

INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

**INVENTORY MANAGEMENT SYSTEM FOR PHARMACY**

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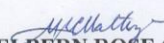
**"INVENTORY MANAGEMENT SYSTEM FOR PHARMACY"**

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## ABSTRACT

“Efficient inventory management plays a great role in pharmacy practice,” according to Ali in 2013. With the evolving technology and digitalization of every process happening now in the world, the Philippines has remained stagnant and reliant on the traditional processes – the use of pen and paper when doing the basic transactions on their enterprises. But this kind of process is prone to delay of processes, human error, poor management, and an additional workload for normal employees. According to the interview conducted by the developers with the pharmacists working at JCBO Pharmacy in Manila, Philippines, the employees of this local pharmacy have faced a lot of difficulties in keeping up with their workload because of the traditional inventory management that is conducted daily. The pharmacists also shared that they had to pay a yearly fee for their Point-of-Sales system, which only functions as stated and doesn’t cover the inventory management which they had to manually work on. So, the 4<sup>th</sup> year BSIS students from the Technological University of the Philippines – Manila conducted a capstone project exclusively for JCBO pharmacy, which will help the employees and the owner to monitor and manage their inventory system. The system has operational features such as POS(Point-of-Sales), customer profiling, product inventory, report generation, and notification. To develop the inventory management system for pharmacy, the developers utilized the use of web frameworks, IDEs, and programming languages namely, Bootstrap, CSS, HTML, JavaScript, and PHP. And to manage the data needed, the developers used MySQL for the database management. The inventory management system for pharmacy has undergone the ISO 25010 evaluation. The evaluation of the system has resulted in a 3.65 rating, which indicates the satisfactory performance of its functionalities. Overall, the digitalization of processes in small enterprises like an inventory management system has a great effect on the overall performance of the local pharmacy.

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## **Chapter 1**

### **THE PROBLEM AND ITS SETTING**

#### **Introduction**

Technology is progressing at a faster rate than it has ever been. Various approaches have been developed to make people's lives and jobs easier. Automation is at the forefront of these tactics. Automation provides answers to a wide range of challenges and organizational issues. Automation is defined as the functioning of a system and equipment in the desired manner at the proper time, under the control of mechanical or electrical devices that operate with or without human intervention (Arani, Namusonge, & Mbuvi, 2017) It has been the age for technology and automation, but it is obvious that the Philippines has been declining with the technology with its fast pacing around the world.

There are still a lot of people who use traditional paper-based transactions or rather prefer using them because they are neither introduced to the new way nor better technology. For instance, there are small enterprises that still use traditional inventory management systems. This traditional management system is done through the manual checking of product stocks. Particularly in Manila, Philippines, the developers found a local pharmacy that uses the traditional inventory. The ever-evolving era of automation is always thriving to replace the conventional way of manual efforts. Nowadays it is extremely important to have easy access to data in a visually representable form via an app for a user-friendly system. Managing the data manually tends to be enormous and existing systems fail to maintain every inventory in the shipment process accurately.



*Figure 1.* JCBO Pharmacy

Located in San Andres, Manila, JCBO Pharmacy is a local pharmacy that caters to the whole barangay for pharmaceutical needs. The pharmacy claimed to have been using paid POS (Point-of-Sales) that is available online, however, the system doesn't cover inventory management. The employees, including the licensed pharmacists, are conducting traditional paper-based inventory management. As a result, the workload of employees piles up at the end of the day, human errors, and delays in processes.

### **Objectives of the Study**

The study aims to develop an inventory management system for pharmacy.

The specific objectives of this study include:

1. Design the system with the following features:
  - a. Responsive web application to work across multiple types of platforms and devices.
  - b. Access levels for system administrator, pharmacist, and manager.

- c. Add and update items in the inventory.
  - d. Maintain, manage, and track inventory.
  - e. Display consolidated data via the dashboard for each user.
  - f. Generate notifications for expiring and running out-of-stock items.
2. Create the system using software development tools such as PHP, MY SQL, HTML, CSS, Bootstrap, and JavaScript.
  3. Test and improve the system in terms of functional suitability and reliability.
  4. Evaluate the performance of the system using ISO 25010 criteria for quality software.

### **Significance of the Study**

The importance of the study is it targets the enterprise inside the community that needs to be improved in terms of automation and technology. Inventory management is crucial in running a certain business, particularly a pharmacy. According to World Health Organization, one of the essential roles of a pharmacist is managing resources such as money, material, manpower, time, and information. This is a key factor to professional success on an individual level as well as an organizational level. From both financial and operational perspectives, efficient inventory management plays a great role in pharmacy practice. From a financial viewpoint, efficient inventory management enhances gross profit and net profit by reducing the cost of procured pharmaceutical products and associated operational expenses (Ali, A., 2013) So, through this study, the researchers are focusing on the improvement of inventory management of small pharmacy by making a system that will help the inventory transaction faster and fault-proof system.

**Scope and Limitations of the Study**

The study aimed to develop an inventory management system for JCBO Pharmacy in Manila, Philippines, with the objective of enhancing its operations through automation. The study's client is the pharmacy, situated in the San Andres area of Manila. By implementing an automated system, the study sought to streamline the pharmacy's inventory management processes, ultimately leading to increased efficiency and improved customer service. The project focused on assessing the pharmacy's existing inventory management practices, identifying areas for improvement, and designing a customized software solution tailored to the specific needs of JCBO Pharmacy. Through this initiative, the study aimed to revolutionize the pharmacy's operations and contribute to its overall success in the competitive pharmaceutical industry.

The proponents of the study have proposed a comprehensive system for the pharmacy that encompasses various functionalities, such as file maintenance, item maintenance, transaction processing, sales transaction management, account creation, and report generation. This proposed system aims to revolutionize the way the pharmacy operates by providing a centralized platform for managing essential files and information. With the file maintenance feature, the system will allow for efficient organization and storage of important documents, ensuring easy access and retrieval whenever necessary. The item maintenance functionality will enable the pharmacy to effectively manage its inventory, including adding new items, updating item details, and tracking stock levels. Additionally, the proposed system will facilitate seamless transaction processing, enabling smooth and accurate recording of sales transactions. By automating the process, the system will minimize errors and improve overall efficiency. Furthermore, the

inclusion of an account creation feature will enable the pharmacy to establish personalized customer accounts, providing a more tailored experience and allowing for easier tracking of customer information and preferences. Lastly, the reports generated by the system will provide valuable insights into the pharmacy's performance, offering a comprehensive overview of sales, inventory status, and other key metrics to design, develop and implement a module that will manage the security of the system.

The cashier's role within the organization is primarily responsible for managing the point of sale (POS) system. As a cashier, their main task is to handle customer transactions, process payments, and issue receipts. They have access to the POS system, which enables them to input sales information, calculate totals, and generate reports. However, their access is limited to the functionalities of the POS and does not extend to other systems or modules within the organization.

To effectively manage the files, records, and important data of the business, a file maintenance module is being designed, developed, and implemented. This module will serve as a centralized system for storing and organizing crucial business information. It will enable authorized personnel to create, update, and retrieve files and records related to inventory, sales, customer information, and other relevant data.

The Items feature in a system or database is a crucial component that stores and manages all the records related to the addition of products. It serves as a comprehensive repository, keeping track of various details associated with each product that is added to the system. This includes information such as the product name, description, category, pricing, availability, and any other relevant attributes or metadata. This is to ensure that accurate and up-to-date information is maintained for all the products within the system,

facilitating efficient inventory management and streamlined processes for businesses. Additionally, it provides a centralized location where users can easily retrieve specific product information whenever needed, enabling smooth operations and effective decision-making.

The staff module of the system is responsible for maintaining a comprehensive record of all employee and pharmacist details, including additions and deletions from the system. This module ensures efficient management of the company's workforce.

In addition to the staff module, the system also aims to design, develop, and implement a sales module. This module will be responsible for managing all sales transactions within the company. It will provide a streamlined process for recording and tracking sales, generating invoices, and managing customer information.

*Critical Level* - it shows that the system will closely monitor items that are low in stock to ensure that there is an adequate supply available. This level of monitoring is crucial to avoid any potential shortages or disruptions in the availability of essential items. By closely tracking the stock levels and reordering, when necessary, the system aims to maintain sufficient inventory to meet customer demands and prevent any negative impact on sales or customer satisfaction. This proactive approach allows businesses to stay on top of their inventory management and ensure a smooth and uninterrupted supply chain.

*Expiring Items* – To ensure the quality and safety of products, businesses often implement measures to monitor items that are close to their expiration dates. These expiring items undergo regular inspections and checks to prevent their sale after the specified expiration date. By closely monitoring these products, businesses can minimize the risk of selling expired goods to consumers, thereby maintaining their reputation, and



ensuring customer satisfaction. This proactive approach helps in maintaining the integrity of the business and ensures that customers receive fresh and safe products.

To design, develop and implement a sales module that will manage the inventory of products. This system provides sales transactions for the company. It holds information data regarding their sales operations and provides auto-generated receipts for the customers.

To design, develop and implement a generated module that will manage the sales and inventory reports. This will provide the generation of reports which are necessary for the proper evaluation of the company's sales and inventory records.

## **Chapter 2**

### **CONCEPTUAL FRAMEWORK**

This chapter presents the related literature and studies after the thorough and in-depth search done by the researchers.

#### **Review of Related Literature and Studies**

Inventory will be difficult to control when there is an increase in product item number. It needs product grouping analysis to determine product priorities. So that, an inventory management information system that supports inventory planning process becomes important to discuss. (Herlambang, 2021)

According to Ali (2013), Pharmacy inventory management is one area where information technology has proven valuable. In industrialized nations, computerized systems are widely used in all pharmacy practice settings. Technology improves the effectiveness, accuracy, and precision of inventory management procedures and evaluation methodologies. Examples of how technology is used in inventory management include periodic inventory control using hand-held scanners to read barcodes on product packaging or shelf labels and electronically submitting purchase orders after entering the scanned data into a computer via a web-based system, such as e-procurement. Nowadays, technology is utilized in almost all pharmacy operations, from ordering, procurement, and storage, to pay for products. Pharmacists should employ the benefit of newer technologies in their practice for better management of their pharmacy inventory. An example of newer technology to improve product distribution from manufacturers to wholesalers to pharmacies is the use of radiofrequency identification (RFID) microchips, or “tag”.

The inventory is used to meet patient demand, so it is important to estimate the exact amount and timing of demands in the planning process. It is also important to know how long it will take until the order has been received, so it will not run out of stock.

(Afnaria, Tulus, Herman Mawengkang, & Wiryanto. 2020)

### ***Inventory Management System***

An inventory management system (or inventory system) is the process by which the employee can track goods throughout the entire supply chain, from purchasing to production to end sales. It governs how the employee approaches inventory management for the business. Even though inventory management has been around for a while, not all businesses use it to cut costs. (Plinere, 2015)

In pharmacy operations, inventory is referred to as the stock of pharmaceutical products retained to meet future demand. Inventory represents the largest asset in pharmacy practice, and its value continues to rise because of the growth in the variety and the cost of pharmaceutical products. From both financial and operational perspectives, efficient inventory management plays a great role in pharmacy practice. Inventory management aims at reducing procurement and carrying costs while maintaining an effective stock of products to satisfy customer and prescriber demands. (Ali, 2013)

### ***Benefits of Using an Inventory Management System***

Inventory decreased by 70% along with the continuous improvement of the system during the past decade. The workload in inventory management in each section of the Pharmacy Department as well as in clinical units was dramatically reduced after the implementation of this system. The automation system in drug inventory management allows the creation of new clinical positions for pharmacists. This system also could pay

for itself in time. (Awaya, 2015)

A study conducted in Kenya by Naliaka and Namusonge (2015) identified that inventory management affects the competitive advantage of manufacturing firms. The same study further concludes that the firm can compete based on quality and delivery of customer orders on time.

### ***Inventory and Monitoring Process Control System***

Over time, both the demand for services and the needs of the client change. Those in the service industries must adapt to the new technology. These are the explanations for why modernizing the current systems and procedures is crucial. The goal of this study was to evaluate the current system of medical supply inventory and monitoring in rural health facilities and to build a new and enhanced process control system that can produce accurate and effective outcomes. The researcher's ability to create a system that is user-friendly, efficient, and more accurate was made possible by more study and review of the current system. Beneficiary data is recorded and encoded more quickly and without paper than under the previous system.

### ***Pharmaceutical Supply Chain and Inventory Management Strategies***

All healthcare industries must strive to provide excellent customer service and implement efficient inventory management procedures. In addition to causing financial losses, medicine shortages and incorrect usage of medications can negatively affect patients. Due to the fact that they have not addressed how drugs are managed, provided, and used to save lives and promote health, many health systems and hospitals have trouble attaining these goals. Research is necessary to comprehend how the healthcare sector operates and to develop instruments for strategic decision-making in

the pharmaceutical supply chain, patient safety, and public health. The researchers provide an inventory model for a supply chain combining a pharmaceutical company and a hospital supply chain that incorporates continuous review with manufacturing and distribution.

### ***Pharmacy Inventory Management***

In healthcare facilities, pharmacy inventory management is a crucial procedure. On the one hand, meeting the patients' therapeutic needs depends on efficient drug procurement. On the other hand, effective inventory management may be key to limiting operational costs because hospital pharmacists' purchase and storage expenditures account for a sizeable portion of hospital budgets. In order to minimize excessive purchasing volumes, maximize warehouse capacity, meet forecasted demand, and guarantee crucial stock levels, healthcare facilities should develop and apply decision-aid procedures for planning the acquisition of medications. The controlled pharmaceutical pharmacy at the Regional Hospital of Talca in Chile needs to plan its purchases and inventory levels, so the researchers in this paper describe the methodological aspects of such a tool. The findings from the first year of operation, which were reported by the researchers, reveal that our technique was more successful at maintaining key stock levels and achieved savings of more than 7% when compared to the conventional inventory planning strategy. Furthermore, our approach surpasses a recently published method for a related application from a computational perspective.

### ***Simulation-Optimization to Improve Pharmacy Inventory Management***

The largest grocery retailer in the country is Kroger Co. It runs 1,950 in-store pharmacies and 2,422 supermarkets. Kroger's business strategy is centered on enhancing

customer service. In order to achieve this, the operations research team of Kroger worked with Wright State University faculty to create a cutting-edge simulation-optimization method for managing pharmacy inventories. Traditional standard statistical distributions do not accurately represent pharmacy demand distributions in applications. This simulation-optimization approach leverages empirical distributions to estimate demand, offers end users a visual, intuitive experience, and delivers optimal or almost ideal solutions in milliseconds through local search heuristics, overcoming business aversion to complex mathematics. Since the system's implementation in all American Kroger pharmacies in October 2011, there are now 1.6 million fewer out-of-stocks per year, guaranteeing that more patients have access to their drugs. It led to an annual rise in revenue of \$80 million, a decrease in inventory of more than \$120 million, and a \$10 million decrease in labor costs.

***Determining the Optimal Inventory Management Policy for Naval Medical Center San Diego's Pharmacy***

Navy pharmacies are still using out-of-date inventory management techniques and technologies. This thesis investigated the periodic review and continuous review systems with single item ordering and joint quantity ordering to investigate which was best for Naval Medical Center San Diego NMCS D and determined the optimal inventory management system for NMCS D using demand data collected from NMCS D. According to the study's findings, collaborative ordering and continuous inventory review are less expensive than single-item ordering and infrequent inventory reviews. It is advised that NMCS D start investigating the expenses and the best way to start putting a continuous review mechanism in place.

***Information System Design and Inventory Management on Pharmacy***

The management of inventory will get more challenging as the quantity of product items rises. To establish product priorities, product grouping analysis is required. As a result, it is critical to talk about an information system for inventory management that supports the inventory planning process. The same issue also affects Kutisari Pharmacy, which uses a traditional-based stock and inventory-keeping system to keep track of its almost 1500 product items. Observations show that pharmacy planning is currently done subjectively by the owner. Because the control system is still traditional and there are a lot of product items, expired goods frequently became an issue. An analysis is carried out to find out the benefits of the application system. Based on data analysis, losses from expired drugs and goods that are not recorded in the warehouse resulted in lost sales of Rp. 3,312,000 in a year. In the future, these losses could be prevented and minimized so that they can be of benefit to the pharmacy business.

***The Influence of Inventory Management***

By aligning inventory management techniques with competitive advantages in the competitive world, effective inventory management offers a possible solution today to increase performance. Inventory management procedures, supply chain operations, and logistics networks are viewed as crucial to an organization's existence and ability to compete. Inadequate management may have been brought about by a number of reasons, including the amount of management commitment, the costs incurred, and the level of worker skill, according to studies on inventory management techniques. An important obstacle to enhancing coordination along the value chain in firms is inventory management across the supply chain. Controlling inventory is essential since it

determines whether a business will succeed or fail in the future because of the fierce, always-increasing competition. This study develops and conceptualizes the function of inventory management procedures in improving performance. The quantitative approach is suggested as a means of testing the correlations between various variables. The suggested framework's insights would assist the respective Heads of Pharmacists in Malaysia's public hospitals and other public or private inventory managers in putting in place a suitable system of inventory management practices to improve the overall effectiveness of inventory management.

A complicated system, computer-based systems heavily rely on information technology. It facilitates faster, more accurate, and simpler labor. Because they are expected to provide the best services possible, small, and large businesses alike now depend on the automated system. However, some businesses still favor keeping with a system that is not technologically integrated. Lack of resources and illiterate computer workers are the likely explanations. It is advised that businesses, especially large ones, migrate from manual to automated systems because doing so would boost the company's productivity and efficiency, which will enhance the industry's reputation.

One of the most sought-after automated systems of different companies is a sales and inventory system which comes hand in hand. A sales and inventory system are very important in every organization because good sales and inventory management can create excellent productivity. Primarily, inventory work consists of input, output, and restocking. Input is the process of buying new products into the inventory and replacing the old products with new ones. Meanwhile, output is a procedure of taking out the products from the inventory for sales or usage and refill is a process of increasing the



number of existing products in the inventory in order to fulfill the insufficient products or escalating demands. Most of the retailing market is using traditional ways in inventory management systems where a person is assigned to check and record the stock by hand using pen and paper. It is where operations with regard to all the stock will be archived. It is without a doubt that one of the major roles played by today in almost every area of society, particularly in business and marketing, is the computerized system. This system enables us to do very detailed work and follow accurate directives without error. The basic advantages of the system are to make the process fast and well-organized, which means that they can process much more quickly than humans. Data retrieval must be searched in lots of registers slowly and it wastes a lot of time. It makes the data not reliable enough as it is handwritten and there is a high probability of errors occurring. Data recording consumes a lot of space since it is stored in cabinets and folders. It is also prone to data loss where it could be missing because of improper file management.

Inventory is a company's merchandise, goods, and materials that are contained in the store factory at any given time. The employees need to know how many units of their products are available for reservation and sale and the items that are sold. All of these rely on the inventory system to present solutions. The sales inventory system would provide service to the user, input information to the database, summarize the inquiry of bills, and manage the product releases and storage. This would generate a faster improvisation of work given less time and effort. Inventory control systems maintain information about activities within firms that ensure the delivery of products to customers. The subsystems that perform these functions include sales, ordering, and receiving. In different firms the activities associated with each of these areas may not be

strictly contained within separate subsystems, but these functions must be performed in sequence in order to have a well-run inventory control system.

In today's business environment, even small and mid-sized businesses have come to rely on computerized inventory management systems. Certainly, there are plenty of small retail outlets, manufacturers, and other businesses that continue to rely on manual means of inventory tracking. Indeed, for some small businesses, like convenience stores, shoe stores, or nurseries, the purchase of an electronic inventory tracking system might constitute a wasteful use of financial resources. But for other firms operating in industries that feature high volume turnover of raw materials and/or finished products, computerized tracking systems have emerged as a key component of business strategies aimed at increasing productivity and maintaining competitiveness. Moreover, the recent development of powerful computer programs capable of addressing a wide variety of record-keeping needs—including inventory management—in one integrated system has also contributed to the growing popularity of electronic inventory control options.

Given such developments, it is little wonder that business experts commonly cite inventory management as a vital element that can spell the difference between success and failure in today's keenly competitive business world.

Inventory is one of the most important in monitoring a stock that takes place in business activity. The inventory system does the entire task in computing the value with inventory (cost and quality) and handling data or information. Inventory System maintains an orderly flow of supplies, raw materials, or finished goods through an office shop/factory because of items in any inventory. Represents cost, they need to be controlled. The purpose of an inventory system for management is to keep inventory

levels and costs at the desired minimum while maintaining proper safeguards over materials to places and people who need them.

Inventory means goods and materials, or those goods and materials themselves, held available in stock by a business. This word is also used for a list of the contents of a household and for a list for testamentary purposes of the possessions of someone who has died. In accounting, inventory is considered an asset.

Automation can dramatically affect all phases of inventory management, including counting and monitoring of inventory items; recording and retrieval of item storage locations; recording changes to inventory; and anticipating inventory needs, including inventory handling requirements. Effective Inventory Analysis. Get Data Related to Effective Inventory Analysis. For many distributors, inventory is the largest and perhaps the most important asset. Inventory ties up more money than buildings or equipment and is often less “liquid.” It is crucial, then, that distributors develop and use a comprehensive set of tools that allows close monitoring of the performance of inventory investments.

According to the study of Edwin Bello and his fellow researchers of Computerized Monitoring and Inventory of Stock with Warning Level dated March 2005, many firms have thousands of items of inventory that require some form of control. The usage calculations and record-keeping chores would soon become overwhelming were it not for the computer and its unique information storage and retrieval capabilities.

According to the study of Anna Marie Beltran Distor of Proposed Sales Monitoring System issued 1995, the accelerated work structure of the company’s proper monitoring is essential in order to keep track of the company’s sales activities. Her

system aims to come up with an efficient, and accurate mechanized system of preparing invoices that will keep track of the daily transaction and generate reports. Important information will be provided by this study in order to prove the computerization of the company's operation and achieve a more reliable and efficient means of monitoring day-to-day activities. Her system focuses on the analysis and design of the sales monitoring system which will monitor the stocks inventory of the sales departments. This system of hers is somewhat related to our study but our system focuses more on the inventory monitoring system of a trading company.

According to Kj Henderson, they have three major advantages using of an inventory system are (Time savings, Accuracy, and Consistency) which help a lot for a businessman to increase the sales of their business.

As the old saying goes, "Time is money". The amount of time that can be saved by a business is, perhaps, the biggest benefit of using a computerized inventory system. The only thing a manager would have to do each day is print out the report highlighting the inventory to be restocked.

An additional benefit of using a computerized inventory system is the accuracy it ensures. Eighteenth-century English poet Alexander Pope is often quoted as having said, "To error is human." When an inventory list is maintained by hand, the margin of error widens with each update. If one mathematical calculation is wrong or one typo is made, disaster may occur. For instance, if a clerk accidentally adds a zero to the end of a purchase order, a business could potentially end up paying 10,000 units of merchandise as opposed to the 1,000 that is needed.

A small business operates most efficiently when its processes are executed in a

consistent manner. By using a computerized inventory system, a business owner can ensure that all orders, reports, and other documents relating to inventory are uniform in their presentation, regardless of who has created them.

According to Neil Kokemuller, using the Inventory system they have some disadvantages by using this. These are (Customer Needs, Inventory Costs, Coordination, and Risks).

Balancing the goals of avoiding stock-outs while minimizing inventory costs is at the heart of just-in-time inventory. One of the main benefits of automated and efficient inventory replenishment systems is that you can quickly respond to reduced inventory levels. Companies are equipped to pull back stock in each product category and ramp up inventory in another as customer needs and interests change.

Inventory Costs Minimization of inventory management costs is a primary driver and benefit of just-in-time practices. You also have less likelihood of throwing out a product that gets old or expires, meaning reduced waste.

A disadvantage of managing a just-in-time inventory system is that it requires significant coordination between retailers and suppliers in the distribution channel. Retailers often put major trust in suppliers by syncing their computer systems with suppliers so they can more directly monitor inventory levels at stores or in distribution centers to initiate a rapid response to low stock levels. This usually means the build-up of technology infrastructure, which is costly. This coordinated effort is more involving overall than less time-intensive inventory management systems.

Just-in-time inventory is not without risks. By nature of what it is, companies using JIT intend to walk a fine line between having too much and too little inventory. If

company buyers fail to adjust quickly to increased demand or if suppliers have distribution problems, the business risks upsetting customers with stock-outs. If buyers overcompensate and buy extra inventory to avoid stock-outs, the company could experience higher inventory costs and the potential for waste.

### ***Sales & Inventory Monitoring Systems***

This system was able to function as recording a sale against a customer and/or builder specifying line items, quantities, discounts, and GST applicable. The ability to receive the sale as either an account or cash sale. The sales module must cater for quotes (provisional sales), credits, and orders (pending assembly/delivery).

The ability to merge detailed lines in an invoice to limit the granularity visible to the customer but still retain the detail for inventory and reporting/inquiry purposes, the ability to automatically generate a purchase order or purchase order reminder when stock levels are insufficient to satisfy the order and the ability to generate job cards to enable the manufacturing team to produce the door to suit the customer's order.

### ***Expiry Management***

In any pharmacy, medicines are purchased in a bulk with different MRP & expiry dates, therefore the pharmacists find it difficult to keep a check on every medicine. Unknowingly many medicines get expired lying on the shelves, which at last can only be thrown into the garbage. In case a software with an expiry management system is implemented then it will prompt for the near expiry medicines which the pharmacist can either sell to the customer or return to the supplier. This saves on huge losses & also the products are not wasted. (Kunmar, 2019)

## **Developmental Tools**

### ***PHP***

PHP is an open-source server-side scripting language that many developers use for web development. It is also a general-purpose language that you can use to make lots of projects, including Graphical User Interfaces (GUIs).

PHP has some advantages that have made it so popular, and it's been the go-to language for web servers for more than 15 years now. Here are some of PHP's benefits:

- **Cross-Platform:** PHP is platform-independent. You don't have to have a particular OS to use it because it runs on every platform, whether it's Mac, Windows, or Linux.
- **Open Source:** PHP is open source. The original code is made available to everyone who wants to build upon it. This is one of the reasons why one of its frameworks, Laravel, is so popular.
- **Easy to learn:** PHP is not hard to learn for absolute beginners. You can pick it up pretty if you already have programming knowledge.
- **PHP syncs with all Databases:** You can easily connect PHP to all Databases, relational and non-relational. So, it can connect in no time to MySQL, Postgres, MongoDB, or any other database.
- **Supportive Community:** PHP has a very supportive online community. The official documentation provides guides on how to use the features and you can easily get your problem fixed while stuck.

The PHP scripting language is the culmination of the collaboration of development efforts across the globe, resulting in the creation of a wonderfully rich and

powerful web development language. (Gilmore,2008)

The developers have chosen PHP as the programming language to develop the important modules of the system.

### ***MYSQL***

MySQL is currently the most popular database management system software used for managing the relational database. It is open-source database software, which is supported by Oracle Company. It is a fast, scalable, and easy-to-use database management system in comparison with Microsoft SQL Server and Oracle Database. It is commonly used in conjunction with PHP scripts for creating powerful and dynamic server-side or web-based enterprise applications.

MySQL is a Relational Database Management System (RDBMS) software that provides many things, which are as follows:

- It allows us to implement database operations on tables, rows, columns, and indexes.
- It defines the database relationship in the form of tables (collections of rows and columns), also known as relations.
- It provides the Referential Integrity between rows or columns of various tables.
- It allows us to update the table indexes automatically.
- It uses many SQL queries and combines useful information from multiple tables for the end-users.

In order to integrate the database used in the system, the developers used MYSQL. The use of MYSQL is crucial in the system features such as notifications as the developers used its event function.



***Hypertext Markup Language (HTML)***

HTML, according to Wikipedia (2022), is the standard language used for creating webdocuments that can be viewed in web browsers. It is responsible for structuring web pages and providing instructions to browsers on how to display text, images, and multimedia content. HTML elements serve as the fundamental building blocks of web pages, allowing for the inclusion of images, interactive forms, and other objects. By using HTML tags, developers can define the structure and semantics of text elements such as headings, paragraphs, lists, links, and quotes. The tags, enclosed in angle brackets, provide information about the content and formatting of the document.

In addition to defining the structure, HTML enables the embedding of programminglanguages like JavaScript, which affects the behavior and content of web pages. The visual appearance and layout of content are controlled by CSS. The World Wide Web Consortium (W3C) has advocated for the use of CSS since 1997, encouraging the separation of presentation from HTML. HTML5, a newer version of HTML, leverages the canvas element in conjunction with JavaScript to facilitate the display of video and audio content.

According to Rathburn (2022), HTML is a collection of markup symbols or codes used to display files on the Internet. Markup provides instructions to web browsers regarding the presentation of text and images. HTML tags, referred to as elements, are enclosed in angle brackets and occur in pairs to define the beginning and end of display effects.

HTML is a language that is relatively easy to learn, allowing individuals to create increasingly powerful web pages as they gain proficiency. The evolution of HTML is

driven by the World Wide Web Consortium, ensuring that it meets the demands and expectations of the internet, including the transition to Web 2.0.

The process of navigating the internet through hyperlinks is known as hypertext. Users can easily access different destinations on the web by clicking on hyperlinks, which are special text elements. HTML tags utilize markup to identify specific types of text and apply formatting, such as bold or italic styles, to emphasize words or phrases.

According to Chris (2021), HTML serves as the foundational structure for websites. It is a crucial element in web development and controls the organization of web pages. To create dynamic and visually appealing websites, JavaScript and CSS are employed in conjunction with HTML. An HTML element consists of a character, an opening tag, text content, and a closing tag. Some elements are empty, lacking a closing tag but providing a source or link to content that needs to be included on the page. While tags and HTML components are sometimes used interchangeably, an element encompasses the content between its opening and closing tags.

Lutkevich (2020) states that HTML is a text-based language used to describe the structure of information in an HTML file. It provides instructions to web browsers on how to display text, images, and multimedia elements. HTML adheres to standards set by the Worldwide Web Consortium (W3C) and is recognized by most popular browsers.

HTML5 is the latest specification and can be created using any text editor, if the file follows the required syntax, file format, and naming conventions.

A basic HTML standard is the declaration of the document type at the beginning of the file. It informs the computer that the file is an HTML file and must always be placed first. The document header, formatted as DOCTYPE html>, ensures that the computer recognizes the content as HTML. Additionally, the .html file extension is essential for the computer and web server to identify the file as HTML. Once the doctype and file extension are in place, users can apply HTML syntax to modify the webpage's content. It is important to maintain the same file hierarchy when uploading HTML files to ensure that links between pages remain intact.

## CSS

As explained on the TechTerms website (2006), CSS (Cascading Style Sheets) aids web developers in achieving a consistent visual design across multiple pages of a website. Instead of defining the style for each table and block of text within the HTML code of a page, commonly used styles are declared once in a CSS file. By referencing this CSS file, any page can apply the defined styles. Additionally, CSS simplifies the process of updating styles across multiple pages simultaneously. For instance, if a web developer wants to change the default text size on fifty pages from 10pt to 12pt, modifying the text size in the CSS file will automatically reflect the change on all pages.

Although CSS is commonly used for establishing text styles, it can also be utilized to format various aspects of webpage layout. For example, CSS allows developers to control table cell padding, define table border styles, thickness, and color, and adjust padding around images or other objects. Compared to HTML, CSS provides web developers with more precise control over the visual appearance of web pages. This is why cascading style sheets have become the preferred choice for most web pages.

***JavaScript***

JavaScript (js) is a lightweight object-oriented programming language that is used by several websites for scripting webpages. It is an interpreted, full-fledged programming language that enables dynamic interactivity on websites when applied to an HTML document. It was introduced in the year 1995 for adding programs to the webpages in the Netscape Navigator browser. Since then, it has been adopted by all other graphical web browsers. With JavaScript, users can build modern web applications to interact directly without reloading the page every time. The traditional website uses js to provide several forms of interactivity and simplicity.

Although, JavaScript has no connectivity with Java programming language. The name was suggested and provided in the times when Java was gaining popularity in the market. In addition to web browsers, databases such as CouchDB and MongoDB use JavaScript as their scripting and query language.

To develop more efficient functions of each module, the developers used JavaScript.

***Bootstrap***

Bootstrap is a free, open-source front-end development framework for the creation of websites and web apps. Designed to enable responsive development of mobile-first websites, Bootstrap provides a collection of syntax for template designs.

As a framework, Bootstrap includes the basics for responsive web development, so developers only need to insert the code into a pre-defined grid system.

The Bootstrap framework is built on Hypertext Markup Language (HTML), cascading style sheets (CSS), and JavaScript. Web developers using Bootstrap can build websites much faster without spending time worrying about basic commands and functions. To design the system dashboard and table view neatly, the developers used Bootstrap.

### ***Notepad++***

Notepad++ is a free and open-source text and source code editor for use with Microsoft Windows. It supports tabbed editing, which allows working with multiple open files in a single window. The product's name comes from the C postfix increment operator.

In addition to its programming features, Notepad++ can also be used for editing text files, such as HTML, XML, and CSS. It also has a built-in file viewer, which allows you to view files in a variety of formats, including images, PDFs, and archives.

Notepad++ is a versatile tool that can be used for a variety of tasks. It is a popular choice for programmers, but it can also be used by anyone who needs to edit text or code.

### ***XAMPP***

XAMPP, as described by Ganesan (2021), is a free software developed by Apache Friends that serves as a local server. It includes Apache distributions for MariaDB, PHP, and Perl servers. XAMPP allows the testing of clients or websites before deploying them to a remote web server. It provides a local testing environment for MySQL, PHP, Apache, and Perl applications. XAMPP features a cross-platform Apache server, MariaDB database, PHP, and Perl, making it compatible with various operating systems.

Ashwani (2021) explains that XAMPP stands for Cross-Platform, Apache, MySQL,

PHP, and Perl, with the "Ps" representing PHP and Perl. It is an open-source bundle of web solutions that includes Apache delivery for different servers, command-line executables, Apache API, MariaDB, PHP, and Perl modules. XAMPP enables the testing of websites or clients locally before publishing them to the main cloud server on desktops and laptops. It provides a suitable environment for evaluating and testing Apache, Perl, MySQL, and PHP projects within the host's framework.

Perl is a web development language, PHP is a backend programming language, and MariaDB is a popular database for MySQL. XAMPP is installed quickly and easily, acting as a local server or local host on the user's PC. It allows users to inspect websites before deploying them to a remote web server. The XAMPP server application on a local PC provides an appropriate testing environment for MySQL, PHP, Apache, and Perl programs.

According to TechABU (2022), XAMPP is a widely used cross-platform web server that enables developers to generate and test code on a local web server. It was created by Apache Friends and allows for contributions and modifications to the source code.

XAMPP is primarily intended as a development tool, facilitating testing of web designers' and developers' work without relying on an internet connection.

In summary, XAMPP is a cross-platform software package that acts as a local server, facilitating the testing and development of websites and applications. It includes Apache, MySQL, PHP, and Perl components and provides a convenient environment for evaluating and testing code on a local web server.

**Evaluation Tool*****ISO 25010***

According to Britton (2021), ISO 25010, titled “Systems and software engineering – Systems and Software Quality Requirements and Evaluation (SQuaRE) – System and software quality models”, is a software quality standard. It describes the models, consisting of characteristics and sub-characteristics, for both software product quality, and software quality in use together with practical guidance on the use of the quality models.

ISO25010 describes two quality models:

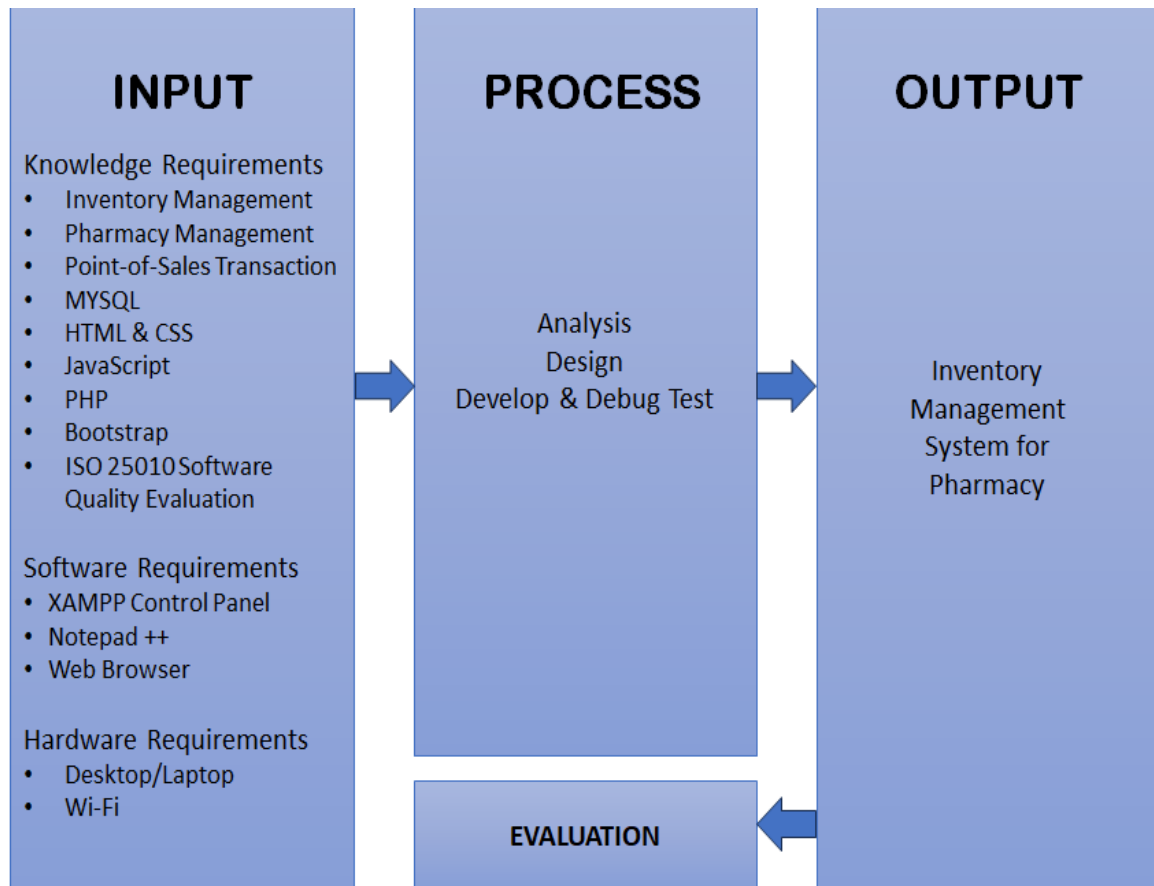
1. The quality-in-use model is composed of five characteristics (some of which are further subdivided into sub-characteristics) that relate to the outcome of interaction when a product is used in a particular context of use.
2. A product quality model composed of eight characteristics (which are further subdivided into sub-characteristics) that relate to static properties of software and dynamic properties of the computer system.

The characteristics and sub-characteristics provide consistent terminology for specifying, measuring, and evaluating system and software product quality. They also provide a set of quality characteristics against which stated quality requirements can be compared for completeness.

Software quality reflects how well software conforms to the design but also how it meets non-functional requirements such as security or maintainability as described by the characteristics in ISO 25010.

### Conceptual Model of the Study

The foregoing review of the related literatures and studies guided the researcher in the development of the conceptual framework of the study as can be seen in Figure 2.



**Figure 2.** Conceptual Model of the Study

The first phase of input includes the following knowledge requirements such as knowledge in inventory management, pharmacy management, and POS transaction needed in order to develop the main concept of the study. Additionally, MYSQL, HTML and CSS, JavaScript, PHP, Bootstrap, and ISO 25010 software quality evaluation are technical knowledge requirements in order to develop the system. The software requirements are the needed software to develop the system which includes the XAMPP control panel, Notepad++, and the web browser. Lastly on input is the hardware



## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

requirements which include the Desktop/Laptop and the Wi-Fi.

The second phase shows the process which includes how the study will take place. Which includes the Analysis, Design, and Develop and Debug Testing.

The output of the study is the developed inventory management system for pharmacy. Lastly, the evaluation process from where the system will be evaluated according to its functionalities.

### **Operational Definition of Terms**

***Critical Level*** – refers to the minimum amount of inventory that a company should have on hand to avoid stockouts. A stockout occurs when a company runs out of inventory and cannot fulfill customer orders.

***Items*** – refers to the item in inventory is a physical good or service that a company has on hand for sale. It can be anything from a product in a retail store to a component part in a manufacturing plant.

***Notification*** – refers to a message that is sent to a user to inform them of something.

***Owner*** – refers to the person who has the majority of the ownership shares in the company and is therefore in control of the company.

***Staff*** – refers to a group of people who work for an organization: In this sense, the word staff is often used interchangeably with the word employees.

***User Account*** – refers to an account that allows a user to access a computer system, network, or application.

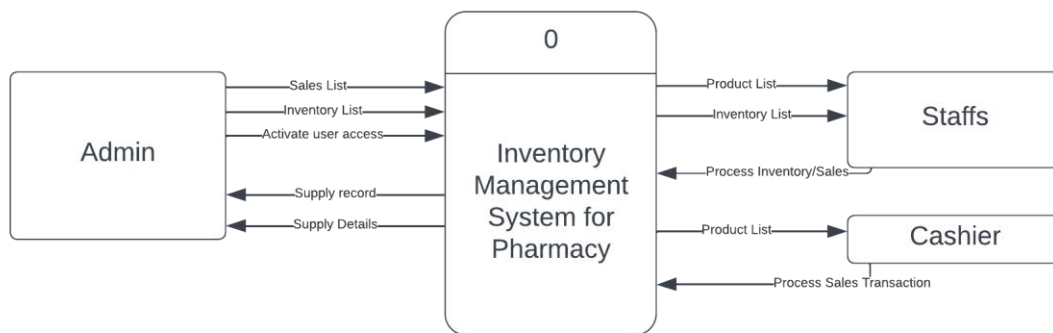
***User Level*** – refers to the set of permissions that determine what a user can do on a system or application.

### Chapter 3

## METHODOLOGY

This chapter contains the methodology of the study such as the project design, project development, operation and testing procedure, and evaluation procedure.

### Project Design

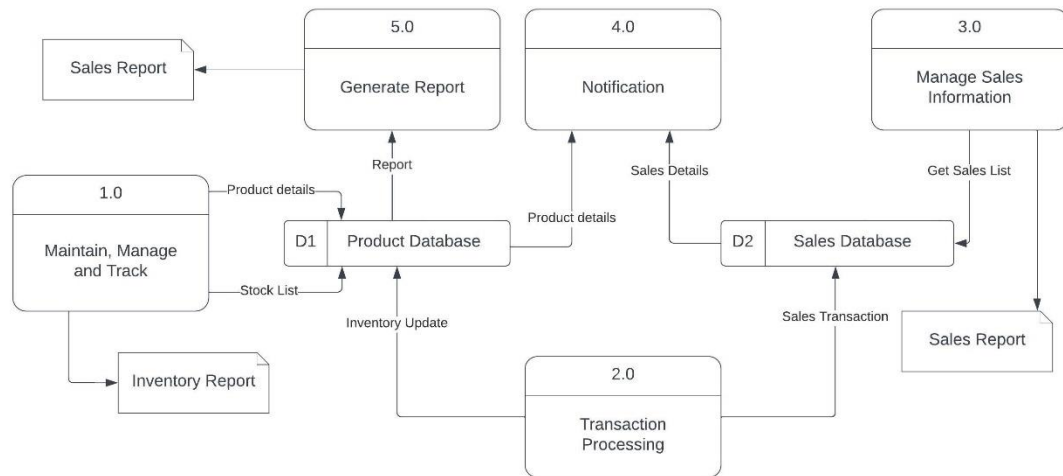


**Figure 3.** Context Diagram of Inventory Management System for Pharmacy

The context diagram as shown in Figure 3 has 3 external entities that interact with the system. First, there is the pharmacist that inputs the data needed by the system upon the sales transaction. The admin inputs the supply record and supply details. And lastly, the system gives the output of the stocks list, and sales list and generates a report for the manager.

The Top-Level Dataflow Diagram as shown in Figure 4 has 6 major processes and 3 external entities. The three main entities are the admin, the pharmacist, and the manager. The admin mostly manages the whole system by supplying the needed data, the pharmacist processes the sales transaction, and the manager that is the one who will be receiving the report.

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY



**Figure 4.** Top Level Diagram of Inventory Management System for Pharmacy

The description of the five processes is as follows:

1. **Maintain, Manage, Track** – In this process, the admin is allowed to manage the whole inventory, this process is for updating, and tracking.
2. **Transaction Processing** – this process is for the transaction with the customer, upon proceeding with the POS the system will automatically update its database.
3. **Manage Sales Information** – this process is for the sales of the system; the admin can manage the sales information and be able to generate sales reports.
4. **Notification** – this process is where the system generate notification for products and sales, this process will identify which products are on the critical level.
5. **Generate Report** – this process is for the overall generation of the report which includes inventory, sales, prices, expiring items, and a list of items that need to be re-ordered.

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

**Project Development**

This section presents the normalized relations and the Input Process Output (IPO) for the processing requirements in developing the system. The creation of the system is detailed by the Input-Process-Output of each module.

The process requirements for managing the product list as shown in Table 1 include add, edit, delete, and update.

**Table 1**

*Process Requirement for Managing Product List*

INPUT	PROCESS	OUTPUT
Maintain, Manage, Track	Update product list	Updated product list

**Operation and Testing Procedure**

The following are the procedures to be taken to properly operate the modules in the application and test them in terms of functionality and reliability.

**Table 2**

*Testing*

Modules	Steps to be taken	Expected Output
Login	1. Enter username. 2. Enter password. 3. Check if the user will be redirected to the dashboard.	1. The user must be able to type in the textboxes specified for credentials and login.

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

		<p>2. If an incorrect username or password, a notice will be displayed, and be asked to re-enter credentials.</p> <p>3. If the user is not validated, won't be able to login.</p>
<b>Dashboard</b>	<p>1. Click the login button.</p>	<p>1. The user must be able to see the dashboard.</p> <p>2. The user must be able to see the graph and illustrations.</p> <p>3. The user must be able to see a number of notifications.</p>
<b>Manage Product</b>	Click on 'Manage Product'	The user must be able to see the additional option

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

		such as edit and add product.
<b>Manage User</b>	Click on 'Manage User'	<ol style="list-style-type: none"> <li>1. The user must be able to see the details of the user registered, which includes the status.</li> <li>2. The user must be able to edit the user details.</li> <li>3. The user must be able to change the status of the user.</li> <li>4. The user must be able to add new users.</li> </ol>
<b>Sort</b>	Click on the drag-down button, and select which month/year the user needs to view.	The user must be able to view the selected choice in the table view.
<b>Search</b>	Type on the search bar the item name or number	The user must be able to search for the item which is

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

		from the database or the inventory.
<b>Customer Profiling</b>	Click on 'Customer Profiling'	<ol style="list-style-type: none"> <li>1. The user must be able to see the customer transactions in the table view.</li> <li>2. The user must be able to print the receipt of the transaction.</li> </ol>
<b>Point of Sales</b>	Click on 'Point of Sales'.	<ol style="list-style-type: none"> <li>1. The user must be able to see the textboxes to fill in the customer details.</li> <li>2. The user must be able to see the table view for product transaction.</li> </ol>

		3. The user must be able to generate a receipt.
<b>Sales Report</b>	Click on 'Sales Report'	1. The user must be able to view the table of sales transactions. 2. The user must be able to print the sales report in pdf file.

### Evaluation Procedure

The system was evaluated by 10 IT professionals, a pharmacy owner, a manager, and interested professionals who wanted to be part of the project are selected using purposive sampling.

The evaluation procedure was conducted as follows:

1. The system was deployed for testing used by pharmacy owners and managers.
2. The developers selected the evaluators using purposive sampling and they were



## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

asked to rate the performance of the system.

3. Each evaluator was given a set of questionnaires.
4. The system was carefully evaluated by the respondents, and they were allowed to raise questions.
5. The evaluators were requested to rate the software based on the criteria in the evaluation instrument.
6. The results were tallied to determine the meaning of each criterion and the overall meaning.
7. The results were interpreted using the table below.

**Table 3**

*Range of Scale Value and its Qualitative Interpretation*

<b>Numerical Rating</b>	<b>Range</b>	<b>Qualitative Interpretation</b>
4	3.51 – 4.00	Very Good
3	2.51 – 3.50	Good
2	1.51 – 2.50	Quite Good
1	1.00 – 1.50	Not Good

## Chapter 4

### RESULTS AND DISCUSSION

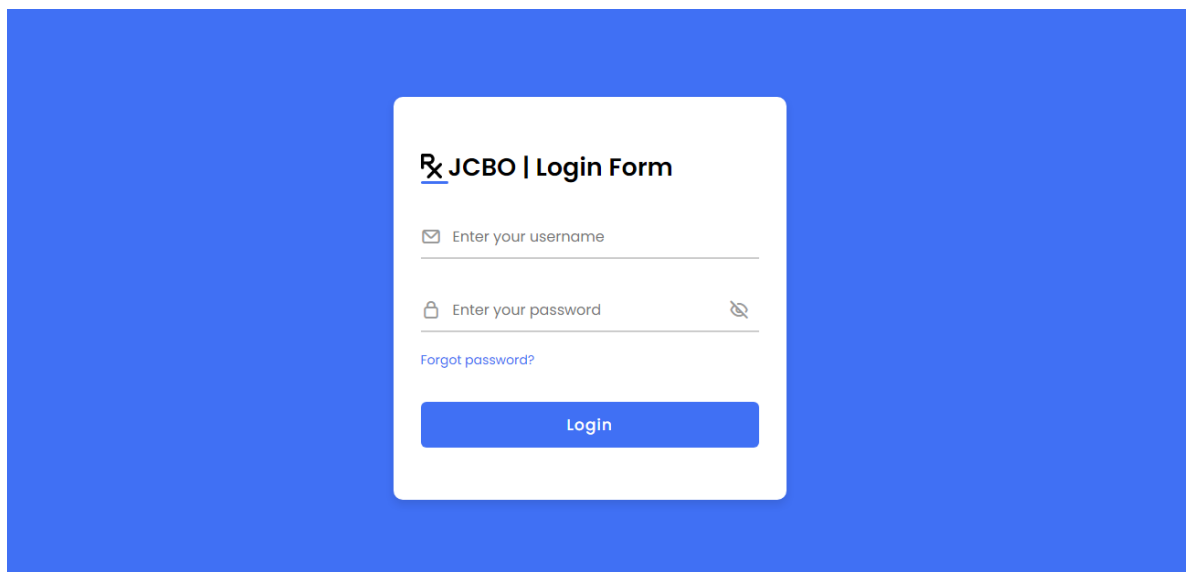
This chapter presents the project description, project structure, project test results, project capabilities and limitations, and project evaluation results of the study.

#### Project Description

The Inventory Management System for Pharmacy is a web application designed purposely for generic pharmacies to track their inventories easily. It also has a built-in POS, which is important for small enterprises.

This web application is only available offline. This software was developed using PHP, HTML, CSS, Bootstrap, and JavaScript.

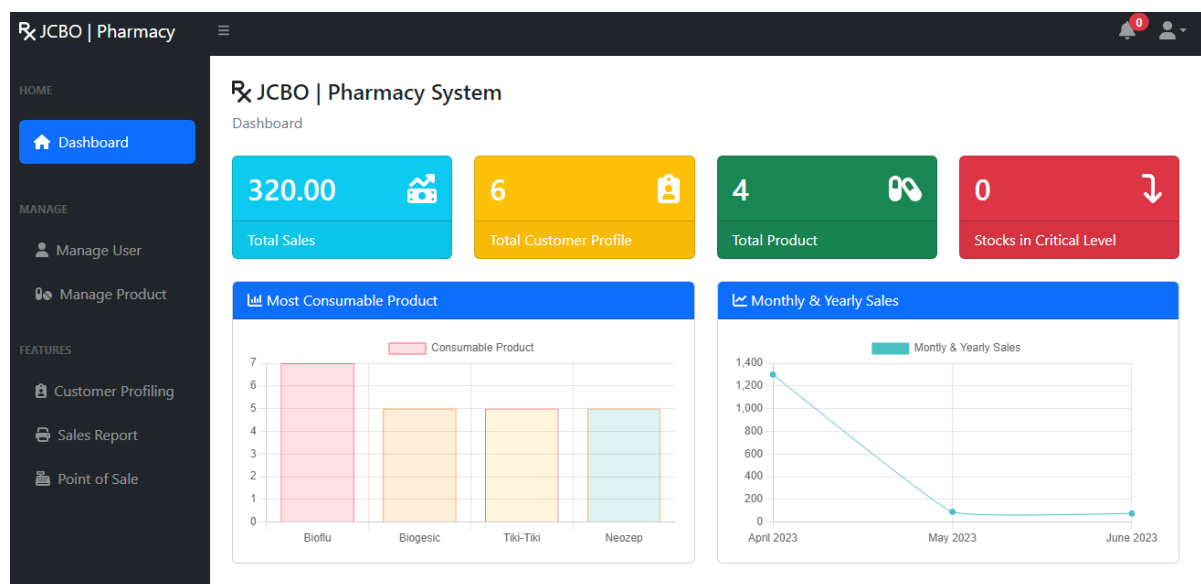
#### Project Structure



**Figure 5.** Log In Page

Figure 5 shown above shows the login screen of the system where the users input their credentials such as username and password.

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY



**Figure 6.** Dashboard

Figure 6 above shows the dashboard of the admin and the owner which shows the total sales of the pharmacy a day, total customers, total products, and the stocks that are at a critical level. And it also shows the graph for the most consumable product and its monthly/yearly sales.

The 'Manage Product' page displays the following data:

Name	Total Stock	Remaining Stock	Cost Price	Retail Price	Description	Prescribed	Expiration Date	Date Added	Image	Actions
Bioflu	10	10	10	15	500mg tablet	Adult	2028-10-06	2023-06-17		
Neozept	12	12	10	12	10mg/2mg/500mg tablet	Adult	2030-06-17	2023-06-17		

**Figure 7.** Manage Product

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

Figure 7 shows the module for managing the product, wherein a table shows all the details about the products.

The screenshot shows the 'Add Product' form in the JCBO Pharmacy system. The form is titled 'Add Product' and has a 'Back' link. It contains several input fields: 'Name' (with placeholder 'Enter Product Name'), 'Quantity' (with placeholder 'Enter Quantity'), 'Description' (with placeholder 'Enter Description'), 'Cost Price' (with placeholder 'Enter Cost Price'), 'Retail Price' (with placeholder 'Enter Retail Price'), 'Prescribed' (a dropdown menu with 'Select'), 'Manufacturer' (with placeholder 'Enter Manufacturer'), 'Image' (with 'Choose File' and 'No file chosen' buttons), and 'Expiration Date' (with placeholder 'mm/dd/yyyy'). There are 'Save' and 'Reset' buttons at the bottom right. The sidebar menu on the left includes 'Dashboard', 'Manage User', 'Manage Items', 'Patient Profiling', 'Sales Report', and 'Point of Sale'.

**Figure 8.** Add Product

Figure 8 shows how the products are being added to the inventory. The user had to insert the details such as name, quantity, description, cost, retail price, manufacturer, prescription type, and its expiration date.

The screenshot shows the 'Manage User' page in the JCBO Pharmacy system. It has a title 'Manage User' and a breadcrumb 'Dashboard / User Account List'. There is an 'Add User' button and an 'Account Category' dropdown menu. Below the form is a table with 10 entries per page and a search bar. The table has the following columns: First Name, Last Name, Initial, Category, Username, Status, Date Added, and Actions. The data rows are:

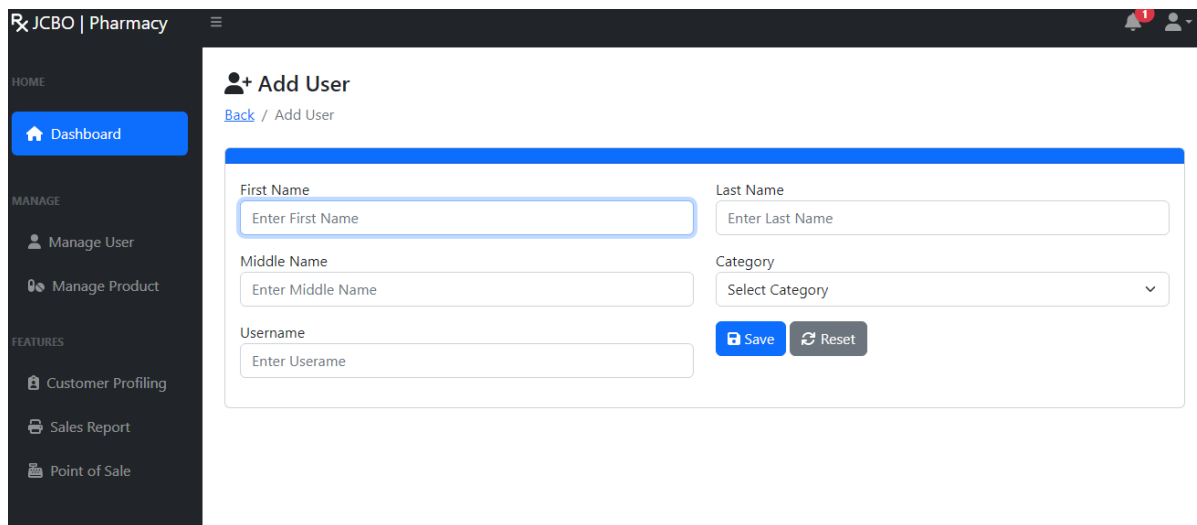
First Name	Last Name	Initial	Category	Username	Status	Date Added	Actions
Ana	Dela Cruz	H	Employee	ana	Active	2023-06-19	
Marivic	Ramos	--	Employee	employee	Active	2023-06-18	
Lyka	Lucas	--	Cashier	cashier	Active	2023-06-18	
Karlo	Nachor	--	Admin	admin	Active	2023-06-18	

The sidebar menu on the left includes 'Dashboard', 'Manage User', 'Manage Product', 'Customer Profiling', 'Sales Report', and 'Point of Sale'.

**Figure 9.** Manage User Page

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

Figure 9 shows the screen for managing the users, this module is only limited to the owner and the admin. For which they can either activate or deactivate the user's account access.



**Rx JCBO | Pharmacy**

HOME

- Dashboard

MANAGE

- Manage User
- Manage Product

FEATURES

- Customer Profiling
- Sales Report
- Point of Sale

**+ Add User**

[Back](#) / Add User

First Name

Last Name

Middle Name

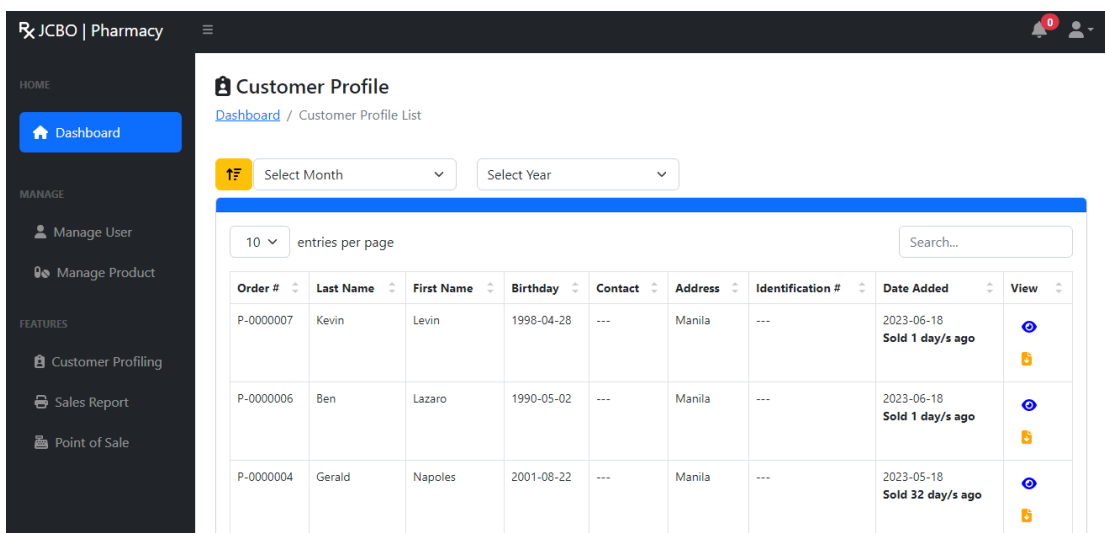
Category

Username

**Save** **Reset**

**Figure 10.** Add User

Figure 10 shows the Add user function where the user needs to fill in the details such as first name, middle name, last name, username, and category selection. New users are provided with a default password which they can later change upon login.



**Rx JCBO | Pharmacy**

HOME

- Dashboard

MANAGE

- Manage User
- Manage Product

FEATURES

- Customer Profiling
- Sales Report
- Point of Sale

**Customer Profile**

[Dashboard](#) / Customer Profile List

Select Month  Select Year

10 entries per page

Order #	Last Name	First Name	Birthday	Contact	Address	Identification #	Date Added	View
P-0000007	Kevin	Levin	1998-04-28	---	Manila	---	2023-06-18 Sold 1 day/s ago	
P-0000006	Ben	Lazaro	1990-05-02	---	Manila	---	2023-06-18 Sold 1 day/s ago	
P-0000004	Gerald	Napoles	2001-08-22	---	Manila	---	2023-05-18 Sold 32 day/s ago	

**Figure 11.** Customer Profile

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

Figure 11 shows the Customer Profile where the user can view all the customer details, its sales transaction, view and print it.

First Name:  Enter First Name

Last Name:  Enter Last Name

Birth Date:  mm/dd/yyyy

Contact #:  Enter Contact Number

Identification #:  Enter Identification # (Leave blank if not apply)

Address:  Enter Address

#	QR Number	Product Name	Brand	Description	Stock	Quantity	Cost	Total Cost	+
					0	1	0	0	+

**Item Details**

#	QR Number	Product Name	Brand	Description	Quantity	Cost	Total Cost	+
Sub Total						0.00		
Discount %					0			
VAT %					0			
Total Payment						0.00		

[Save Record](#) [Product](#) [Reset](#)

**Figure 12.** Point-of-Sale

Figure 12 shows the display of the Point-of-Sale where the user can input the customer order, compute it, and store the customer's data such as name, birthdate, contact number, and identification number.

**Sales Report**

[Home](#) / [Report List](#)

Month:  Select Month Year:  Select Year [1f](#)

From:  mm/dd/yyyy To:  mm/dd/yyyy [C](#)

10 entries per page  Search...

Product #	Name	Unit	Stock	Sold	Cost Price	Selling Price	Profit	Income	Date
308	Biogesic	Paracetamol	25	2	5	10	5	10	2023-05-17
307	Tiki-tiki	Tiki-tiki	49	1	200	250	50	50	2022-05-17

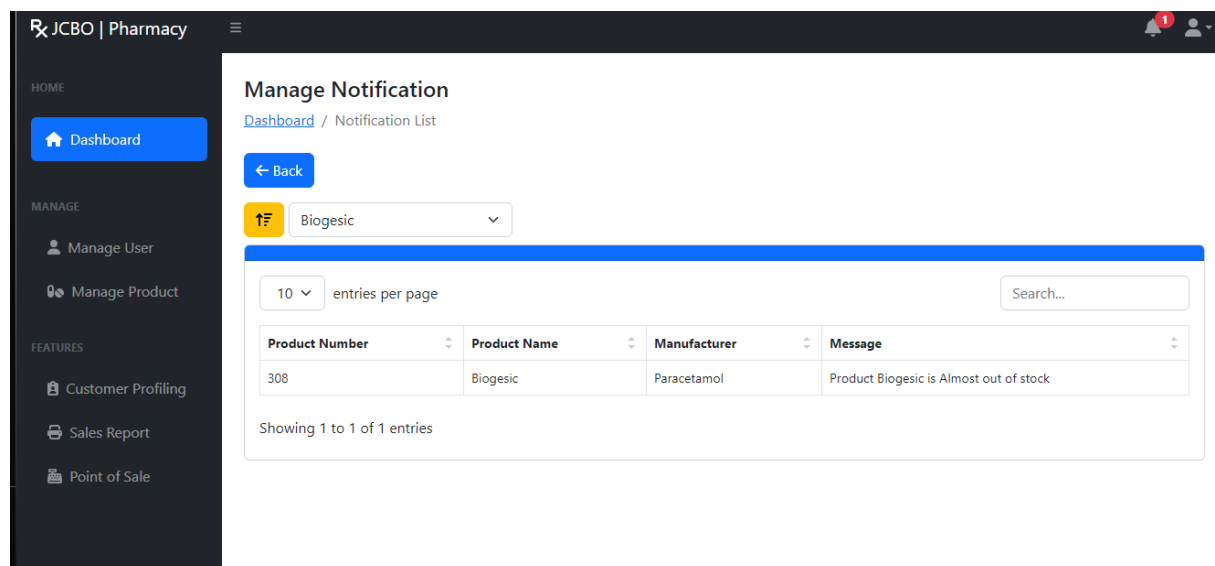
Showing 1 to 2 of 2 entries

[Export PDF](#)

**Figure 13.** Sales Report

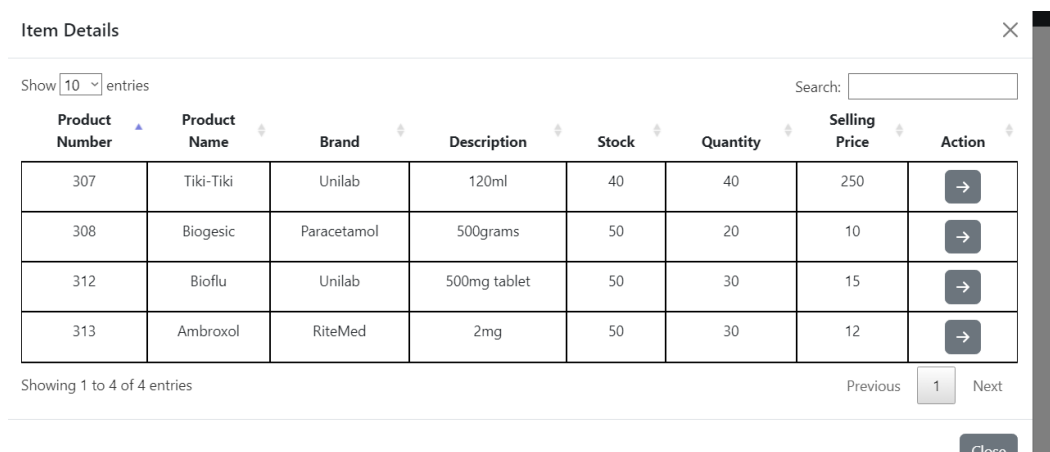
## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

The above Figure 13 shows the sales report display of the system where the user can view all the sales transactions and be able to filter it based on their preferences such as by month or certain date.



**Figure 14.** Manage Notification

Figure 14 shows the manage notifications where the user can view all notifications specified to critical stocks and expiring items in the inventory.



**Figure 15.** Point-of-Sales-Product List

Figure 15 shows the product list that is made for the easier POS process, wherein

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

the user can just search for the specific item and add it to the sales transaction.

**JCBO | PHARMACY**  
2039 San Andres cor. Angel Lines Malate Manila  
Malate, NCR, CITY OF Manila, First District

Sales Report as of: 06-22-2023

Product No.	Name	Brand	Stock	Sold	Cost Price	Selling Price	Profit	Total Profit	Date
308	Biogesic	Paracetamol	50	30	5	10	5	150	2023-06-21
313	Ambroxol	RiteMed	50	20	10	12	2	40	2023-06-21
312	Bioflu	Unilab	50	40	10	15	5	200	2023-06-21
312	Bioflu	Unilab	50	1	10	15	5	5	2023-06-18
312	Bioflu	Unilab	50	6	10	15	5	30	2023-06-18
308	Biogesic	Paracetamol	50	5	5	10	5	25	2023-04-18
307	Tiko-Tiko	Unilab	40	5	200	250	50	250	2023-04-18
								Total Income	700.00
								Total Revenue	327.00
								Total Expenses	250.00

Cashier/Authorized Representative

..... Nothing Follows .....

**Figure 16.** Sales Report

Figure 16 shows the PDF-generated sales report that shows the overall sales of the pharmacy.

### Project Capabilities and Limitations

The following are the capabilities of the system:

1. Collect and record the product list and inventory of the pharmacy.
2. Collect and record customer details and sales transactions.
3. Display graphical illustrations such as bar and line graphs in the dashboard.
4. Generation of receipts
5. Generation of printable reports.

The following are the limitations of the system:

1. Unavailability of online interfaces such as mobile and web applications.
2. Exclusivity to JCBO Pharmacy.



3. Report generation is only available in one format which is PDF.

### Project Evaluation

The evaluation procedure was conducted using the standard criterion of ISO 25010 for quality software.

The evaluation process involved 5 pharmacy employees, and 5 IT professionals. The following are the results of the evaluation of the Inventory Management System.

The following charts are graphical illustrations of the evaluation results gathered from the clients of the study.



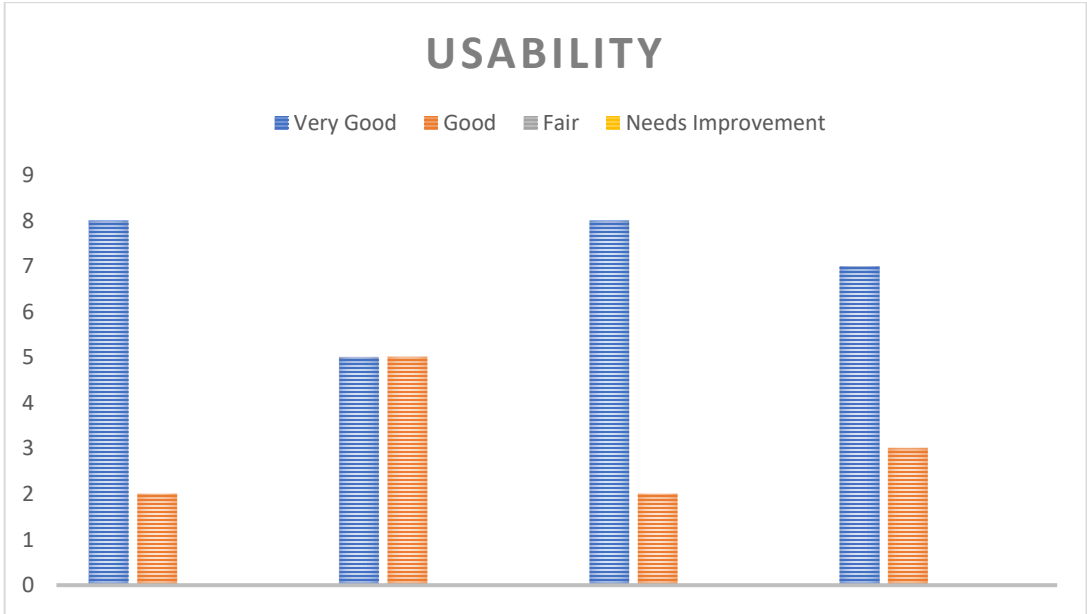
**Figure 17.** Suitability – Evaluation and Result

Figure 17 shows the graph for the evaluation results of functional suitability. The system was evaluated very good with a mean score of 3.70 which implies that the system meets the functions stated and needs to be implied under specification conditions.



**Figure 18.** Security – Evaluation and Result

Figure 18 shows the graph for security. The system was evaluated as good with a mean result of 3.33 which has the appropriate safety processes in place to prevent unauthorized access of sensitive data.



**Figure 19.** Usability– Evaluation and Result

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

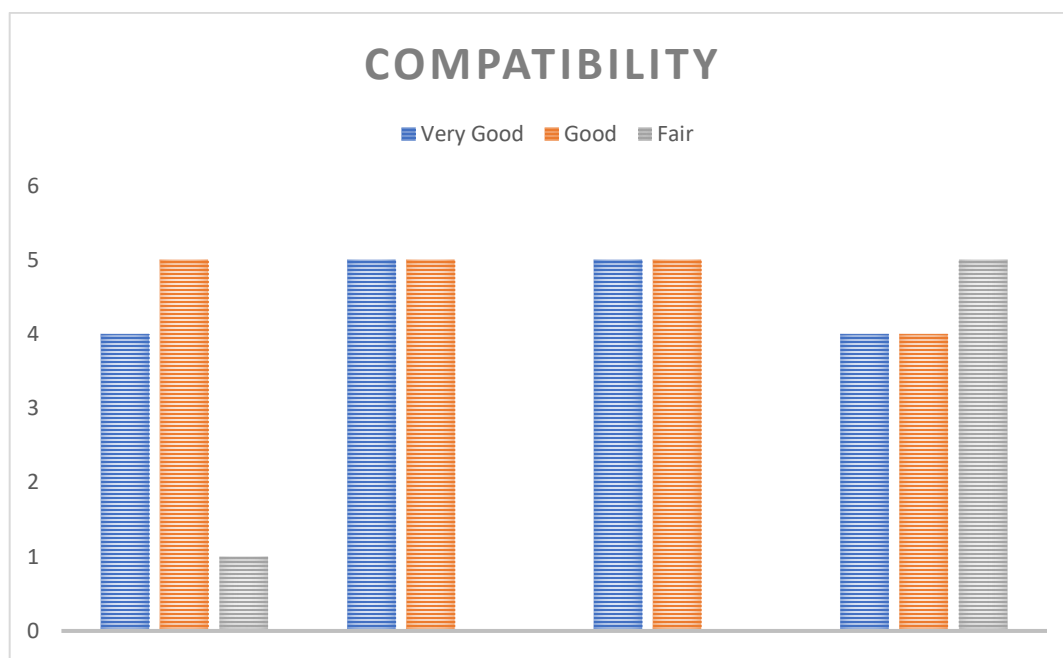
Figure 19 shows the graph for usability. The system was evaluated as very good with mean score of 3.70 which denotes the system design and user-friendly to the user.



**Figure 20.** Efficiency– Evaluation and Result

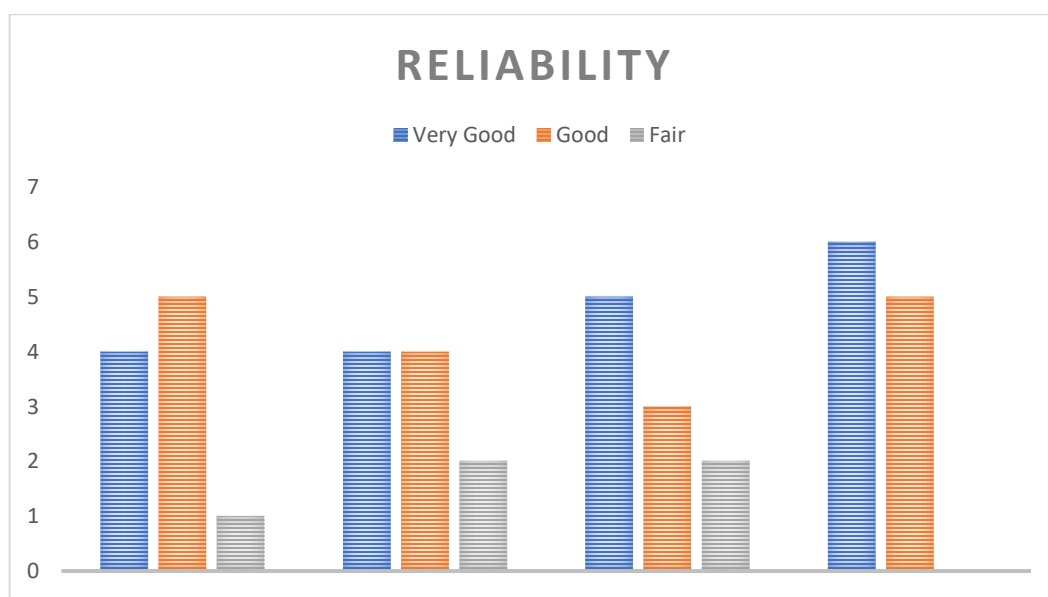
Figure 20 shows the graph for performance efficiency. The system was evaluated good with a mean score of 3.48 which shows that the system quickly responds and executes its function within an acceptable response time.

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY



**Figure 21.** Compatibility– Evaluation and Result

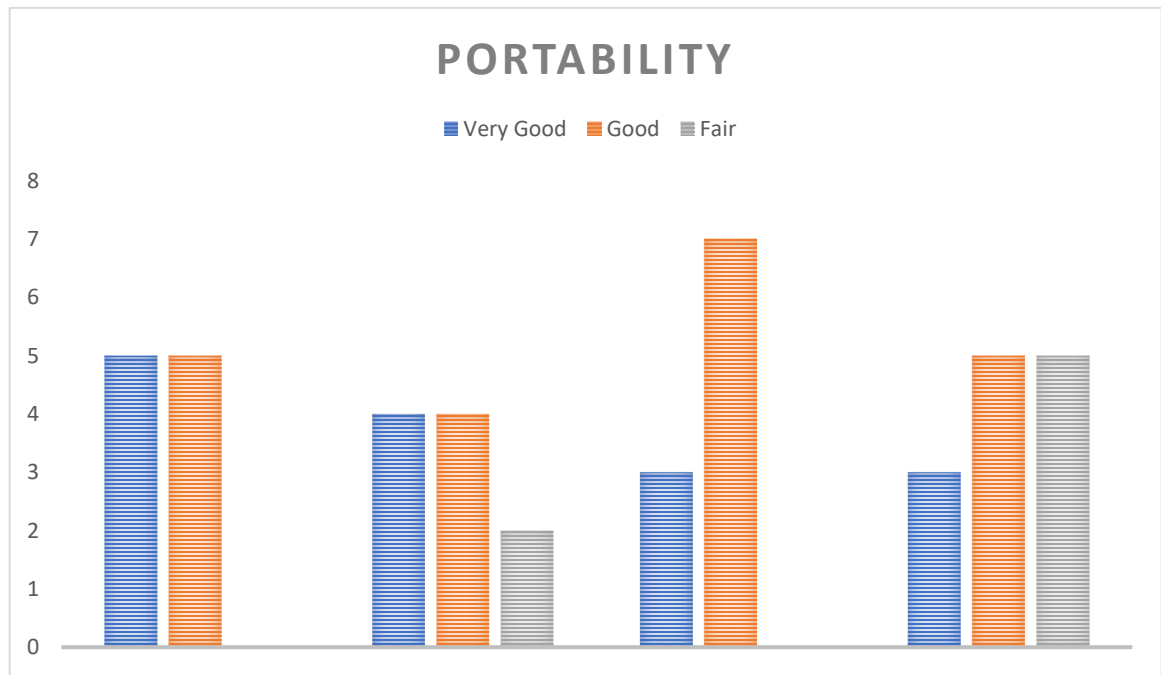
Figure 21 shows the graph for compatibility. The system was evaluated good with a mean score of 3.40, indicating that it can facilitate the flow of information effectively and efficiently.



**Figure 22.** Reliability– Evaluation and Result

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

Figure 22 shows the graph for reliability. The system was evaluated with a mean score of 3.50 which indicates that the system manages its errors and can still perform its main functions.



**Figure 23.** Portability– Evaluation and Result

Figure 23 shows the graph for portability. The system was evaluated good with a mean result of 3.33 which indicated that the system is easy to install and adapt to other enterprise other than the pharmacy.



**Figure 24.** Maintainability– Evaluation and Result

Figure 24 shows the graph for maintainability. The system was evaluated good with a mean result score of 3.47 which proves that it can easily adapt to different environments.

## **Chapter 5**

### **SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS**

This chapter presents the summary of findings, conclusions, and recommendations on the results of the evaluation, comments, and suggestions.

#### **Summary of Findings**

Based on tests and evaluations conducted on the performance capability of the application, the following were the findings of the study:

The inventory management system was developed in compliance with the required specifications and guidelines, which were coordinated to meet the requirements of JCBO Pharmacy.

The study obtained an overall grade of 3.65 and was rated good based on the data gathered during the system evaluation. In particular, the study obtained results of:

- In terms of Functionality Suitability, the system was rated good, which means it meets the functions stated and needs to be implied under specification conditions.
- In terms of Performance Efficiency, the system was rated good, which means the system quickly responds and executes its function within an acceptable response time.
- In terms of Compatibility, the system was rated good, which means it can facilitate the flow of information effectively and efficiently.
- In terms of Usability, the system was rated good, which means the system's design and interface are user-friendly and easy to perceive and use by any user.
- In terms of Reliability, the system was rated good, which means the system

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

manages its errors and can still perform its specified functions.

- In terms of Security, the system was rated good, which means the system has appropriate safety processes in place to prevent unauthorized access or compromise of sensitive data.

- In terms of Maintainability, the system was rated good, which means the system proves that it can easily adapt to different environments.

- In terms of Portability, the system was rated good, which means the system meets the requirements

and is capable of running and performing tasks properly.

### Conclusions

Based on the objectives of the study, and the testing and evaluation undertaken, the conclusions were derived:

1. The Inventory Management System was successfully designed and implemented with the following features:

- a. Responsive web application
- b. Access levels for admin, employees, owner, and cashier.
- c. POS
- d. Add and update inventory.
- e. Display consolidated data via the dashboard for each user.
- f. Generate notifications for expiring and out-of-stock items.

2. The system was created using software development tools such as PHP, MYSQL, HTML, CSS, and JavaScript.

3. Tested and improved the system in terms of functional suitability and reliability.



## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

4. Evaluated the performance of the system using ISO 25010 criteria for quality software and got a result of 3.65.

### **Recommendations**

Considering the findings and conclusions made in the study, the following recommendations for the improvement of the application are hereby presented for future enhancement:

1. Additional features for managing items such as prescriptions for each medicine.
2. Inclusion of additional various medicines or drug products in the application.
3. Enhancement or additional system features or functions.
4. Improvisation of the graphics and design interface.

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

**Appendix A****Software Evaluation Instrument**

Technological University of the Philippines  
College of Science  
Computer Studies Department

Name (Optional): \_\_\_\_\_ Occupation: \_\_\_\_\_ Date: \_\_\_\_\_

Direction: Please encircle the appropriate number of your rating to evaluate the project entitled “Inventory Management System for Pharmacy” using the scale below:

4 – Highly Acceptable 3 – Very Acceptable 2 – Acceptable 1 – Not Acceptable

INVENTORY MANAGEMENT SYSTEM FOR PHARMACY				
Criteria	Rating			
A. Functional Suitability				
1. The integration of blockchain web application in supply chain is appropriate or suited to the intended functionality. (suitability)	4	3	2	1
2. The Web application's functionalities are fully operational. (appropriateness)	4	3	2	1
3. The Web application's features cover all of the established tasks and user objectives. (completeness)	4	3	2	1
4. The Web application delivers precise findings with the required level of precision. (correctness)	4	3	2	1
B. Performance Efficiency				
1. The Web application has the ability to process and respond accordingly in a timely fashion. (time behavior)	4	3	2	1
2. The web application makes efficient and optimal use of resources in terms of both amount and type. (resource utilization)	4	3	2	1
3. The maximum process parameters for the Web application are appropriate. (capacity)	4	3	2	1
C. Compatibility				
1. The device can perform the required functions efficiently while sharing resources with the mobile application. (co-existence)	4	3	2	1
2. The device can exchange information with the mobile application and use the information that has been exchanged. (interoperability)	4	3	2	1

## INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

D. Usability				
1. Users can determine that the Web application is fit for their expectations. (appropriateness recognizability)	4	3	2	1
2. The web application enables users to accomplish certain learning objectives with satisfaction, effectiveness, efficiency, and reliability. (learnability)	4	3	2	1
3. The web application contains qualities that make it simple to navigate and manage. (operability)	4	3	2	1
4. The Web application protects users against making errors and mistakes. (user error protection)	4	3	2	1
5. Interface provides comfort, acceptability of use of the smart contracts, and overall satisfaction level. (user interface aesthetics)	4	3	2	1
6. The Web application can be used by people with the widest range of capabilities to achieve the specified goal in a specified context of use. (accessibility)	4	3	2	1
E. Reliability				
1. The Web application is stable for frequent use. (maturity)	4	3	2	1
2. The Web application does not suddenly brake or stop working whenever an update or new compiled version is released on the smart contract platform. (fault tolerance)	4	3	2	1
3. The Web application can be accessed easily when needed. (availability)	4	3	2	1
4. The use of Web application reduces the execution time, the middleman, and costs. (efficiency)	4	3	2	1
F. Security				
1. The Web application prevents unauthorized access to the app. (integrity)	4	3	2	1
G. Maintainability				
1. Can locate and identify the error's root cause when one occurs. (analyzability)	4	3	2	1
2. In the Web application, bugs can be patched, new features can be implemented, can be modified for expansion and correction, and updates will be added. (modifiability)	4	3	2	1
H. Portability				
1. The Web application can be easily used without adversity (usability)	4	3	2	1

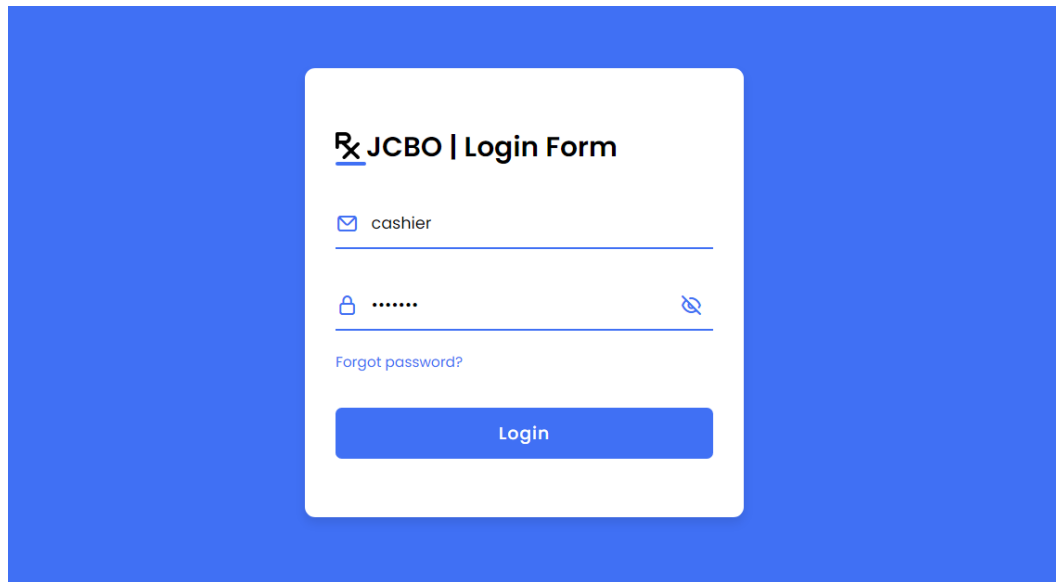
## Appendix B

### Mean Score Tally of Respondents

<b>Respondent No.</b>	<b>Name</b>	<b>Mean Score</b>
1	Vincent Lachenal	3.45
2	John Reb Manggohom	3.60
3	Chaela Chua	3.94
4	Jerome Rasalan	3.31
5	Ma. Theresa Dellosa	3.67
6	River Bacongan	4
7	Dyes Marcelino	3.75
8	Gio Marcelino	3.58
9	Migui Pancho	3.5
10	Princess Joy Espiritu	3.3

## Appendix C

### Testing



**Rx JCBO | Login Form**

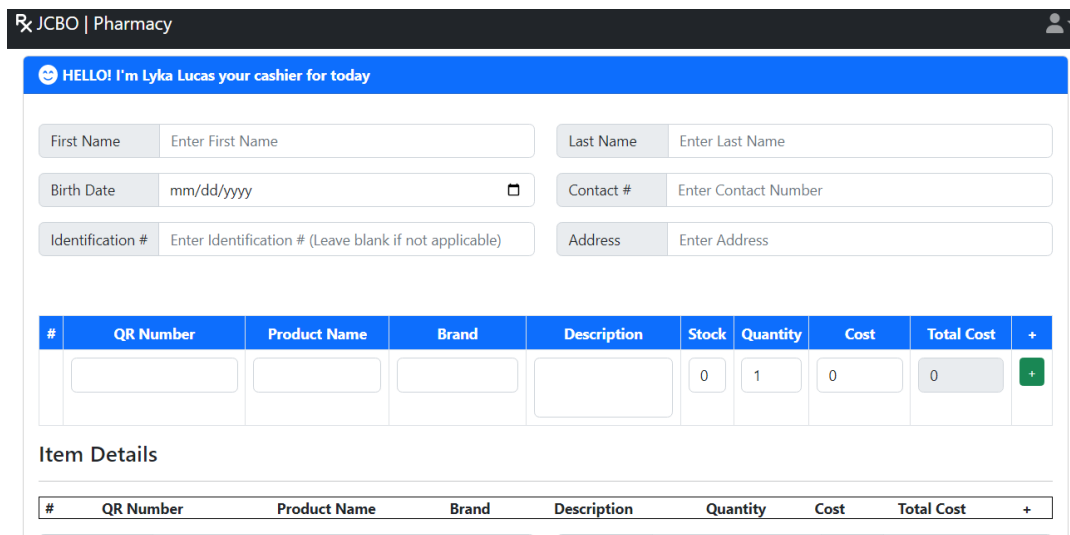
☐ cashier

.....

[Forgot password?](#)

Login

**Figure 25.** Cashier Log In Page - Testing



**Rx JCBO | Pharmacy**

HELLO! I'm Lyka Lucas your cashier for today

First Name: Enter First Name
 Last Name: Enter Last Name

Birth Date: mm/dd/yyyy
 Contact #: Enter Contact Number

Identification #: Enter Identification # (Leave blank if not applicable)
 Address: Enter Address

#	QR Number	Product Name	Brand	Description	Stock	Quantity	Cost	Total Cost	+
					0	1	0	0	+

Item Details

#	QR Number	Product Name	Brand	Description	Quantity	Cost	Total Cost	+
---	-----------	--------------	-------	-------------	----------	------	------------	---

**Figure 26.** Cashier POS - Testing

Item Details

Show 10 entries

Search:

Product Number	Product Name	Brand	Description	Stock	Quantity	Selling Price	Action
307	Tiki-Tiki	Unilab	120ml	40	40	250	→
308	Biogesic	Paracetamol	500grams	50	20	10	→
312	Bioflu	Unilab	500mg tablet	50	30	15	→
313	Ambroxol	RiteMed	2mg	50	30	12	→

Showing 1 to 4 of 4 entries

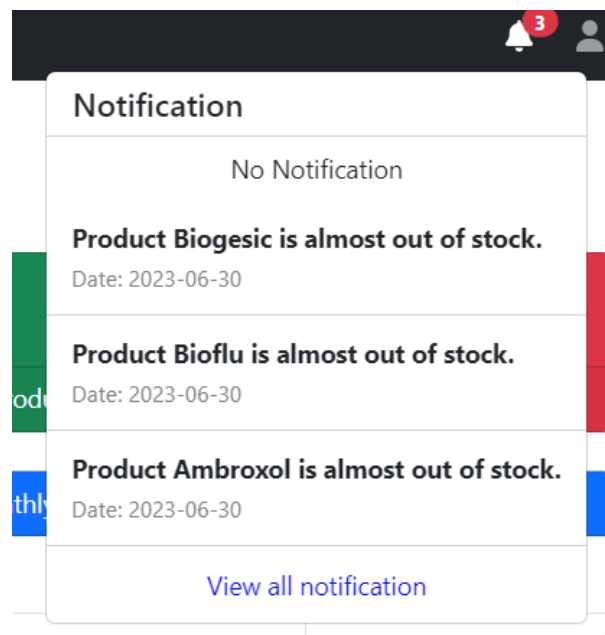
Previous

1

Next

Close

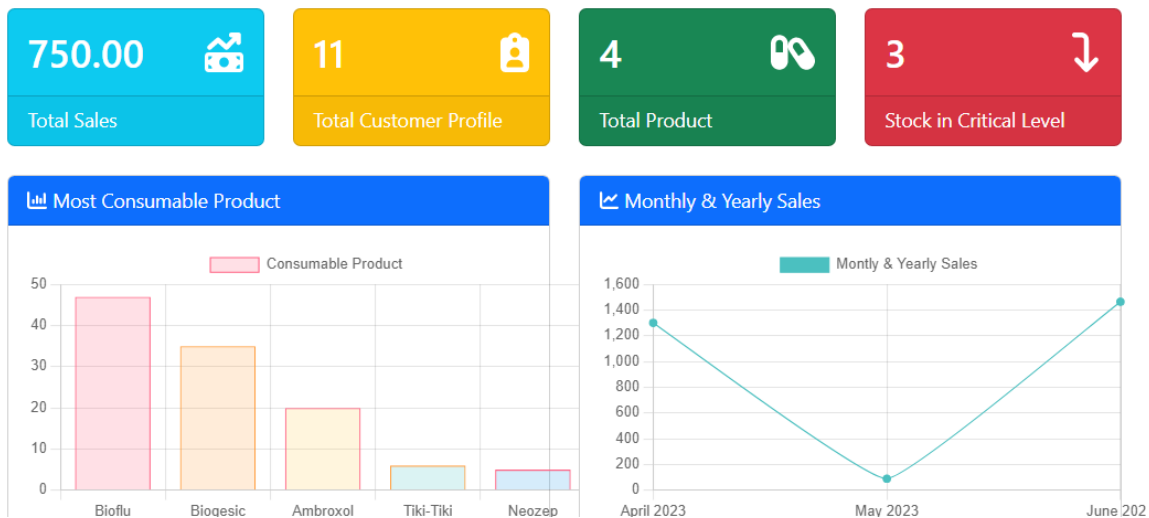
**Figure 27.** Cashier Product List - Testing



**Figure 28.** Dashboard Notification - Testing

## Rx JCBO | Pharmacy System

Dashboard



**Figure 29. Owner Dashboard - Testing**

## Manage User

[Dashboard](#) / [User Account List](#)

[+ Add User](#)

10 entries per page

First Name	Last Name	Initial	Category	Username	Status	Date Added	Actions
Tyrone	Atienxa	S	Cashier	tyrone	Active	2023-06-27	<a href="#">Edit</a> <a href="#">Settings</a>
Ana	Dela Cruz	H	Employee	ana	Inactive	2023-06-19	<a href="#">Edit</a> <a href="#">Settings</a>
Maria	Ramos		Employee	maria	Active	2023-06-18	<a href="#">Edit</a> <a href="#">Settings</a>

**Figure 30. Manage User - Testing**

**Update User**

[Back](#) / Update User

First Name

Last Name

Middle Name

Category

Username

Password

Confirm Password

Copyright © Inventory System

**Figure 31.** Update User Information - Testing

Rx JCBO | Pharmacy

HOME

Dashboard

MANAGE

Manage User

Manage Product

FEATURES

Customer Profiling

Sales Report

Point of Sale

Manage User

Dashboard / Manage User

Add User

Change Status

Full Name: Tyrone Atienxa

Status:

Select

Deactivate

Activate

10 entries per page

First Name	Last Name	Initial	Category	Username	Status	Date Added
Tyrone	Atienxa	S	Cashier	tyrone	Active	2023-06-27
Ana	Dela Cruz	H	Employee	ana	Inactive	2023-06-19

**Figure 32.** Change User Status - Testing









**Manage Product**  
[Dashboard](#) / [Product List](#)

**Add Product**

Select Medicine ▼ Prescribed ▼

10 ▼ entries per page Search...

Name <span>▼</span>	Total Stock <span>▼</span>	Remaining Stock <span>▼</span>	Cost Price <span>▼</span>	Retail Price <span>▼</span>	Mass(mg/g) <span>▼</span>	Prescribed <span>▼</span>	Expiration Date <span>▼</span>	Date Added <span>▼</span>	Image <span>▼</span>	Acti <span>▼</span>
Ambroxol	50	30	10	12	2mg	Adult	2025-11-13	2023-06-21		
Bioflu	50	30	10	15	500mg tablet	Adult	2025-07-06	2023-06-17		
Biondesic	50	20	5	10	500grams	Adult	2027-06-19	2023-06-		

**Figure 33.** View Product List - Testing

## Update Product

[Back](#) / [Update Product](#)

Name

Quantity

Description


Cost Price

Retail Price

Prescribed Adult ▼

Manufacturer

Image Choose File No file chosen

Expiration Date  

**Update** **Reset**

**Figure 34.** Update Product - Testing

Generated PDF using TCPDF

1 / 1 100%

**JCBO | PHARMACY**  
2039 San Andres cor. Angel Linao Malate Manila  
Malate, NCR, CITY OF Manila, First District

**PRODUCT DETAILS:**

Product #	Product name	Description	Quantity	Cost
307	Tiki-Tiki Unilab	120ml	1	250.00

Order #: P-0000012

Total: 250.00

**CUSTOMER DETAILS**

FULL NAME : Tyrone Lacs  
 BIRTH DATE : 2001-05-24  
 ADDRESS : 09845172565  
 CONTACT NUMBER : Manila  
 IDENTIFICATION NUMBER :  
 DATE SOLD : 2023-06-30  
 SIGNATURE :

Cashier Signature

*Figure 35. Receipt Generation*

Sales Report

1 / 1 100%

**JCBO | PHARMACY**  
2039 San Andres cor. Angel Linao Malate Manila  
Malate, NCR, CITY OF Manila, First District

Sales Report as of: 06-30-2023

Product No.	Name	Brand	Stock	Sold	Cost Price	Selling Price	Profit	Total Profit	Date
307	Tiki-Tiki	Unilab	40	1	200	250	50	50	2023-06-30
312	Biofu	Unilab	50	40	10	15	5	200	2023-06-21
308	Biogesic	Paracetamol	50	30	5	10	5	150	2023-06-21
313	Ambroxol	RiteMed	50	20	10	12	2	40	2023-06-21
312	Biofu	Unilab	50	1	10	15	5	5	2023-06-18
312	Biofu	Unilab	50	6	10	15	5	30	2023-05-18
308	Biogesic	Paracetamol	50	5	5	10	5	25	2023-04-18
307	Tiki-Tiki	Unilab	40	5	200	250	50	250	2023-04-18
								Total Income	750.00
								Total Revenue	677.00
								Total Expenses	450.00

Cashier/Authorized Representative

.....Nothing Follows.....

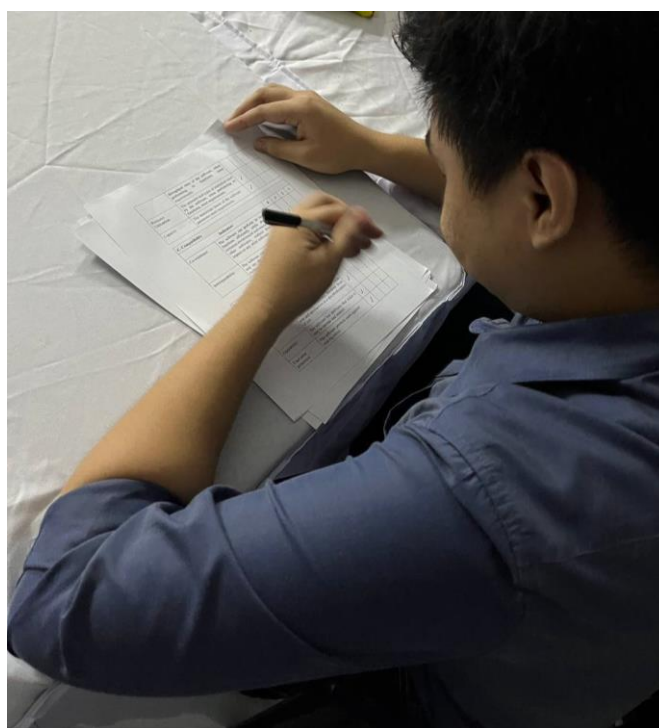
*Figure 36. Sales Report Generation – Testing*

## Appendix D

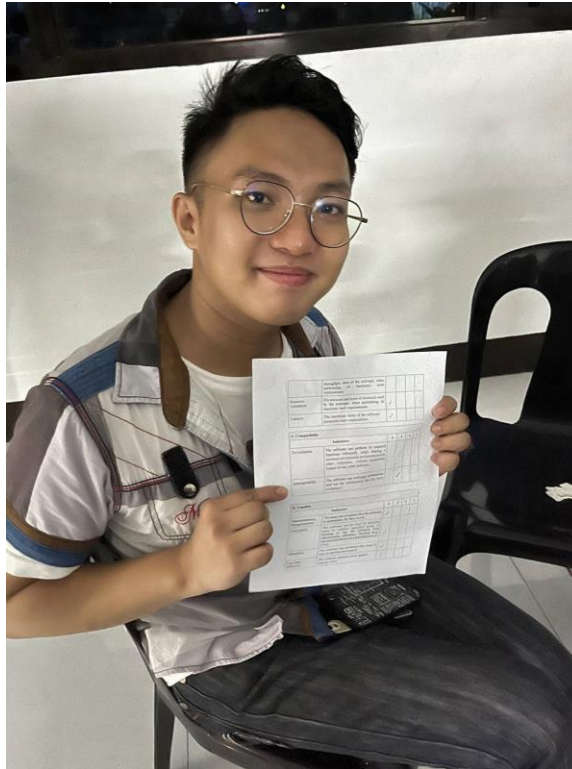
### Documentation



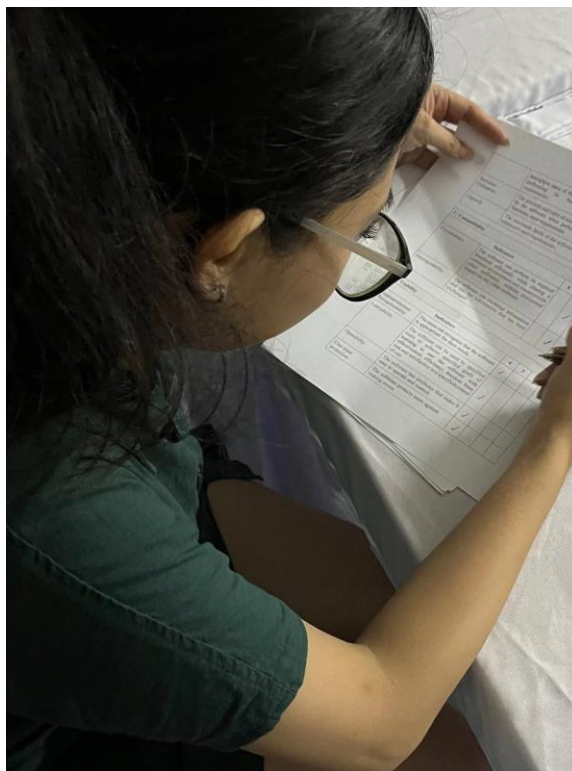
*Figure 37.* Pharmacist – Evaluation



*Figure 38.* Employee – Evaluation



**Figure 38.** IT Professional – Evaluation




**Figure 39.** Employee– Evaluation



***Figure 40. Employee– Evaluation***

## Appendix E

### THESIS GRAMMARIAN CERTIFICATION

THESIS GRAMMARIAN CERTIFICATION			
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		Revision No.	00
		Effectivity Date	06132022
VAA-COS	<b>THESIS GRAMMARIAN CERTIFICATION</b>	Page	1 / 1

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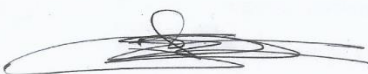
INVENTORY MANAGEMENT SYSTEM FOR PHARMACY

authored by

Yumang, Genesis Reign,  
Nachor, Rene Karlo,

has undergone editing and proofreading by the undersigned.

This Certification is being issued upon the request of Genesis Reign Yumang and Rene Karlo Nachor for whatever purposes it may serve them.



Jonathan N. Nachor  
Grammarian  
Technological University of the Philippines


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		Revision No.	01
		Date	04132021
		Page	1 / 1
VRE-URD	CERTIFICATE OF SIMILARITY INDEX USING TURNITIN	QAC No.	CC-04132021

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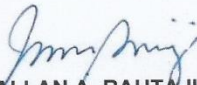
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authored by

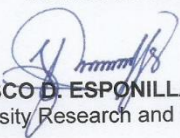
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## LANGUAGE

- English
- Korean (Level 3)

## RELATIVE SKILLS

- Photo Editing
- Video Editing
- Digital Marketing
- Community Management

## CERTIFICATES / AWARDS

**Civil Service Examination - Professional Level Passer**  
(March, 2023)  
**Network Security & Database Vulnerabilities**  
(February, 2023)  
**Certificate in Data Science Operationalization**  
(October, 2021)  
**Best in Research**  
(2019)

## EDUCATION

**Technological University of the Philippines**  
Bachelor of Science in Information Systems  
2019-2023

**Arellano University - Plaridel Campus**  
Information Communication Technology (ICT)  
2017-2019

## COMPUTER SKILLS SUMMARY

Design Process  78 %

Back-End Development  86%

Database Management  70%

## PROJECTS

- Enrolment System for Arellano University - Plaridel Campus
- Webpage for HYT Foundation



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#### LANGUAGE

- English

#### RELATIVE SKILLS

- Community Management
- Communication Skills
- Computer Maintenance

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#### CERTIFICATES / AWARDS

**Web3 Bootcamp (Ateneo De Manila University)**  
(April, 2023)

#### EDUCATION

**Technological University of the Philippines**

Bachelor of Science in Information Systems  
2019-2023

**St. Paul University**

Information Communication Technology (ICT)  
2017-2019

#### COMPUTER SKILLS SUMMARY

Computer Programming  78 %

Data Analysis  70%

#### PROJECTS

- Webpage for HYT Foundation