CHAPTER 7

INVENTORY MANAGEMENT SYSTEM FOR SSM COMPANY

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ABSTRACT

Suruhanjaya Syarikat Malaysia (SSM) is a statutory body vested with the power to regulate and oversee corporate and business affairs in Malaysia. Formed in 2002, SSM fulfils its function as the leading authority for improving corporate governance by ensuring compliance with business registration and corporate legislation through comprehensive enforcement and monitoring activities in order to maintain positive developments in the nation's corporate and business sectors. Therefore, this study aims to develop an online website called Inventory Management System to manage the inventory system of SSM companies. The objective is to provide functions that make managing products in the store more effective. Inventory management includes monitoring and supervising purchases from suppliers and consumers, managing inventory, controlling the quantity of goods for sale, and fulfilling orders, all of which are part of the supply chain. The scopes of the project are to track inventory, perform inventory maintenance, update inventory based on sales information, and generate sales and inventory reports on a daily or weekly basis. Inventory management systems are essential for businesses that purchase consumer products to maintain quality control. If inventory is not tracked, online businesses may be out of stock on key products. The powerful inventory management system can help in automatically tracking large items and reducing errors.

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INTRODUCTION

The Suruhanjaya Syarikat Malaysia abbreviated SSM (English: The Companies Commission of Malaysia) is a statutory body vested with the power to regulate and oversee corporate and business affairs in Malaysia. Formed in 2002 under the Companies Commission of Malaysia Act 2001, SSM assumes the functions of the Registrar of Companies and Registry of Business. SSM's major function is to operate as an agency for the incorporation and registration of enterprises, as well as to enable public access to company and business information. SSM fulfils its function as the leading authority for improving corporate governance by ensuring compliance with business registration and corporate legislation through comprehensive enforcement and monitoring activities in order to maintain positive developments in the nation's corporate and business sectors.

Any type of business or commercial activity that involves the exchange of information via the Internet is considered an online business. These online businesses also can consider to register in SSM, then become a company under SSM. Business is the exchange of goods and services between companies, groups and individuals, and is one of the most basic activities of any company. Running an online company is very attractive, but it also has its own set of difficulties. The reality is that it is difficult to start any type of company. Although some people may think that the Internet is a quick get rich solution, simple business concepts are still very important. For example, inventory management systems are also an important part of company daily business. The inventory management system organises all of the components of inventory management. This is the method of tracking products from one end of the supply chain to the other. Always be aware of what you have, where it is located and how to use it.

The project inventory management system is a complete website designed based on php and other programming languages.

The main goal of the project is to develop inventory management system model software, which will display all the inventory details of the business. This is an intranet-based online website with management components for inventory management and inventory system maintenance. The case study for this project focuses on how to develop an inventory management system that is suitable for SSM companies. The system will contain the function of the general business profile, sales information, purchase information, and the remaining stock of the business. This system also shows the stock's remaining balance, as well as the details of the transaction's balance. Each new inventory will be created and assigned a name and date, and can be changed at any time as needed, based on the transaction or sales return in the case of sales. The login page is designed to protect the company's inventory management from threading and inventory abuse.

In this era of rapid technological development, various online businesses have gradually emerged on many platforms. The inventory management system is a useful system to help the SSM company to run well. Although the current technology is developing rapidly, some online businesses are still using more traditional inventory systems. This will cause them to make fatal mistakes in handling inventory. The importance of inventory cannot be overstated in any commodity-based company, which is why inventory management can increase your operational efficiency and lifespan.

Background of the Problem

Inventory is one of the main departments that needs to be properly managed to make daily business operations smooth. One of the cases shows a company is using a very outdated wholesale backend package, which has been outdated for 25 years. The system was a very popular software package at the time, but sometimes it took a long time to get someone's order status. In addition, all content must be manually recorded on paper. This requires workers to sit down and screen a large number of documents in order to find everything. Inventory management would be challenging without an integrated inventory system.

This is due to the fact that inventory levels may be sold, purchased or kept without inventory levels being correctly updated to represent transactions. Since the inventory cannot be accurately reflected, the seller of the online business will not know the total inventory on hand, which leads to uncertainty.

Objective and Scope

There are three objectives in this study, which are (i) to determine the inventory information such as sales, purchases and profit, (ii) to develop an easy-to-manage inventory for SSM company, and (iii) to evaluate the efficiency of overstocking and understocking that happen in business. This inventory management system is a web-based system. The target user of this system is the SSM company. The focuses of this system are to record their inventory into this system and keep track of inventory information. Furthermore, the system is able to generate a simple report of the inventory information to the company.

RELATED WORK

There are a number of options to trigger a replenishment order for the currently stocked item [1]. The different methods of replenishment order in the inventory management system will be discussed in this section. Table 1 shows some comparison between the existing methods.

Table 1: Comparison between the existing methods

Method	Process
Vendor Managed Inventory (VMI)	The vendors are managing the supply of the inventory. Vendors have full control of the inventory.
Consignment Inventory	Retails have full control of the inventory for the goods until selling the goods or return to the vendors.
KANBAN	A solution for managing inventory and ensuring that items are always available.

Vendor Managed Inventory (VMI)

Vendor Managed Inventory (VMI), as in Figure 1, is a corporate structure, in which the product buyer communicates information to the seller, who is then entirely responsible for managing an agreed-upon inventory of things, often at the customer's consumption site. [2]. By controlling demand and supply gaps, third-party logistics firms may assist purchasers in obtaining the items they want. VMI decreases the likelihood of firms losing inventory and lowering inventory in the supply chain due to human error.

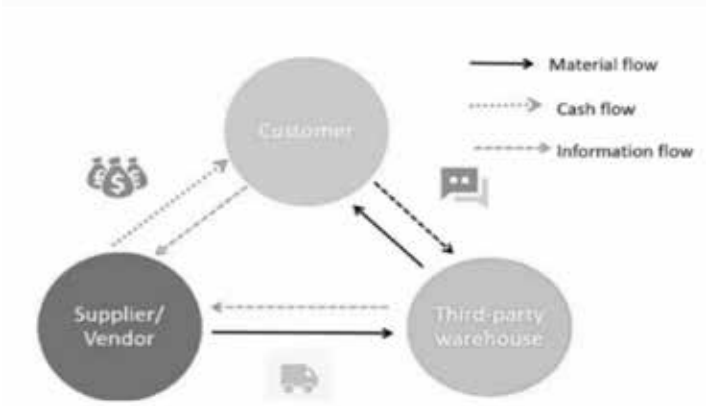


Figure 1: Vendor Managed Inventory (VMI)

Consignment Inventory Management

A commercial agreement, in which a supplier or wholesaler agrees to deliver its goods to a consignee (usually a store), is called consignment inventory management, as in Figure 2. The items remain the property of the consignor and the consignee does not pay for them until they are sold [3]. A broad range of objects, including artwork, apparel and literature, is available for consignment. Although consignment stores and thrift stores are more usually associated with the practice, some types of retail

sales might be regarded as a type of consignment, in which producers rely on retailers to sell their products to customers. [4].

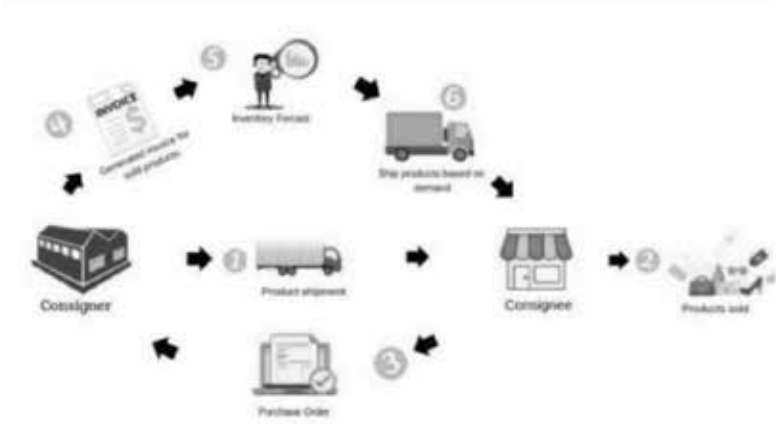


Figure 2: Consignment Inventory Management

KANBAN

KANBAN is a visual tool for keeping track of inventory flow. Taiichi Ohno, a Toyota industrial engineer, invented it about three-quarters of a century ago. KANBAN, as in Figure 3, boards allowed Toyota to restock inventory only when it was needed, and it was this innovative technique that aided the company's rapid growth [5]. KANBAN allows a corporation to keep just the parts and artwork needed for the production or distribution process on hand. KANBAN is a lean manufacturing method for keeping levels of inventory as low as possible. Lean manufacturing is a method of pushing materials through the production or distribution process. When inventory has to be reordered or supplied, the KANBAN system sends out alerts [6].

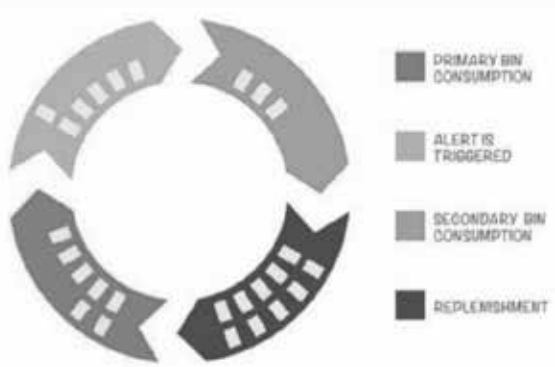


Figure 3: KANBAN

Comparative Analysis

Vendor Managed Inventory (VMI) has a lot of advantages. First, VMI can improve efficiency. Finding the right balance is crucial not only for our budget but also for your shelf space and customer satisfaction. Furthermore, a VMI system may be able to deal with it by issuing purchase orders automatically, lowering the possibility of data entry mistakes. Next, VMI can help us to decrease the cost. With a VMI, you will have fewer orders, no more expensive "rush" orders, and no overstocks to worry about. You can enhance production by allowing your employees to focus on other tasks. VMI can also improve data insights. Providers can forecast demand and make data-driven choices to deal with seasonal or market patterns as suppliers and business partnerships grow [7].

The disadvantage of VMI is the system can easily lose control. You may not want outsiders to manage your inventory, especially if you are not sure whether the merchant can meet your specific requirements. In addition, for security reasons, you may hesitate to distribute data. Second, the options you can choose in VMI are limited. If you are not satisfied with the services provided by VMI partners, the supply chain may be severely disrupted. You might be able to locate more cost-effective or high-quality suppliers elsewhere, but a VMI contract may prevent you from doing so [4].

The advantages and disadvantages of consignment inventory can be classified into vendors and retailers. By selling on consignment, vendors may enter new markets at a low cost to retailers, making retailers more willing to carry vendor goods. After that, inventory is expensive for the vendor's warehouses. Vendors can cut inventory expenses by distributing a portion of it to retailers. Instead of having inventory sent to a storehouse and then to a merchant, suppliers can have their manufacturers deliver the goods directly to the retailer. This simplifies the supply chain, lowers labour costs and speeds up the time it takes for items to reach shop shelves. Consignment inventory, on the other hand, allows merchants to use inventory without having to own it, cutting their total cost of ownership and storage costs. Retailers will not have to pay for inventory up front, freeing up capital to acquire and sell more mature items while decreasing the risk of carrying a new supplier's brand. Retailers are not charged any fees for storing items and suppliers are paid only after the products are sold. The retailer does not have to care about extra holding charges because the supplier still owns the goods until it is sold. This means that retailers may keep more consignment inventory at a lower cost without fear of running out of stock or purchasing products that will not sell.

Since the vendor still owns the inventory, it must be included in their cost analysis. The less profitable the supplier, the longer the inventory can be maintained without being utilised or sold. The retailers will not pay the vendors until some or all of the inventory have been sold. Unsold merchandise is usually returned to the vendor. Cash flow will become variable and unstable because they do not know when or how many things will be sold. The longer retailers have goods on hand, the more probable it is that it may be destroyed during typical company operations, forcing them to buy. Most employees should be able to see consignment inventory. In other words, it should be handled the same as any other inventory. If consignment inventory must be maintained separately from other types of inventory and the store does not use an inventory management system designed particularly for consignment inventory, they may face costly inventory issues such as repetitive counting and shipment delays.

There are several advantages of using KANBAN. First, customer demand for specific products will allow retailers to quickly calculate replenishment thresholds. According to the KANBAN system of inventory management, the inventory should not be replenished unless there are vacancies in the inventory. Only when the sales of a certain product are found to be surprisingly good can the retailer develop a new inventory plan for that product. Second, KANBAN can help retailers avoid over-stocking. There have been instances where businesses have overestimated demand for a product, resulting in it being overstocked for months. Overstocking forces them to either get rid of the inventory or sell it at a discount. In such instances, keeping track of stock becomes very difficult. The KANBAN system aids in preventing this from occurring in the first place. After that, for the entire order process, the KANBAN system functions as a watchtower. Retailers can set priority orders or any concurrent requirements as needed, and meet them in a simple manner as needed, from accepting orders from various channels to confirming orders to shipping and fulfilling goods [8].

As traffic patterns change, the shortcomings of the KANBAN system begin to appear. The KANBAN approach is based on production schedules that are predictable and reproducible. According to the KANBAN concept, components should be supplied to the manufacturing line as needed by the warehouse or supplier. The operation of the KANBAN system may be affected by demand and product changes. As a result, the approach is less appropriate for industries with a wide range of product quantities and combinations. Furthermore, KANBAN is incompatible with industrial settings characterised by low product quality, short production cycles, a diverse variety of product types and highly variable product needs. Weekly and monthly production schedules, as well as daily flexibility, are required by KANBAN systems. This may not be feasible in a manufacturing setting with a variety of product types; changing production requirements and long-term production runs reduce the overall efficiency of the production line [9]. Table 2 shows the advantages and disadvantages of the method in the existing system.

Table 2: Advantage and Disadvantage of the method in existing system

Method	Advantages	Disadvantages
Vendor Managed Inventory (VMI)	-Improved efficiency -Cost reduction	-Loss of control -Limited options
	-Improved data insights	
Consignment Inventory	Vendors -New market -Low inventory carrying costs - Direct-to- Retailer Shipping Retailers -Lower cost of ownership -Minimal risk -Improved cash flow	Vendors -Increased cost for unsold inventory -Uncertain cash flow Retailers -Increased risk of damaging inventory -Increased chance of stock count errors
KANBAN	-Customer demand is an alarm -Avoid over-stocking -Streamlined order fulfilment	- Product mix or demand changes may cause problems - Production flow problems

METHODOLOGY

The Waterfall model methodology was chosen as the technique for this entire completed project. The waterfall model methodology is a linear project management strategy, in which stakeholders and customer needs are gathered at the start of the project, and a sequential project plan is then built to satisfy those requirements. This Waterfall model methodology involves seven phases: design phase, implementation phase, testing phase, deployment phase and maintenance phase, as shown in Figure 4. This thoroughly entails documenting a project in advance, including the user interface, user stories, and all variants and outcomes for each feature.

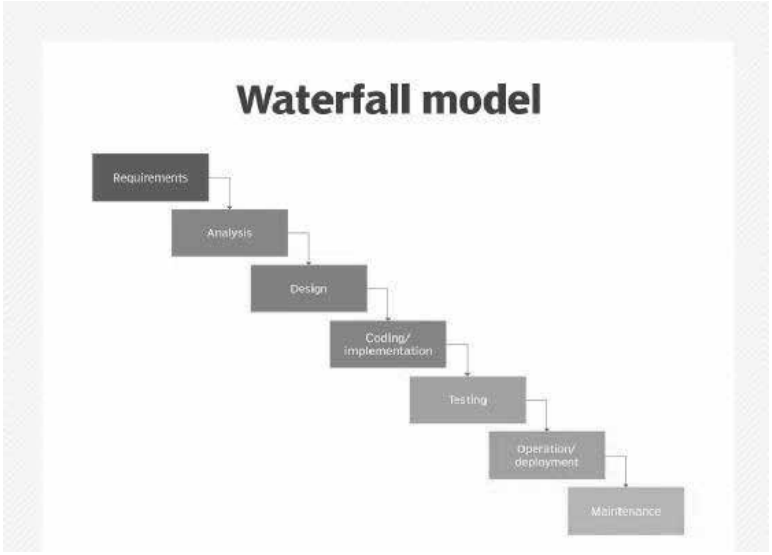


Figure 4: Overview of Waterfall model

Requirement phase

The key aspect of the waterfall technique is that all client needs are collected at the outset of the project, allowing all future stages to be planned without further customer engagement until the product is completed. It is assumed that at this point in the waterfall management process, all requirements may be obtained.

Analysis phase

The product development team looks over the specs and makes sure they understand everything. There will be no building during this phase of investigation. In order to develop the product needed, the team takes every attempt to ask all of the questions and get all of the information they require.

Design phase

The requirements specifications from the previous phase are evaluated in this phase and the system design is developed. This

system design may be used to sketch out hardware and system requirements, as well as construct the overall system architecture. Software developers employ scenarios, layouts and data models to provide a technological solution to the challenges outlined in the product specifications. The higher-level or logical design specifies the project's goal and scope, as well as the overall traffic flow of each component and connecting points. After that, it is transformed into a physical design using certain hardware and software technologies.

Implementation phase

When the design is finished, the implementation phase begins. Because thorough research and design have already been completed, this might be the shortest step of the Waterfall process. This phase includes programmers creating applications based on project specifications and needs, as well as some testing and deployment. If significant modifications are required during this stage, it may be necessary to return to the design phase.

Testing phase

Before it can be given to clients, the product must be thoroughly tested after the full installation is completed. Based on the product manager's design papers, personas and user case scenarios, the software testing team will develop test cases.

Deployment phase

The maintenance phase begins after the programme has been released to the market or to users. When bugs are discovered and user requests for changes to be made, a team will be formed to oversee updates and the delivery of new versions of the programme.

Maintenance phase

The client utilises the product on a frequent basis throughout the maintenance phase, looking for faults, insufficient features and

other production problems. These adjustments are applied as needed by the production team until the customer is happy.

Proposed Design & Interface

In this subtopic, the flow of the Inventory Management System will be clearly stated using flowchart and interface design.

Figure 5 shows the proposed flowchart of the Inventory Management System. If the user needs to use the system, the user needs to have an account for the system. The user already has an account that he or she can directly log in to the system by using the correct email and password. Those who do not have an account must register for an account to facilitate data recording for the system. After login into the system, the user will be at the home page of the system. Later, the user can do actions like add the product, add vendor and add transaction. When the user adds some data to the system, the user can manage the data with edit and delete action. For the report part, the report will display the stored data to the user, as shown in Figures 6 and 7.

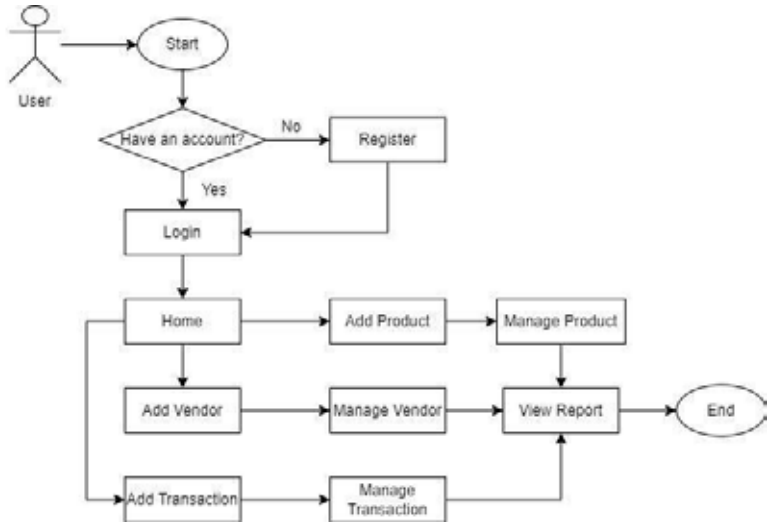


Figure 5: Purposed Process Flow Diagram

Figure 6: Purposed Home Page Interface Design

Figure 7: Purposed Manage Data Interface Design

RESULT AND DISCUSSION

PHP programming language

Many web developers favour PHP as a server-side programming language. It is also a general-purpose language that may be used to build a variety of applications, including graphical user interfaces (GUIs). When PHP was initially created, it stood for Personal Homepage. Web server development is the most prevalent usage of PHP. Both the command line and the browser may be used to run it. You may use the terminal to show your code output if you do not want to use the browser. The initial version of PHP was published 26 years ago. It is presently on version 8, which was released in November 2020, however the most common version is still version 7.

JavaScript

JavaScript is a dynamic programming language that can be used for various purposes such as web development, web applications, game creation and more. It enables you to add dynamic features to your website that are not possible with HTML and CSS alone. JavaScript is used in a variety of locations, including Amazon's search box, The New York Times' news summary video and updating your Twitter feed. By converting a static web page into an interactive one, using JavaScript enhances the user experience. To summarise, JavaScript provides functionality to web pages.

MySQL Database

MySQL is one of the most well-known technologies in the current big data world. MySQL is generally referred to as the most popular database and it is currently widely used in a variety of sectors. At the absolute least, everyone dealing with corporate data or general IT should strive for a fundamental grasp of MySQL. In many of the most popular software stacks, MySQL is used to build and manage anything from customer facing web apps to complicated, data-driven B2B services. MySQL back ends are used by internet-critical companies such as Facebook, Flickr,

Twitter, Wikipedia and YouTube because of its open-source nature, reliability and comprehensive feature set, as well as Oracle's continued development and support.

Result

Tables 3 and 4 are the login page for the user to log in to the inventory system. The user needs to register an account in the sign-up page, which is shown in Table 5, to ensure that the user can enter the inventory management system normally. If the user forgets the account password, he or she can enter the forgot password page, which is shown in Table 6, then enter their email. After the user enters them to reset the password, the user will receive an email to change the password. After login to the system, the user will go to the home page, which is shown in Table 7. The home page will show the overview of the recorded data like total product and total profit. A simple report and table will also be shown in the home page. Table 8 is the inventory page. In this page, user can click the “Add Inventory” button to add their company’s inventory to the system. After clicking the “Add Inventory” button, the user will go to the Add Inventory Page, then the user can fill in the inventory detail and add it into the database. The inserted inventory data will show in the inventory page.

Table 9 is the transaction page. In this page, the user is able to see the company’s purchase or sale record. Besides that, user also can click the “Add Transaction” button in this page to add a new transaction record. The vendor page is shown in Table 10. The vendor data will be shown in this page and it is easy for user to find the vendor details. The user can also click the “Add Vendor” button to add new vendor data. Table 11 is the report page. The user is able to see the simple report of the company in this page. Table 12 is the setting page. The user is able to edit or update the company details into the database or change the password. The footer will be shown in Table 13. The users can through the footer to find the website’s author.

Table 3: Index Page Testing Table

UI Design		
Use Case	UC01 Index Page	
Test Case ID	TC-01	
Objective	To check the function of the login button.	
Test Data	**Expected Result**	**Pass/Fail**
Does the login button function?	User can click the button and go to login page	Pass

Table 4: Login Page Testing Page

UI Design		
Use Case	UC02 Login Page	
Test Case ID	TC-02	
Objective	To check login function	
Test Data	**Expected Result**	**Pass/Fail**
Can user log in with correct	User is able to login with correct email and password.	Pass

email and password?		
Are the links forgot password and sign up function?	User is able to click the link to the reset password page and register page.	Pass

Table 5. Register Page Testing Table

UI Design		
Use Case	UC03 Register Page	
Test Case ID	TC-03	
Objective	To check register page functior	
Test Data	**Expected Result**	**Pass/Fail**
Can user register normally?	User is able to register an account normally.	Pass
Does that icon show password can function normally?	User is able to click the icon to see the inserted password before completing the register.	Pass
Does the link login function?	User is able to click the link and go to login page.	Pass

Table 6: Reset Password Testing Page

UI Design		
Use Case	UC04 Reset Password Page	
Test Case ID	TC-04	
Objective	To check reset password page function	
Test Data	**Expected Result**	**Pass/Fail**
Can user reset password normally?	User is able to reset the password with correct email.	Pass
Does that icon show password can function normally?	User is able to click the icon to see the inserted password before completing the reset the password.	Pass
Does the link login function?	User is able to click the link and go to login page.	Pass

Table 7: Home Page Testing Table

UI Design		
Use Case	UC05 Home Page	
Test Case ID	TC-05	
Objective	To check the detail in home page	
Test Data	**Expected Result**	**Pass/Fail**
Is the report displayed in home page?	User is able to view the report display in home page..	Pass
Is the inserted data shown in the correct table?	User is able to view the correct data in correct table.	Pass
Does the nav bar menu function?	User is able to click nav bar menu to other page.	Pass
Does the home page show the correct user's name?	User is able to view the correct user's name in home page.	Pass
Does the button total quantity, top sale and recent transaction function?	User is able to click the button and show the report or table in the home page.	Pass

Table 8: Inventory Page Testing Table

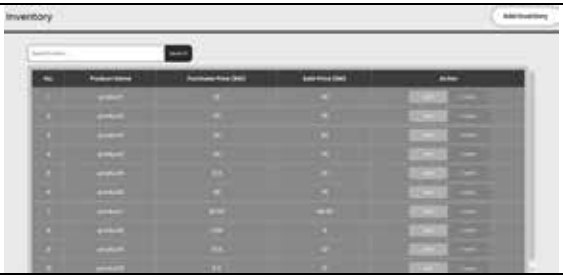
UI Design		
Use Case	UC06 Inventory Page	
Test Case ID	TC-06	
Objective	To check the detail in inventory page.	
Test Data	**Expected Result**	**Pass/Fail**
Is the inserted data shown correct in the table?	User is able to view the correct inserted data shown in the table.	Pass
Does the search data function normally?	User is able to search the data to show in the table.	Pass
Does the add button function normally?	User is able to click add button to add new product.	Pass
Does the edit button function normally?	User is able to click edit button to edit product's data.	Pass
Does the delete button function normally?	User is able to click delete button to delete product's data.	Pass

Table 9: Transaction Page Testing Table

UI Design		
Use Case	UC07 Transaction Page	
Test Case ID	TC-07	
Objective	To check the detail in transaction page.	
Test Data	**Expected Result**	**Pass/Fail**
Is the inserted data shown correct in the table?	User is able to view the correct inserted data shown in the table.	Pass
Does the search data function normally?	User is able to search the data to show in the table.	Pass
Does the add button function normally?	User is able to click add button to add new transaction..	Pass
Does the edit button function normally?	User is able to click edit button to edit transaction's data.	Pass
Does the delete button function normally?	User is able to click delete button to delete transaction's data.	Pass

Table 10: Vendor Page Testing Table

UI Design		
Use Case	UC08 Vendor Page	
Test Case ID	TC-08	
Objective	To check the detail in vendor page.	
Test Data	**Expected Result**	**Pass/Fail**
Is the inserted data shown correct in the table?	User is able to view the correct inserted data shown in the table.	Pass
Does the search data function normally?	User is able to search the data to show in the table.	Pass
Does the add button function normally?	User is able to click add button to add new vendor..	Pass
Does the edit button function normally?	User is able to click edit button to edit vendor's data.	Pass
Does the delete button function normally?	User is able to click delete button to delete vendor's data.	Pass

Table 11: Report Page Testing Table

UI Design		
Use Case	UC09 Report Page	
Test Case ID	TC-09	
Objective	To check the detail in report page.	
Test Data	**Expected Result**	**Pass/Fail**
Is the inserted data shown correct in the chart?	User is able to view the correct inserted data shown in the chart.	Pass

Table 12: Setting Page Testing Table

UI Design	
Use Case	UC10 Setting Page
Test Case ID	TC-10
Objective	To check the detail in setting page.

Test Data	Expected Result	Pass/Fail
Can the option profile and account setting be clicked?	User is able to click the option profile and account setting to edit the detail of user.	Pass

Table 13: Footer Testing Table

UI Design		
Use Case	UC11 Footer	
Test Case ID	TC-11	
Objective	To check the detail in footer.	
Test Data	**Expected Result**	**Pass/Fail**
Can the icon of the social media be clicked?	User is able to click the icon and go to the link.	Pass

CONCLUSION

As conclusion, this inventory management system can help the SSM company or other small companies to record their company's inventory. The employees of these companies can easily get started with this inventory management system to record the inventory data or some transaction data. The company can easily track their inventory, then avoid the overstocking and understocking that happen in business. There are various

constraints to the proposed inventory management system's development. So, there are still some minor flaws in some functions. Future work on adding the option to choose currencies in the system has been suggested, like can develop a chat system inside the system to ease the user to communicate with the vendors. After that, the email verification for login also can be developed inside this system. Finally, this study has a lot of room for growth in the future and it can assist user to address a variety of problems related to inventory management.

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