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Review Article

Shrinath Automobiles Shop: An Application for Inventory Management System

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Abstract: The main focus of this project is the creation of an Inventory Management System (IMS), conceived to improve the inventory management of businesses of all sizes. It includes key features such as stock level tracking in real-time, automatic reorder notification generation, and detailed reporting tools. The IMS, with a friendly interface, allows users to efficiently manage inventories at multiple locations and streamline order processing. The technologies utilized for ensuring data entry accuracy and enhancing accessibility are barcode scanning and cloud computing. This project demonstrates IMS's capabilities to change inventory management practices by offering savings and reducing turnaround time, which improves customer satisfaction, as elaborated in the paper. The author ends with views on the implementation and future improvement for scalability and integration with other business systems.
This paper presents a system design and implementation aimed at enhancing the efficiency of inventory tracking, sales management, and financial transactions. The system encompasses customer information management, real-time stock updates, sales tracking, and payment management. It provides a seamless experience to customers and administrators alike. The system minimizes errors and ensures accurate data flow and decision-making based on detailed reports and automated alerts with an interlinked database for customer, product, sales, and payment information system. The expected benefits include increased operational efficiency, improved inventory management, streamlined transaction processes, thus improving customer satisfaction and effective use of business resources.

Keywords: An application for inventory management; track stock, collect real-time data, and automate with cloud computing; supply chain management; order fulfillment; data analytics; user-friendly interface; operational efficiency; cost savings; customer satisfaction.

1. Introduction

In the ever-evolving, fast-paced, and competitive environment of today's business world, effective inventory management has become one of those sine qua-non for the success of the organization .Inventory serves as a vital asset for companies, influencing cash flow, operational efficiency, and customer satisfaction. As businesses grow and expand, the complexity of managing inventory increases, often leading to challenges such as stock discrepancies, inefficient order processing, and high operational costs.This introduction sets the stage for a detailed exploration of the system's development, including problem analysis,methodology, and anticipated impacts on inventory management practices. By implementing an effective IMS, organizations can improve their inventory accuracy, enhance order fulfillment, and ultimately achieve greater operational efficiency and customer satisfaction.
This paper introduces a comprehensive inventory management system designed to streamline operations by integrating real-time tracking of stock levels, managing customer and sales information, and ensuring accurate transaction processing. The system provides both customers and administrators with user-friendly interfaces, allowing customers to view product availability and purchase items while administrators can monitor stock, sales trends, and financial records. Through the use of interconnected databases, the system ensures seamless communication between different modules, reducing errors, improving decision-making, and enhancing overall business efficiency.

This introduction outlines the key features of the system, its expected outcomes, and its importance in modern business environments team, ensuring that all aspects of the system are

carefull. Today, with the fast and ever-competitive environment within which a business operates, inventory management has developed into one determinant of an organization's success. All levels of business, whether small startups or large enterprises, are faced with the burden of keeping track of, controlling, and managing their inventory effectively so as to adapt to the ever-changing customer needs, all while keeping costs at a minimum. An Inventory Management System (IMS) is one of the major instruments that help organizations automate and streamline their inventory processes, thereby addressing issues that are pervasive, such as stock discrepancy, overstocking, and stockouts. Such issues often arise when tracking manually, which in turn leads to lost sales opportunities and increased operational costs. The purpose of this project is to develop a full-fledged IMS aimed at improving accuracy, providing real-time insight, and enabling better decision making in inventory-related operational processes. At its simplest, the goal of inventory management is to ensure product flow from the suppliers to the final customer. This encompasses everything from ordering, storing, and tracking to ultimately managing inventory levels through: 1. Effective inventory management can result in substantial cost savings and greatly improved customer satisfaction. Therefore, it is a critical aspect of the business strategy for any organization in today's economic environment. 2. But one of the downside effects of poor inventory management is the operational inefficiency it causes. In the first place, stock discrepancies due to manual tracking could lead to overstocking or tying capital and storage costs on excess inventory. On the other hand, stockouts would mean losing on sales opportunities and disappointing customers due to inadequate inventory levels. Furthermore, in the absence of an effective system, businesses may not be equipped to capitalize on the current market changes, hence losing huge revenues and incurring unnecessary costs.

The project will enter a phase of rigorous testing, in which various testing methodologies will be applied to identify and rectify any problems or bugs in the system. In this respect, unit testing, integration testing, and user acceptance testing will be utilized to ensure that this system satisfies all quality measures and is therefore deployment-ready. After the completion of the testing phase, the rollout of the IMS system will commence in the business environment, during which data will also be migrated from existing systems to support the transition to the new IMS. Training sessions will be held to ensure the employees are well acquainted with the system and its features; this would facilitate user uptake and reduce interference with operations during the transition period. After-going live, there will be maintenance and support to address any arising issues and updates and improvements as necessary. The successful completion of the Inventory Management System is predicted to bring several positive outcomes for the business. Increased efficiency is one of the major advantages, for inventory processes will be automated, thus streamlining operations with less time devoted to manual work. Second, inventory accuracy would be improved with the use of barcode scanning and real-time tracking to reduce discrepancies and losses that may arise through poor inventory management practices. Furthermore, real-time data and comprehensive reporting functionalities will facilitate better decision-making in inventory management by allowing the business to respond efficiently to market changes. In relation to this, large cost savings will be achieved by lowering inventory levels and the risk of overstocking and stockouts. Ultimately, an improved customer experience would be the best possible outcome.

2. Literature Review

1. The product Zoho commenced functioning in 2015. It was made and considered an integral part of the Zoho platform to provide a holistic solution for businesses, having a major focus on inventory or order management. The application has evolved with new features and integrations since its inception to match user requirements. This application offers cloud-based solutions for tracking stock, managing orders, and optimizing supply chain function, being yet another member of the Zoho suite of applications. The app allows businesses to keep track of inventory live, create and manage purchase and sales orders, and integrate with an array of online selling platforms. Some features are barcode scanning for accuracy, automated stock updates to avert stockouts, and exhaustive reporting for data-based decision-making. Moreover, by integrating seamlessly with other Zoho apps like Zoho Books, it plays a crucial role in streamlining business processes and getting more works done. Zoho Inventory allows businesses to keep live track of stock levels, automate the management of orders, and integrate with various sales channels such as Amazon or Shopify, thus providing a centralized inventory control solution. In their research, it is said that the system minimizes manual errors and enhances operational efficiency by recording stock movement and sales trends: all of which gives a glaring and complete insight. Besides that are its easy interface and customizable workflow, which can be suited to a wide-ranging assortment of industry requirements, solidifying this product as a true master in inventory management. Studies show that firms using Zoho Inventory enjoy long-term accuracy in stock management, reduce costs associated with overstocking or stockouts, and increase productivity, thus becoming a well-valued gem to optimize supply chain processes.

2.Cin7 Limited is an inventory management software platform established in 2014, providing a cloud-based solution that helps businesses manage their inventory, orders, and supply chain processes effectively. It offers real-time inventory tracking across various locations and sales channels, which helps prevent stockouts and overstock situations. Users can create and manage sales and purchase orders while integrating with multiple online marketplaces and eCommerce platforms, ensuring centralized sales management. Additionally, Cin7 includes warehouse management features, comprehensive reporting tools for analyzing inventory performance and sales trends, and point-of-sale (POS) capabilities for businesses with physical stores. Overall, Cin7 aims to enhance operational efficiency and profitability by streamlining inventory and order

management. As a robust inventory management and POS solution, Cin7 highlights its extensive features designed to assist businesses in managing inventory across different sales channels. It integrates smoothly with various e-commerce platforms like Shopify and Amazon, as well as accounting software such as Xero and QuickBooks, allowing businesses to maintain centralized inventory control and real-time visibility into stock levels. Research shows that Cin7's functionalities, including automated order management, stock tracking, and reporting analytics, significantly boost operational efficiency, especially for retail and wholesale businesses. Users of Cin7 report improved accuracy in inventory management, lower operational costs, and greater customer satisfaction due to timely order fulfillment. Moreover, its powerful API enables extensive customization and integration with existing systems, making it a versatile solution that caters to the unique needs of various industries. In summary, Cin7 is recognized as a valuable tool that optimizes inventory processes, streamlines operations, and fosters growth in an increasingly competitive market.

3.Fishbowl Inventory Management Software, established in 2001, offers a complete inventory and order management solution suitable for businesses of all sizes. The software allows for real-time tracking of inventory levels, making processes like order fulfillment, shipping, and receiving more efficient. It features barcode scanning, batch and serial number tracking, and multi-location management to improve accuracy and efficiency. Additionally, it provides advanced reporting tools to analyze inventory performance and trends. Overall, Fishbowl aims to simplify inventory management, lower operational costs, and boost productivity for businesses. The software is particularly effective for companies looking to enhance their inventory management and manufacturing processes. With robust features such as inventory tracking, order management, and manufacturing capabilities, Fishbowl is especially advantageous for small to medium-sized enterprises (SMEs) in industries like retail, manufacturing, and distribution. Research shows that Fishbowl's integration with accounting software like QuickBooks and various e-commerce platforms increases its effectiveness by offering real-time visibility into inventory levels and streamlining order fulfillment. Users of Fishbowl report significant gains in operational efficiency, reduced inventory handling costs, and improved accuracy in stock levels. Its user-friendly interface and customizable reporting tools also enable businesses to make informed decisions based on real-time data, enhancing overall supply chain management. In summary, Fishbowl is recognized as a powerful inventory management tool that helps businesses maintain optimal stock levels while boosting productivity and profitability in a competitive market.

4.Katana Inventory Management Software, launched in 2017, is tailored for small to medium-sized manufacturers and retailers aiming to improve their inventory and production processes. The software offers real-time visibility into inventory levels, enabling users to monitor stock across various locations and manage orders effectively. Key features include production planning, bill of materials management, and integration with popular eCommerce platforms like Shopify and WooCommerce.

Additionally, Katana provides barcode scanning for precise stock management and detailed reporting tools to analyze sales trends and inventory performance. By simplifying the complexities of inventory management and production, Katana assists businesses in optimizing operations and boosting productivity. It emphasizes its role as an effective solution for manufacturers and distributors seeking to enhance their inventory management and production processes.

Katana includes features such as real-time inventory tracking, batch and recipe management, and integration with various e-commerce platforms and accounting software like QuickBooks and Xero. Research shows that Katana's focus on manufacturing-specific needs, including the management of raw materials and finished goods, significantly improves operational efficiency and supports production planning. Users have reported better visibility into stock levels and order fulfillment, leading to improved decision-making and shorter lead times. Furthermore, Katana's user-friendly interface and customizable workflows meet the unique needs of different industries, making it suitable for small to medium-sized enterprises (SMEs). Studies indicate that businesses using Katana see greater accuracy in inventory control, lower costs related to overstocking or stockouts, and overall enhanced productivity, establishing it as a valuable tool for optimizing supply chain operations in the manufacturing sector.

5.Monday.com, established in 2012, is a flexible work operating system designed to help teams effectively plan, track, and manage their projects and workflows. The platform boasts a user-friendly interface that enables users to create customizable boards tailored to various tasks, projects, and processes. Key features include task assignment, timeline tracking, collaboration tools, and automation options that help reduce repetitive work. monday.com seamlessly integrates with a variety of other applications, including Slack, Google Drive, and Trello, enhancing its capabilities and making it suitable for diverse business needs. With a strong emphasis on transparency and collaboration, monday.com seeks to boost team productivity and improve communication within organizations. Literature on monday.com underscores its role as a versatile project management and work operating system (Work OS) that promotes collaboration, organization, and workflow optimization across different teams and industries. Thanks to its intuitive interface, users can create tailored workflows, monitor project progress, and manage tasks in real-time. Research shows that the platform's adaptability makes it ideal for various applications, from marketing and sales to product development and inventory management. Studies indicate that users gain improved visibility into project timelines and team responsibilities, which enhances accountability and increases productivity. Furthermore, monday.com's ability to integrate with numerous third-party applications, such as Slack, Google Drive, and CRM systems,

streamlines communication and data sharing among teams. The software's visual dashboards and reporting features offer valuable insights into project performance, supporting data-driven decision-making. In summary, monday.com is recognized as a powerful tool that not only facilitates efficient project management but also encourages collaboration and boosts overall organizational effectiveness in a fast-paced work environment.

6.Square was established in 2009, but its Inventory Management System was developed and integrated into its broader suite of business tools over time. The company has consistently improved its offerings, with inventory management features becoming more significant as the platform evolved, especially around 2017 when Square shifted its focus to providing comprehensive solutions for retailers and restaurants. This system, launched as part of Square's offerings, enables real-time tracking of stock levels, allowing businesses to oversee inventory across various locations and sales channels. Key features include automated stock alerts, purchase order management, and detailed reporting on inventory performance and sales trends. The system integrates smoothly with Square's point-of-sale (POS) and eCommerce solutions, helping businesses streamline operations and enhance accuracy. By simplifying inventory management, Square aids businesses in reducing costs and boosting overall efficiency. As an inventory management application, Square demonstrates its effectiveness in equipping small and medium-sized enterprises (SMEs) with the necessary tools to optimize inventory control and improve operational efficiency. Its features allow businesses to monitor stock levels in real time, manage product listings, and receive alerts for low stock, thus minimizing the chances of stockouts and overstocking. Research shows that Square's seamless integration with its POS system allows businesses to synchronize sales and inventory data effortlessly, providing accurate insights into product performance and sales trends. Furthermore, the application's user-friendly interface enables users to manage inventory across multiple locations and sales channels, enhancing overall visibility and control. Studies indicate that businesses using Square for inventory management experience greater accuracy in stock tracking, fewer manual errors, and improved order fulfillment processes. Overall, Square's inventory management capabilities are highly beneficial.

7.Megaventory, launched in 2013, is a cloud-based inventory management software aimed at small to medium-sized businesses. It offers a complete solution for tracking inventory levels, managing sales orders, and streamlining purchasing processes. Notable features include real-time inventory tracking across multiple locations, automated stock alerts, and detailed reporting tools that assist businesses in analyzing their inventory performance and sales trends. Additionally, Megaventory integrates with various eCommerce platforms like Shopify and WooCommerce, enabling users to efficiently manage both online and offline sales. By simplifying inventory management and enhancing operational visibility, Megaventory seeks to help businesses optimize their processes and boost productivity. The software is particularly effective for small to medium-sized enterprises (SMEs) looking to improve their inventory control and supply chain processes. It includes a robust suite of features such as real-time inventory tracking, order management, multi-location support, and integration with various e-commerce platforms and accounting software. Research shows that Megaventory's user-friendly interface makes it easier to manage stock levels, sales orders, and purchase orders, helping businesses keep accurate inventory records and minimize stockouts or overstocking. Users gain improved visibility into their inventory and sales data, which supports informed decision-making and effective demand forecasting. Furthermore, Megaventory's reporting capabilities offer valuable insights into inventory turnover rates and product performance, enabling businesses to refine their purchasing and sales strategies. Overall, Megaventory is recognized as a powerful tool that not only streamlines inventory management processes but also enhances operational efficiency and growth for SMEs in a competitive marketplace.

8.Sortly Inventory Management System was established in 2013 to offer a straightforward solution for businesses to visually manage their inventory. The software provides a user-friendly mobile and web interface that makes it easy to track, organize, and categorize inventory items. Key features include barcode scanning, customizable QR codes, and the ability to create detailed visual records of inventory. Sortly also includes reporting tools to monitor inventory trends and stock levels, along with integration options for other business applications to ensure smooth management. By prioritizing simplicity and accessibility, Sortly aims to assist businesses of all sizes in efficiently managing their inventory and boosting overall productivity. The system is particularly effective for small to medium-sized enterprises (SMEs) looking to streamline their inventory tracking and organization. Sortly's intuitive interface allows users to build a visual catalog of their inventory using photos, QR codes, and customizable tags, making it easy to manage and find items. Research shows that Sortly's features, such as real-time inventory tracking, stock alerts, and reporting capabilities, significantly improve operational efficiency by providing clear insights into stock levels and usage patterns. Users report fewer manual errors and more streamlined workflows, as Sortly simplifies item check-ins and check-outs, enhancing inventory accuracy and accountability. Furthermore, Sortly's mobile app supports on-the-go inventory management, which is especially beneficial for businesses with multiple locations or those needing field access to inventory data. In summary, Sortly is recognized as a valuable tool that simplifies the inventory management process, improves visibility, and supports efficient operations across various business environments.

3. Problem Analysis

The analysis of inventory management systems reveals several significant challenges that businesses encounter, such as inaccurate inventory tracking, inefficient order

management, and insufficient real-time data visibility. These problems can result in stockouts, overstocking, and delays in fulfilling orders, which ultimately impact customer satisfaction and cash flow. Furthermore, managing inventory across multiple locations, poor integration with other business systems, and limited reporting capabilities can obstruct effective decision-making and operational efficiency. User adoption may be low due to the complexity of these systems, and scalability issues can emerge as businesses expand. Tackling these challenges is crucial for creating an effective inventory management solution that improves accuracy, efficiency, and overall productivity. Inventory management presents considerable challenges for businesses in various sectors, especially small and medium-sized enterprises (SMEs). Common problems include inaccurate stock tracking, which can lead to overstocking or stockouts, resulting in lost sales opportunities and higher carrying costs. Many traditional inventory systems depend on manual processes that are susceptible to human error, making it challenging to keep accurate records and maintain real-time visibility of stock levels. Additionally, the lack of integration between inventory management systems and other business functions—like sales, accounting, and customer relationship management—can create information silos that impede efficient operations and decision-making. Another widespread issue is the difficulty in forecasting demand, which is further complicated by rapidly changing market conditions and consumer preferences. Without accurate data and analytics, businesses struggle to make informed purchasing decisions, further exacerbating inventory issues. Furthermore, managing inventory across multiple locations or sales channels introduces complexity, as it requires coordinated efforts to ensure consistent stock levels and fulfill orders promptly.

Managing inventory manually or through outdated systems can lead to significant inefficiencies and errors, especially as the volume of stock increases. Common challenges include inaccurate stock levels, difficulty in tracking items, poor visibility of inventory data, and delayed response to low-stock situations. These issues can result in overstocking or stock shortages, both of which negatively impact business operations. Manual processes often lack real-time updates, causing delays in decision-making, and there's a higher likelihood of human errors during transactions, item addition, or removal. Furthermore, a lack of role-based access control can compromise data security, as sensitive information might be accessible to unauthorized users.

Without proper inventory management, businesses may also struggle with inefficient order processing and an inability to forecast demand accurately. The absence of alerts or notifications when stock reaches critical levels can lead to missed sales opportunities, while excessive inventory ties up capital and storage space. Additionally, the inability to efficiently search for or filter items in the inventory can slow down the process of locating items for sale, restocking, or auditing.

This analysis highlights the need for a streamlined Inventory Management System that addresses these problems by providing real-time tracking, role-based access control, search and filter functionality, and automated notifications to ensure smooth and accurate inventory operations.

4. Expected Results

Implementing an effective inventory management system is anticipated to deliver substantial benefits, such as improved accuracy in tracking inventory, streamlined order processing, and better real-time visibility into stock levels. These enhancements will facilitate quicker order fulfillment, minimize errors, and optimize inventory management across various locations. By integrating seamlessly with other business applications, the system will eliminate data silos, while robust reporting tools will offer valuable insights for data-driven decision-making. Higher user adoption rates, supported by a user-friendly interface and thorough training, will contribute to increased operational efficiency. Furthermore, the system's scalability will accommodate business growth, ensuring it can adapt to changing inventory requirements. In summary, these outcomes will boost productivity, lower costs, and enhance customer satisfaction, positioning the business for sustainable growth.

The anticipated benefits of an inventory management system include efficient inventory tracking, with real-time updates on stock levels based on purchases and restocking, ensuring both customers and administrators have accurate information on product availability. The system should simplify customer and sales management by effectively handling customer data, purchase history, and order processing, while equipping administrators with tools to manage sales, stock, and product information. Financial transactions should be processed and recorded accurately to ensure transparency. Administrators should gain insights into stock trends and sales to make informed decisions, with automated alerts for low stock levels and reduced errors due to less manual handling. Overall, the system should enhance the user experience for both customers and administrators, improving operational efficiency and decision-making.The Inventory Management System are to provide a secure and efficient platform for managing inventory with seamless user authentication and role management. Users should be able to register, log in, and log out securely, with different access permissions based on their roles, such as admin, manager, or employee. The system is expected to offer real-time tracking of inventory, allowing users to add, update, and delete items, with detailed records of each item including name, SKU, quantity, and price. It should also generate automatic notifications when stock levels fall below a predefined threshold to help maintain optimal stock levels. Additionally, the system should include robust search and filter functionality, enabling users to find specific items quickly by name, category, or SKU, and sort items based on criteria like low stock or price range. Lastly, it is expected to facilitate smooth handling of inventory transactions such as sales, purchases, and returns, while maintaining a comprehensive transaction log that records details like date, time, and the nature of the transaction.

5. Methodology

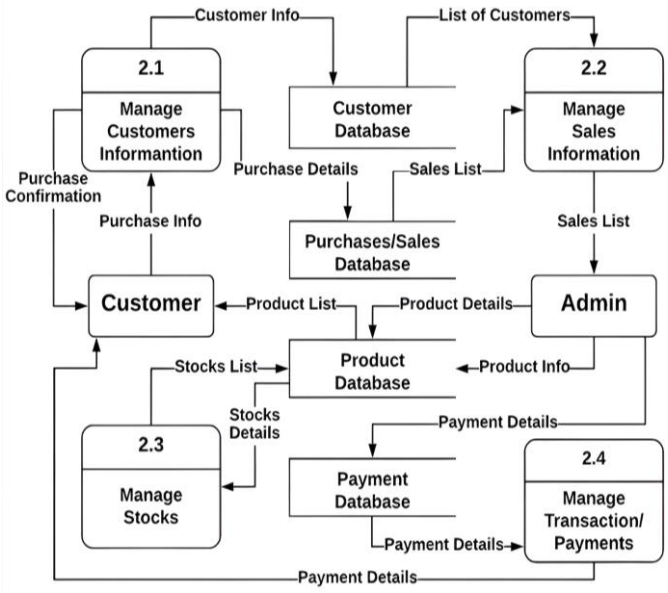

Fig.1. Level-2 DFD

This diagram represents an inventory and sales management system that involves both customers and administrators. It shows the interaction between different system components, such as customer management, sales, product databases, and payment handling. The process begins with the customer providing their information, which is managed in the Customer Database and updated through theManage Customers Information module (2.1). Purchase details are recorded and confirmed through the Purchases/Sales Database, which communicates with the Product Database to update stock levels. The Manage Stocksmodule (2.3) tracks product stocks and ensures availability. Admins oversee the sales process using the Manage Sales Information module (2.2), which interacts with the Sales List and provides product information to theProduct Database. Both customers and admins manage transactions through the Manage Transaction/Payments module (2.4), which updates the Payment Database with payment details. Thus, the system ensures a seamless flow of information between customers, admins, product inventory, and financial transactions. - Identify specific needs related to inventory management, including stock tracking, reporting, and user access.

The system consists of several interconnected modules: 1.Customer Module: Customers interact with the system by providing their details, which are managed through the Customer Database. The Manage Customers Information (2.1) module updates this information. Customers also initiate purchases, and their purchase details are recorded in the Purchases/Sales Database. A confirmation of the purchase is sent back to the customer, completing the transaction. Admin Module: Admins are essential in managing the sales process. In the Manage Sales Information module (2.2), they oversee the sales list, which is integrated into the Purchases/Sales Database. Additionally, the Admin works with the Product Database to ensure that product details are accurate and that updates are made in response to sales activity.3.Product Management: The Product Database is central to the system, maintaining up-to-date product details and providing the customer with a list of available products. When sales or purchases occur, the system interacts with the Manage Stocks module (2.3) to ensure that product availability is managed by checking stock levels and updating stock lists. 4.Payment System: Both the customer and admin interact with the payment system. The Manage Transaction/Payments module (2.4) is responsible for handling all payment details, which are recorded in the Payment Database. This ensures smooth and accurate financial transactions, keeping the system's accounting in check. 5.Interconnectivity and Data Flow: The system has strong interconnectivity between its databases. Customer details, sales records, product information, stock levels, and payment transactions all interact dynamically, ensuring data is updated in real time. The Purchases/Sales Database plays a pivotal role in linking customer purchases, sales by the admin, and product stock updates. Additionally, the Payment Database securely tracks all monetary transactions to ensure accurate financial management.

6. Conclusion and Future Scope

An effective inventory management system is crucial for businesses aiming to boost operational efficiency, enhance accuracy, and optimize supply chain processes. By tackling common issues like inaccurate tracking, inefficient order management, and the absence of real-time visibility, these systems enable organizations to make informed decisions and quickly respond to market demands. The anticipated benefits, such as improved accuracy, streamlined processes, and heightened customer satisfaction, can greatly influence overall business performance. Looking ahead, the future of inventory management systems appears bright. Innovations in technologies like artificial intelligence, machine learning, and the Internet of Things (IoT) are set to further improve inventory management capabilities. These advancements could facilitate predictive analytics for enhanced forecasting, automated replenishment processes, and better integration with eCommerce and supply chain networks. As businesses continue to evolve, the need for more advanced, scalable, and user-friendly inventory management solutions will increase, making it essential for developers to innovate and adapt to the shifting landscape. Ultimately, embracing these advancements will enable businesses to thrive in a more competitive environment.

The Inventory Management System is crafted to simplify the inventory management process by providing real-time tracking, intuitive management features, and secure access control. It ensures efficient monitoring of stock levels, allows for easy addition, updating, or removal of items, and accurately logs all transactions. With integrated search and filtering options, users can swiftly find specific items, while automatic notifications help avert stock shortages. This system offers a comprehensive solution for businesses to manage their inventory, boosting overall productivity, minimizing errors, and enhancing decision-making based on current data.

Conflict of interest
The authors declare that they have no conflict of interest.

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Authors' Contributions
All authors contributed equally to this work.

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