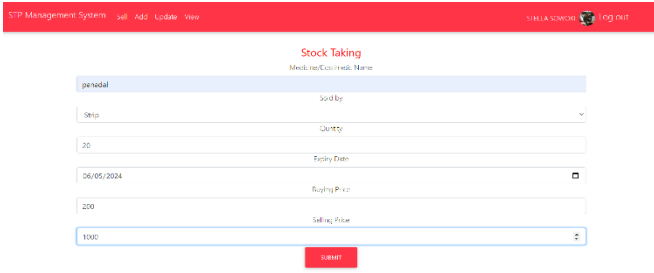


Figure 7: Stocks page.

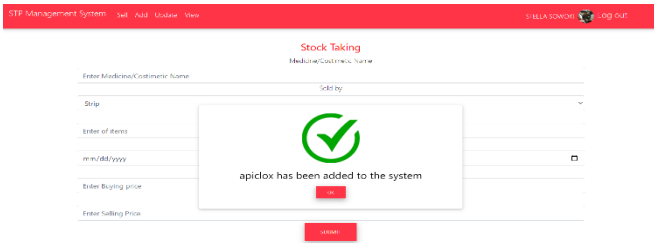


Figure 8: Adding Stock confirmation.

Updating stock:

Once new stock has arrived or want to make some changes on the already existing details in the system.

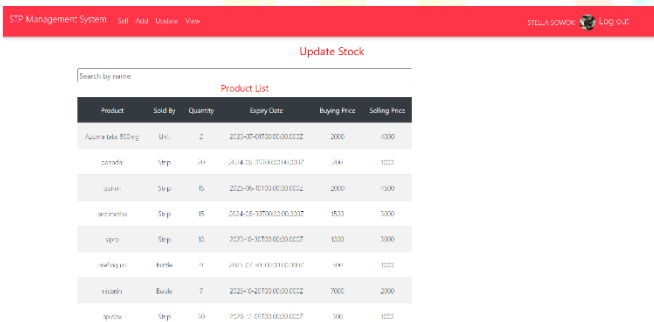


Figure 9: Updating stock page.

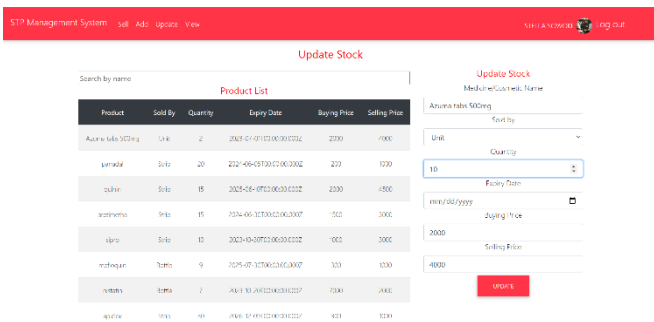


Figure 10: Adding new stock.

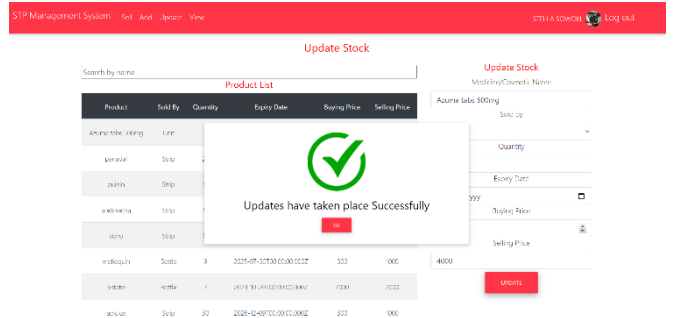


Figure 11: Stock adding confirmation.

When an administrator has logged in, they can access sales, employee's, expenses and view pages.

Sales page:

Shows all the sales made in a specified period of time where the administrator can see sales based on product or dates. There is also a summary of sales expenses and dividend.

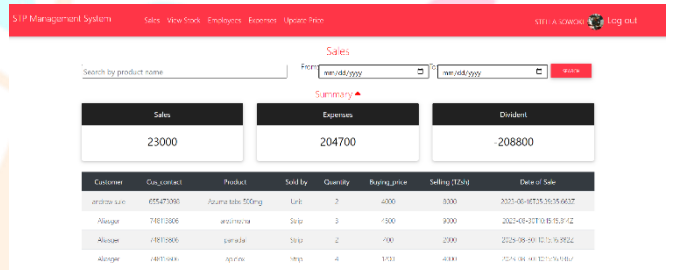


Figure 12: Sales page.

Add employee:

All employee details are filled here of which after employee creation, a UID is automatically assigned to the employee of which it is used when logging in into the system.

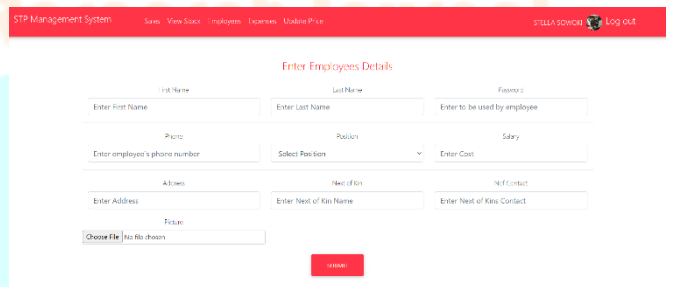


Figure 13: Add employee.

Update employee:

If there is any need to change the employee details, then it is done in this section. It is important to remember that once updating, the password must be changed as well.

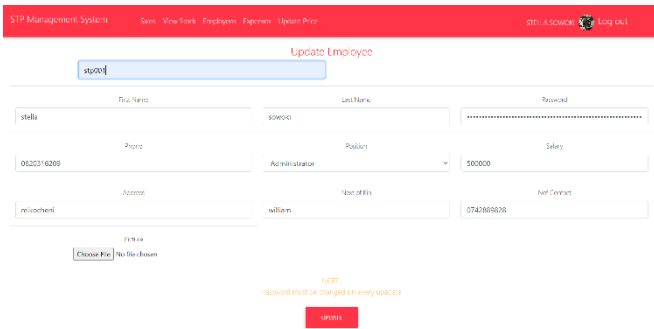


Figure 14: Update employee.

Update price:

The administrator has only the privilege to change the buying and selling price.

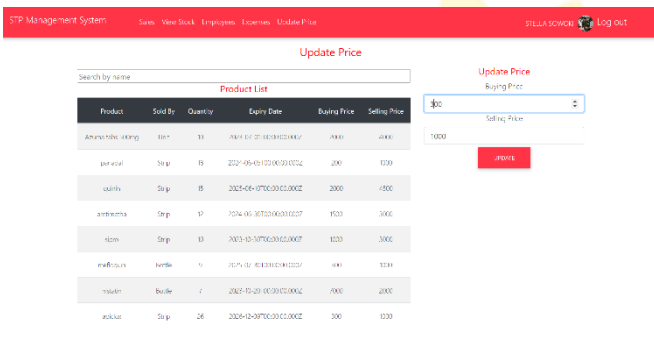


Figure 15: Update price page.

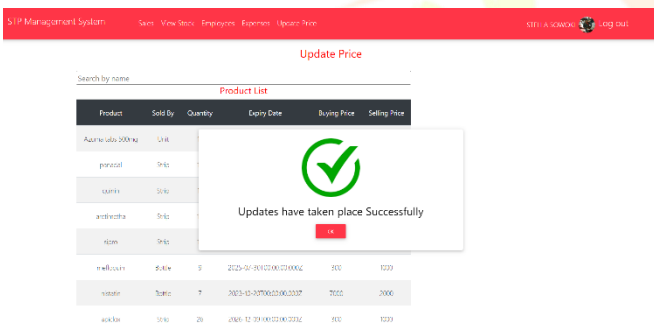


Figure 16: Update price confirmation.

Deleting employee:

When the user has to be removed from the system, only the UID is required then the employee can be deleted from the system.

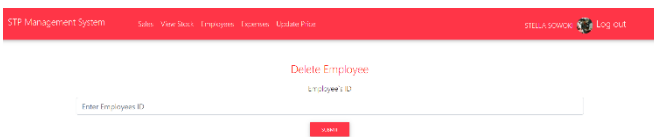


Figure 17: Delete employee page.

Expenses:

All the operational costs that the pharmacy incurs like electricity, water, food, etc. are added to the system in order to keep records for future reference and profit calculation.

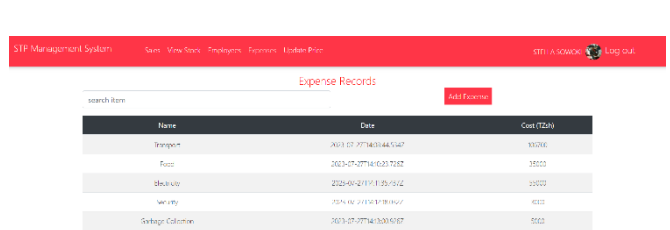


Figure 18: Expense page.



Figure 19: Expense entry point page.

6. CONCLUSION

Work done by the author on operations research design and implementation of pharmacy management information system [6] related to pharmacy management systems have significantly contributed to the field of pharmacy management, enhancing the pharmaceutical processes. However, there was still room for further research, especially on the operability of the system in other OS platforms apart from Windows. In order to reduce the gaps, we created an intelligent sales and stock pharmacy management system, which has solved the issue of interoperability, making our system platform independent, hence the system can work any device having any operating 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 growth pharmaceutical industry.

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