STOCK MANAGEMENT SYSTEM

Egwali, Annie O. and Ikhalo, Emmanuel Itua

Department of Computer Science, Faculty of Physical Sciences. University of Benin, Benin City, Nigeria.

ARTICLE INFO

ABSTRACT

Most existing stock management system has several drawbacks which includes technical issues and downtime, some systems need intensive training of employees in order to use the software effectively which takes time, some system rely on data storage and processing, raising concerns about data security and privacy. Some are not portable and so create a dependency on technology and difficulty in keeping old records. This study aims to develop a Stock Management System that utilizes a client-server model and a connected database to track the sale of items, interpret data, and support multiple stores and warehouses. The system plays a crucial role in controlling material movement, storage, and transactions within a warehouse, including shipping, receiving, put away, and picking. It optimizes warehouse utilization and helps determine the economic order quantity and reorder point for each product, enabling cost-cutting measures during economic slowdowns. The proposed system implements a web application for warehouse management and product performance tracking, facilitating accurate reordering, forecasting, and demand analysis. The system ensures proper inventory management by effectively tracking incoming and outgoing inventories. This will enable decision makers to initiate accurate re-order and make forecast and demand of the product at any point in time and a proper management of inventories.

1. Introduction

Manual stock management system had drawbacks such as slow data handling, excessive paperwork, inaccuracy, and lower efficiency. Effective stock management that implement a computer-based inventory control system that ensures precise documentation, increases productivity, facilitates quantity monitoring, maximizes stock levels, improves order fulfillment accuracy and efficiency, integrates with other company systems, and enhances overall operational efficiency in various industries and highlights technological advancements have simplified the entire stock inventory process. Conducting research on the latest trends and technologies in stock management systems helps businesses choose customized solutions that optimize stock management procedures. In summary, adopting a stock management system can provide significant benefits for businesses in various areas such as risk management, employee productivity, and supply chain visibility. Emerging technologies such as blockchain and mobile applications are likely to further enhance these benefits in the future. However, businesses must also be aware of the challenges of an automated process such and take steps to address them effectively through continuous improvement efforts and effective implementation strategies.**2. RELATED WORKS**

An inventory system was developed by [1] and they conducted a research to examined five sample firms and found a significant relationship between inventory and sales in the commercial vehicle industry. Effective inventory management was identified as

crucial for organizational health and improvement, leading to enhanced profitability. In [2], a model was proposed that focused on the effect of inventory management on the profitability of cement manufacturing companies in Kenya. The research discovered a negative correlation between the gross profit margin and the inventory conversion period. The model resulted in an increase in sales, indicating larger firm size, was associated with higher inventory levels, resulting in improved profits.

A study conducted by [3] involves surveying customers of retail businesses in South Korea. They found that customers were more satisfied when the business had accurate inventory levels, reduced waiting times, and improved product availability. They then proposed and implemented a stock management system that lead to increased customer satisfaction. A model was proposed and implemented on computerizing a stock management system that significantly improved the performance of retail businesses [4]. The study sampled over 50 retail businesses in India and concluded that adopting a stock management system increased sales, reduced stock levels, and improved cash flow.

According to [5], the impact of stock management systems on supply chain management was explores and it was discovered that implementing a stock management system can improve supply chain visibility, reduce lead times, and increase collaboration between suppliers and customers. They proposed a stock inventory model that used data analytics in stock management systems to optimize their supply chain processes. In another study, [6] explored the potential benefits of using blockchain technology in stock management systems and proposed a stock management software which uses blockchain technology that enable businesses to establish trust between different stakeholders in the supply chain.

In another study, a proposed a stock management systems that have significant impact on the performance of small and medium-sized enterprises (SMEs) was developed [7]. In the study they analyzed several SMEs in Vietnam, and found that businesses that implemented the proposed stock management systems were more likely to achieve their revenue and profit goals. using mobile applications in stock management systems, [8] proposed a mobile stock inventory model and highlights the benefits of the system. automation in cloud-based stock management system was proposed in [9]. The study provided businesses with real-time inventory tracking, remote access to data, and scalability. Additionally, the cloud-based system reduce hardware and maintenance costs associated with traditional on-premises systems.

3. METHODOLOGY

The proposed methodology for developing the Stock Management System using PHP involves gathering requirements, designing the system, and implementing it through iterative development. The PHP web program is developed with emphasis on clean code and efficient functionality. Integration, testing, and deployment are important steps, followed by user training and documentation. Feedback is collected for continuous improvement, and ongoing maintenance and support ensure the program's smooth operation. This methodology ensures the successful development and demonstration of a PHP-based Stock Management System.

3.1 Design

The UML Activity diagram provided depicts the interactions between various activities within the Stock Management System. These activities encompass customers, bills, stocks, products, and stores. The diagram provides a visual representation of how these components interact and work together within the system. The UML Activity diagram for the Stock Management System depicts the features accessible to the Admin User, such as customer management, bill handling, and report generation. It shows the steps involved in adding, modifying, and deleting customers and bills. The diagram illustrates the interconnectedness of objects like Customer, Bill, and Store. Additionally, it provides a comprehensive overview of the activities related to

Customer, Product, Store, Stock, and Bill in the system. Major elements of the activity diagram of Stock Management System are shown in figure 1.
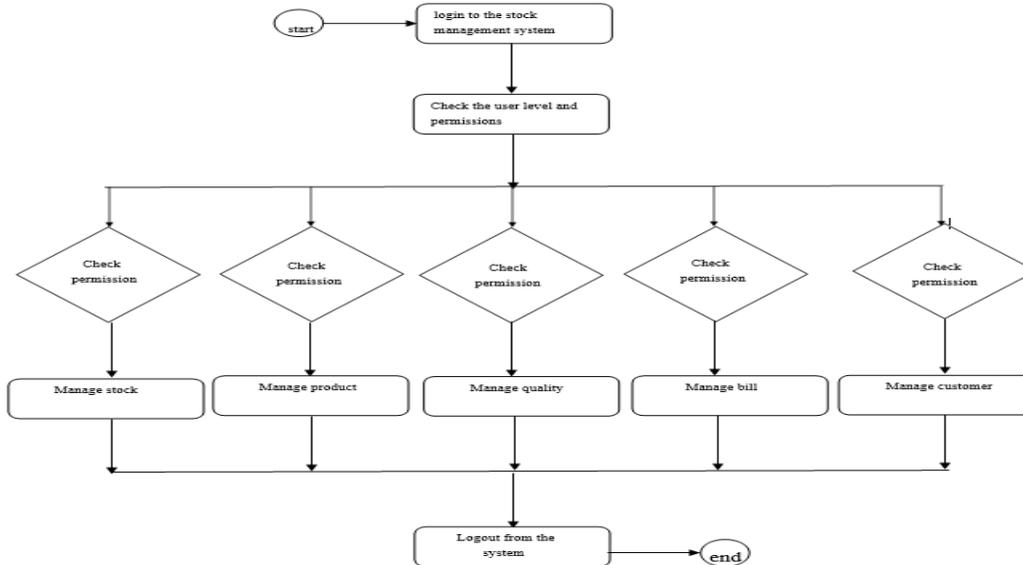

Figure 1: Activity Diagram for the Stock Management System

The UML Activity diagram for the Stock Management System represents the login process for admin users, highlighting authentication and access control. After successful login, users can manage Stock, Customer, Bill, Store, and Product operations. The diagram emphasizes the secure nature of specific pages that require authentication. It provides a concise visual depiction of the login functionality and its role in controlling system access. Major elements of the login activity of Stock Management System are shown in figure 2.
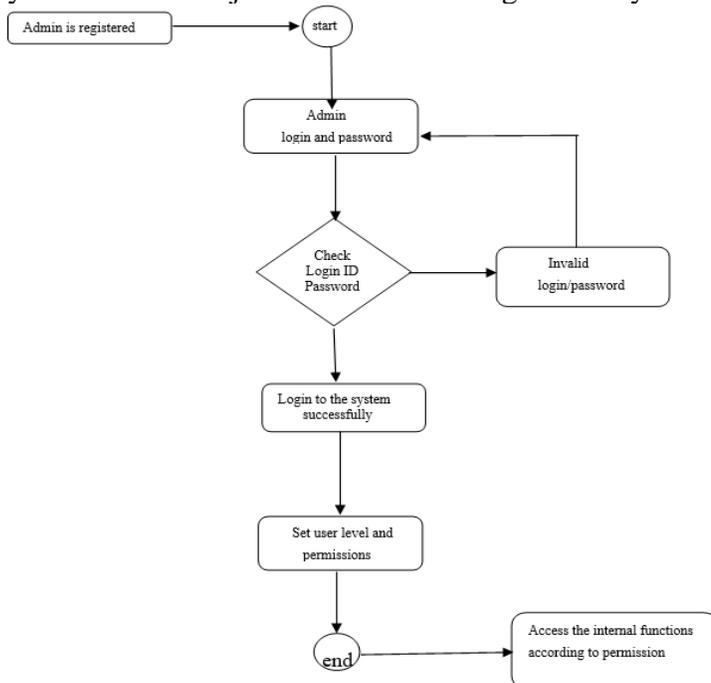
Figure 2: Login Activity Diagram

The Use Case Diagram for the Stock Management System illustrates the interactions between actors and their associated use cases. The main actors include Super Admin, System User, Agents, and Customers. Use cases include Stock Management, Product Management, Bill Management, Customer Management, Store Management, and User Management. The diagram provides a clear overview of the relationships between actors and use cases, aiding in system analysis and requirement identification. Major elements of the UML use case diagram of Stock Management System are shown in figure 3.
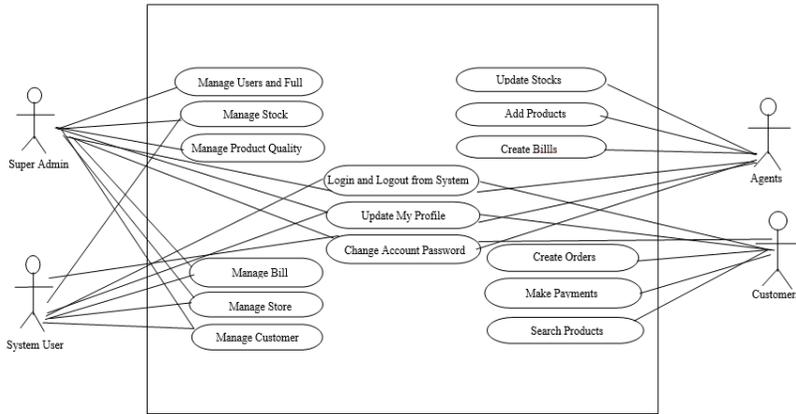
Figure 3: Use-case Diagram of the Stock Inventory System

The major elements of the class diagram of Stock Management System are shown in figure 4.
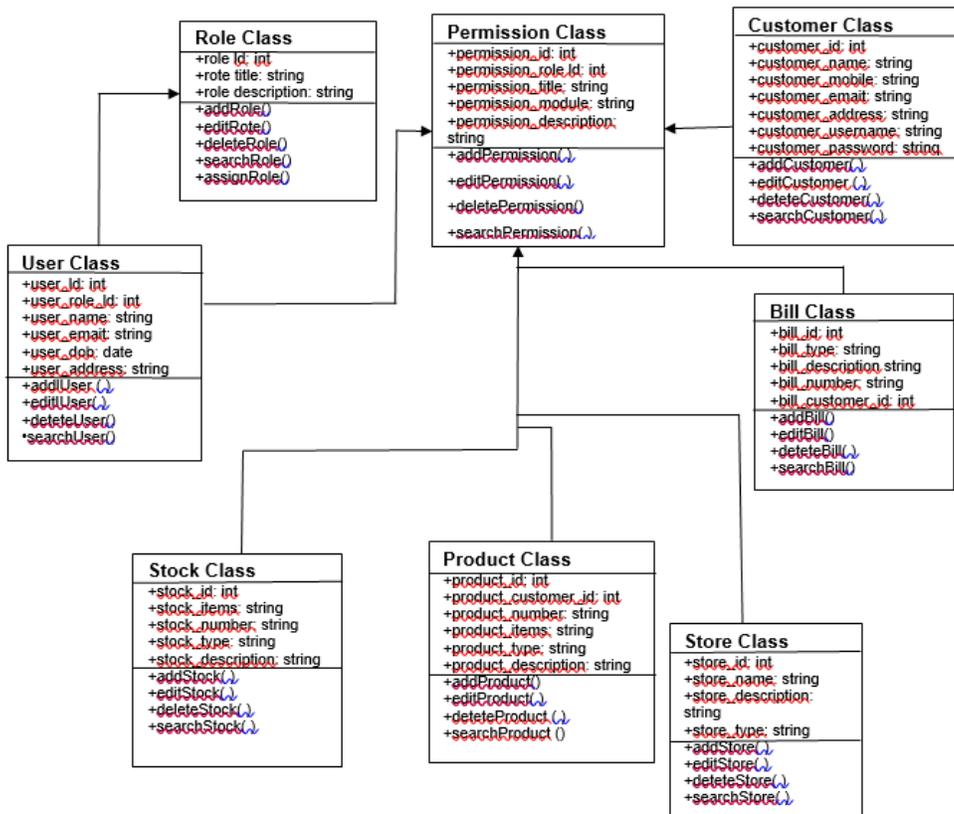

Figure 4: Class Diagram

The Component diagram represents the Stock Management System and its various components. These components include Store, Bill, Product, Stock, and Quality, each responsible for specific operations. The diagram provides an overview of the system's architecture and component interactions, aiding in understanding the system's physical components and their relationships. It also allows for modeling the database schema, executables, and source code of the Stock Management System. Major elements of the component diagram of Stock Management System are shown in figure 5.
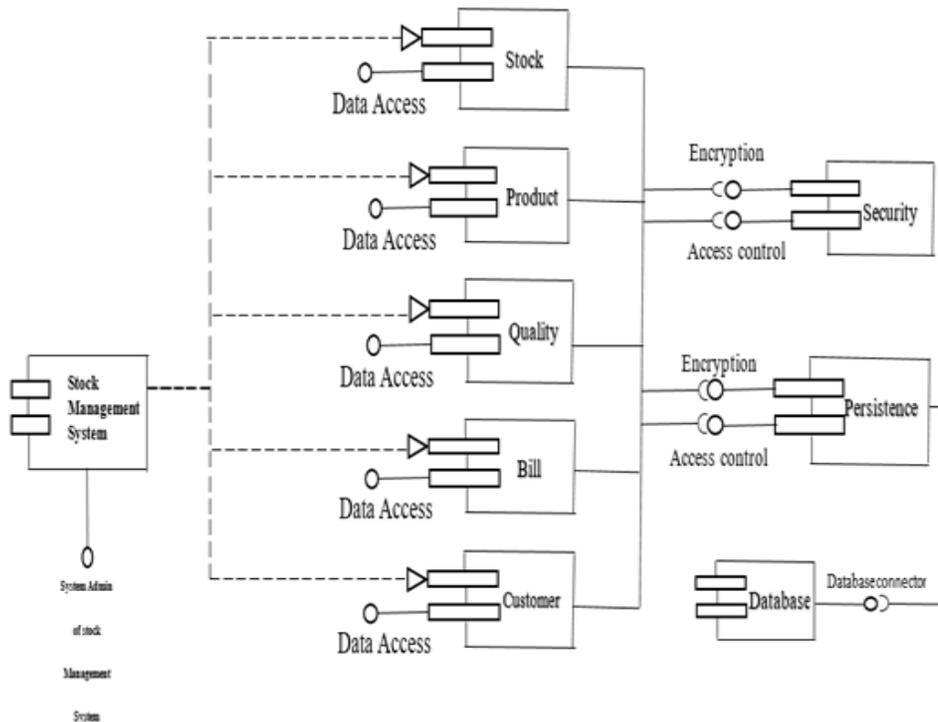
Figure 5: Component Diagram

1.   IMPLEMENTATION

The proposed system requires both hardware and software components. A processor with a clock speed of 1 GHz and multiple cores capabilities was used. The system had a minimum of 2 GB of RAM, with adequate disk space for storing PHP scripts, application files, and databases. The operating system was compatible with the PHP version and any additional software dependencies, including network connection for interaction with external systems.

Software requirements include XAMPP/WAMPP server, which provides a local development environment for hosting PHP applications; a Web browser for accessing and testing the PHP applications; Visual Studio Code, a popular text editor with features for PHP development. Also included is the PHP/HTML programming language used for the system design for the front end, while MySQL is used as the database.

4.1.   Login Module:

Upon launching the program, users are presented with a login module to enter their credentials for authentication. Following successful authentication, the subsequent screen displayed is determined by the user's role and associated restrictions (see figure 6).

Figure 6: Login Module

The admin's dashboard screen displays the date, total revenue, and provides navigation options to different program aspects such as Products (viewing stock and expiring products), Orders (managing and placing orders), Brand (adding new brands), Category (adding new categories), and Me (options for adding users, accessing settings, and logging out). Users with restricted access have a separate dashboard as seen above.

4.2   Add Users Module:
This screen is exclusive to only the admin. It's from here the admin adds new users to the database using a set of username and email address to identify each of them.

4.3   Order Report Module:
This screen is where reports of sales are generated. You can specify the duration by selecting the start and end date, this enables the program to automatically generate the report for the specified range. There's also an option to print the generated report also.

4.4   Settings Module:
The settings screen makes provision for the admin to change the password for security when necessary.

4.5   Manage Order Module:
This screen shows the orders already made and as seen in figure 8, there's an "Action" button where the admin may decide to either delete, edit, or print a receipt for an order made.
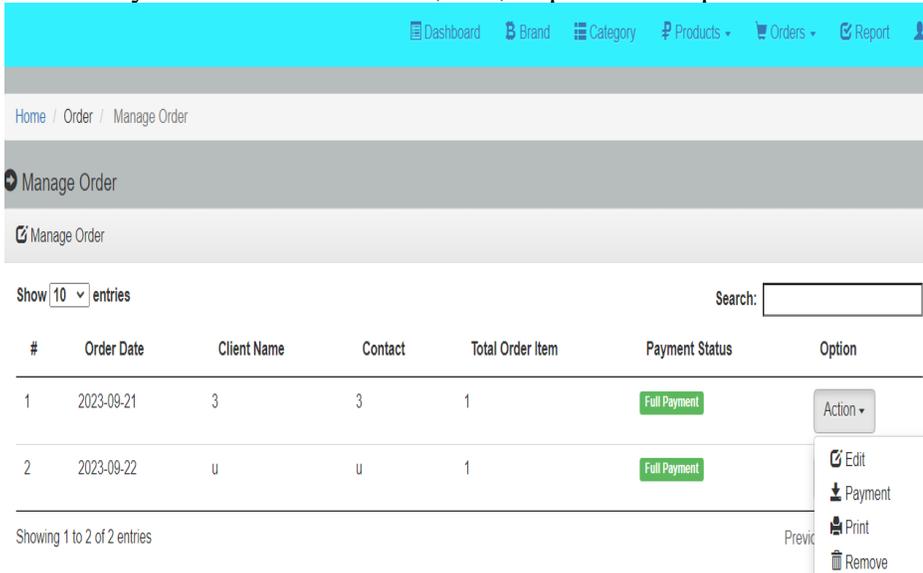
Figure 8: Manage Order Module

4.6   Add Order Module:

The "Add Order" screen is accessed from the "Orders" tab on the dashboard and is used for creating orders for clients. It provides fields for entering the client's name, date of transaction, contact details, amount, and other relevant information. After completing the order, the attendant can generate a printed receipt for the client (see figure 9).

Figure 9: Add Order Module

4.7   Expiring Product Module:

Figure 10: Expiring Product Module Screen

As seen in figure 10, the "manage expiring product module" screen displays all expiring products by displaying the product name, days to expire, etc. There's also an action button where an option to either edit or completely remove the expiring product. This option is exclusive to only the admin.

5. CONCLUSION

This project has successfully achieved its objectives. I have created a robust and user-friendly system that effectively manages stock inventory, ensuring accurate tracking, efficient reordering, and comprehensive

reporting. The system has undergone extensive testing and provides reliable performance. The recommendation is to adopt the newly implemented stock management system for businesses looking to streamline their stock management processes. The system offers benefits such as reduced stockouts, shelf life management, minimized overstocking, and improved decision-making through data-driven insights. It is recommended to continuously monitor the system's performance, address potential issues, and periodically update it to incorporate new technologies and industry trends. Regular staff training is also suggested to maximize utilization of the system's capabilities. Overall, the system will contribute to better inventory control, increased efficiency, and overall business success.

REFERENCES

[1]   Srinivasa Rao, K. (2014). An Analytical Study on Inventory Management in Commercial Vehicle in India. International Journal of Engineering Research, 3(6), 378-383.

[2]   Anichebe, N. A., and Agu, O. A. (2013). Effect of Inventory Management on Organizational Effectiveness. Information and Knowledge Management, 3(8), 92-100.

[3]   Kotler, P. and Armstrong, G. (2004) *Principles of Marketing.* 10th ed. Upper Saddle River: Prentice Hall. *Management Science*, pp. 982-1003.

[4]   Wilson, E., and Turner, M. (2022). Lean Principles in Stock Management: A Case Study in the Manufacturing Industry. *OrganisationalBehaviour and Human Decision Processes*, 50 (2), pp. 179-211.

[5]   White, C. (2023). RFID Technology in Stock Management: Enhancing Inventory Accuracy and Efficiency. *MIS Quarterly*, pp. 425-478.

[6]   Meuter, M.L., Ostrom, A.L., Roundtree, R.I., and Bitner, M.J. (2000) Self-Service Technologies: Understanding Customer Satisfaction with Technology-based Service Encounters. *The Journal of Marketing*, 64 (3), pp. 50-64.

[7]   Reed, T. (2023). Risk Management in Stock Management: A Comparative Study of Different Industries. . *Management Science*, 46 (2), pp. 186-204.

[8]   Park, K., and Lee, J. (2023). Internet of Things (IoT) Applications in Stock Management Systems. *MIS quarterly*, pp. 125-143.

[9]   Gupta, R. (2021). Demand Forecasting Techniques for Effective Stock Management. *B2C Strategies and Models*, pp. 1-17.