EFFICIENT STOCK CONTROL MANAGEMENT SYSTEM

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ABSTRACT

This paper presents a pleasant automated system for stock management. Inventory system is important for industry to manage their things. The objectives of this paper are to help industry to manage inventory competently, improve performance and efficiency in handling inventory. Since the project will focus on small industry, the equipment used is not costly. The material used is software applications for keeping data and produce report of items and sale. Basically, the system will help user in key-in data using the items' code. Then, the system will generate data based on function it is asked such as sales report and detect goods in and out of store. The system is user friendly and it is useful for newbie to become familiar with new system.

ABSTRAK

Kertas ini membincangkan sistem automatik untuk menyenangkan pengurusan stok. Sistem inventori adalah penting bagi industri untuk menguruskan aktiviti mereka. Objektif kertas ini adalah untuk membantu industri untuk menguruskan inventori dengan lebih cekap, meningkatkan prestasi dan kecekapan dalam mengendalikan inventori. Projek ini akan memberi tumpuan kepada industri kecil, oleh itu, peralatan yang digunakan tidak mahal. Bahan yang digunakan adalah aplikasi perisian untuk menyimpan data dan menghasilkan laporan barangan dan jualan. Pada asasnya, sistem ini akan membantu pengguna dalam mengisi maklumat menggunakan kod barangan. Kemudian, sistem akan menjana data berdasarkan fungsi yang diminta seperti melaporkan jualan dan mengesan barang-barang yang masuk dan keluar dari kedai. Sistem ini adalah mesra pengguna dan ia adalah berguna untuk pengguna baharu agar dapat membiasakan diri dengan sistem baru.

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INTRODUCTION

1.1 Purpose of the Project

1.1.1 Background of Study

An inventory control system is a system that encompasses all aspects of managing a company's inventories; purchasing, shipping, receiving, tracking, warehousing and storage, turnover, and reordering ("Inventory Control Systems," n.d.). Besides, Jane (n.d.) encounters that inventory systems are tracking systems that inform the amount of raw materials, supplies or final products that have readily available. The inventory system is updated each time an item is sold or used of raw materials to create a product. Her point toward inventory system is to keep track the items available in our store. If we know the availability of materials, we can easily satisfy the needs of our customers when they reach us. The inventory system informs us when we need to purchase more products or supplies.

Henderson (2011) writes that efficient tracking inventory is a vital component to a small business successful operation. By having up-to-date data regarding all needed office supplies, raw manufacturing materials and merchandise for sale, an organization will drastically increase its bottom line. Furthermore, it has advantages in the terms of

funds; by not reordering unnecessary goods, times; when an enterprise will be better positioned to services customers quickly, and performance; as we can navigate any unexpected changes in business. Although many companies maintain this information manually, there are benefits to using a computerized inventory system.

1.1.2 Problem Statement

Usually, school cooperative (school shop) opens only during recess time, which takes 20 to 30 minutes, since at other time teachers and students have lessons in class. Many students will come at that time to buy necessary things. With manual calculation of products, it will take time. Thus, there will be long queue just to make payment. This will waste students' time and some of them will not have enough time to take their meal.

Besides, the chance to make wrong calculation is also high when dealing with many things. Furthermore, school cooperative does not require high profit. So, cheap tool to solve or reduce its problems is really helped.

Moreover, Norul Aswin (2009) determines that there is no systematic inventory system for Sekolah Rendah Islam Hidayah (SRIH) to manage its cooperative operation because it stills using manual system. The management also does not have an effective inventory checking method to keep track on available inventory and also facing difficulties to make decision regarding the quantity they should order for certain inventory.

In addition, traditional centralized, sequential inventory system and control mechanisms are insufficiently flexible to respond to highly dynamic variations in customers' requirements. The traditional approaches limit the expandability and reconfiguration capabilities of the inventory systems (Norazila, 2002).

1.1.3 Description of Main Aim(s)

The main key of this paper is to help small industry to manage their inventory. Usually, small industry does not gain high profit that ought them to use advanced system. Hence, it is sufficient to facilitate them with automated system and at the same time not so costly that will burden them. It is believed that with computerized system will help this small entrepreneur to stay in the market.

1.1.4 Objective(s)

The objectives of this research are:

a) to develop an automated system for stock management
b) to improve performance and efficiency in handling inventory
c) to manage and keep track goods in storage

1.1.5 Scope and Limitation of Study

Basically, the scope of project contributes with staffs, who organize the shop, and students as customers. With technology that will be proposed, it helps staff in reducing stress, easy control of goods and effective way to calculate products. Then, students will save their time and to have satisfaction with better management.

This technology will focus on space of Windows operating system. Then, it is limited to goods that usually be sold at school shop. The programming language used is Microsoft Visual Studio 2010 and database is Microsoft Office Access 2003.

The system will be automated with basic function such as save, edit, retrieve and update data. In addition, the system will be added with detection of product in and out from store, total of product in store as well as sales report. The products are bound to things that fulfill students' necessity such as sport t-shirt and stationary.

1.1.6 Outline of material presented in report

This report is organized as follows. The first part presents the introduction of this research. It includes the background and problem statement, research objectives as well as scope of this research. This part also reviews the related literature relating to the research objectives of this report as well as studies the previous and existing systems. Furthermore, part two focuses on the instrument or method used to conduct the study on efficient inventory system. Then, part three will conclude the thesis paper and make some suggestion for future study.

1.2 Existing System

1.2.1 Description of Existing System

General structure and design of existing system

Basically, inventory system helps human to manage, control, and make sure the goods in stock are well managed and organized. Years ago, before computerized system is applied, people used manual system to keep track of their inventory. Before computer has been invented, paper tables and paperwork solutions, as in Figure 1.0 and 1.1, were being used as inventory management tools (Arsan, Başkan, Ar & Bozkus, 2011). However, these we very far from being a solution, took so much time, even needed employees just for this section of organization.

There was no an efficient solution available in the many companies during these days. Every process was based on paperwork, human fault rate was high, the process and the tracing the inventory losses were not possible, and there was no efficient logging systems. Lister (2011) thinks that although manual inventory system can cost as little as a sheet of paper and a pencil, its accounting for inventory can saves time because a business owner does not have to scan items into an automated system. Thus, they can be read and deducted from a computerized inventory when sold. Saving time also saves money.

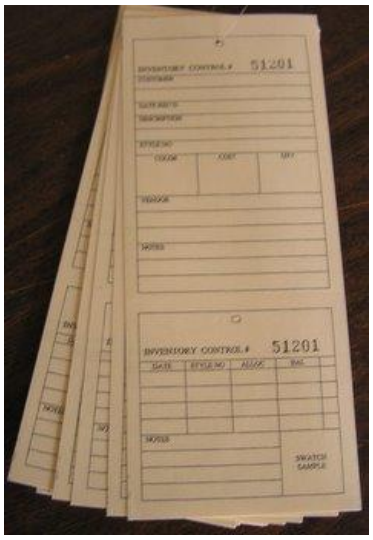

Figure 1.2.1 Sample of receipt

Inventory Tracking

Department	Location

Item #	Description	Qty	Last Date Updated

Figure 1.2.2 Sample of invoice

Then, the world keeps moving forward. Inventory system starts to be computerized and kept in database. At first, it is not advance like nowadays because any data and information wants to keep in database still need to be key-in manually. Next, barcodes was created and used to keep track the goods. It provides a simple and inexpensive method of encoding text information which can be easily read using electronic readers.

Barcode technology and processing provide a fast and accurate tool to enter data without keyboard data entry. Barcodes are much quicker, more efficient entry of information and are inexpensive and easy to implement.

Implementation of technology

One existing system is Bronze Inventory System with Point of Sale (POS).

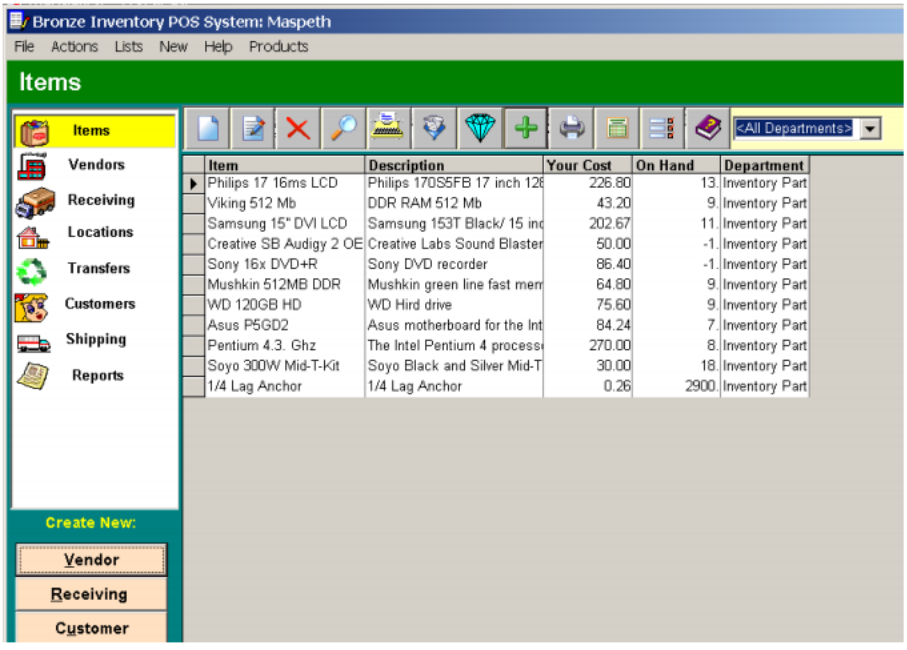

Figure 1.2.3 Basic GUI of Bronze Inventory System

Bronze Inventory System (BrInSy) is the universal inventory management and point of sale system .You can use this system in your business, office and home. This system will guide you through the creation of vendors list, products list, receiving lists, invoices, sale receipts and cash receipt. This is in addition to product labels with barcodes, transfer orders between locations and various types of reports for monitoring your business.

BrInSy Features:

- The simple intuitive interface.
- BrInSy is a multi-user and multi-warehouse system.
- Supports non-stock and non-depleting product codes.
- Calculates sale prices of the list or cost prices.
- Usage separate product descriptions for invoices and purchase orders.
- BrInSy calculates real-time on hand stock levels on different warehouses10. You can independently set up the appearance of the invoice, item receipt and sales receipt.
- The system and in addition to printing the documents, it can also send E-mails from its own program.
- The system is protected with data access control. It can restrict the unauthorized users from having full access to the database by limiting their access to certain management or confidential information.
- BrInSy supports using discounts, shipping and two types of taxes in the invoices and orders.
- Backups and restores databases and many other powerful features.
- Exports and Imports information from csv (comma-separated-value files, Excel and QuickBooks.

1.2.2 Method(s) of Approach

Shazia Arshad, Muhammad Shoaib and Muhammad Sajjad Khan use System Development Life Cycle (SDLC) as their technique to computerized inventory system (2000). Their paper is to propose software can help to improve the efficiency of Store Department of University of Agriculture, Faisalabad because the current system is manual. Its SDLC consist a few phases:

1. Preliminary investigation and analysis
   - This phase is to understand the existing system, determine true nature of problem, objectives and advantages of proposed system, and recognize user requirements.

2. Design
   - The phase is conducted in the following steps: select software and hardware requirements, design input and output forms and reports.

3. Development
   - The development of designed system was carried out by develop the computer program, testing of computer program with sample data and also testing the program with real data.

Besides, there are several techniques to forecast and predict goods in stock. Earlier, Artificial Intelligence and Machine Learning like Support Vector Machines, Artificial Neural Networks (ANNs) and Fuzzy Logic have been applied to solve excess goods (Aditya Gupta, 2012).

But the most unbeaten is ANNs, even quite limited in performance and not reliable enough. In addition, a system based on a recurrent neural network showed appropriate accuracy, which used extract feature using the Autoregressive Integrated Moving Average (ARIMA) (Wang & Leu, 1996).

Recently, the Hidden Markov Model (HMM) approach is used to analyze and predict time depending phenomena or time series. The metric used to evaluate the performance of the algorithm is Mean Absolute Percentage Error (MAPE) in accuracy. MAPE is the average absolute error between the actual stock values and the predicted stock values in percentage

$$MAPE = \frac{1}{n}\sum_{i=1}^{n}\frac{|p_i - a_i|}{|a_i|} \times 100\%$$

.

Where a_i is the actual stock value,

p_i is the predicted stock value on day i,

n is the number of days for which the data is tested

An HMM is based Maximum a Posteriori (MAP) estimator for stock prediction. The model uses a latency of days to predict the stock value for the $(d + 1)^{st}$ day. A MAP decision is made over all the possible values of the stock using a previously trained continuous-HMM.

Besides, there is a technique to reduce uncertainty in the data which is a Fuzzy Markov Model. However, this method is for the reliability evaluation of electric network components allowing for fuzzy quantities to comprise uncertainty in the data.

1.2.3 Problem in the Existing System

BrInSy has too much function that not fit for small enterprise. For example, it is not necessary for small industry to have slot to group products in storage location and department. It is because usually small shop uses limited space to store its product, just need to arrange it neatly.

Refer to Bronze Inventory System with Point of Sale (POS), it scopes are a simple but powerful inventory program with the Point of Sale panel. The inventory system works with MS Access files or with MS SQL Server database. System has 4 different retail prices. This software allows to create different reports in html and Excel formats.

The limitation is too much function that is believed not suitable with small industry like school shop. Then, the used of wired barcode reader has frontier the distance from the PC. The goods need to bring near the PC as to scan the barcode on those goods.

PART 2

REPORT BODY

2.1 User Requirement

The user who selected by is a teacher from SK Tanjong Mas, Kelantan. The user is chosen after several analyses of problems that arise in my mind. Thinking of there is still manual system in managing school shop, I come out of asking a few questions to the teacher.

Since she is quite blur about the computerize system, she just tell me her problems when dealing with manual system and the details are put on me. She wants a system that can:

a. help her to easily keep and manage data
b. track the products in and out of system
c. trigger message if the items less
d. predict what, when and how much to order goods from supplier
e. produce report of inventory

Furthermore, she suggests the system can be used by Windows operating system. The system can only support items that are sold in the school shop such as sport t-shirt and stationary.

2.2 Design Description

2.2.1 Flow Chart/Story board

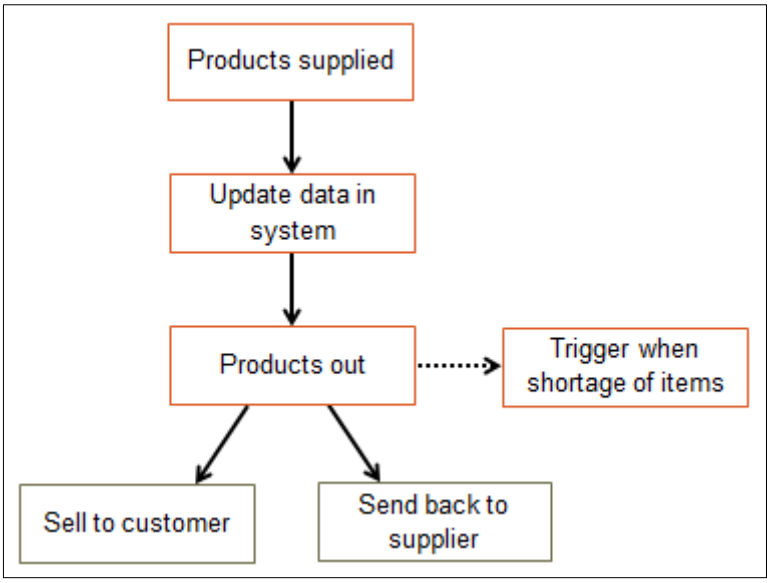

Figure 2.2.1 Workflow of the system

Figure 2.2.1 represents the overall workflow of the system. The system begins when staff enters information of products after receiving them from supplier. For the first time of key in, the system will consider it as process of getting the data into database. Once the code is entered, system will be updated. Then, in module out, the system will reflect as the item is moving out from the database.

Usually there are two reasons why the product is out of the system, the product is sold to customer or sent back to supplier because of labefaction. When the product is sold, it will go to process of sale that will calculate the price and amount of profit. However, if the product is out from system because of return to supplier, it will go to manual process.

During the process of updating data in system, which is out of the system, there is a trigger message to alert staff on quantity of items in stock. Furthermore, with this updating process, report can be generated as to keep track the whole goods in inventory.

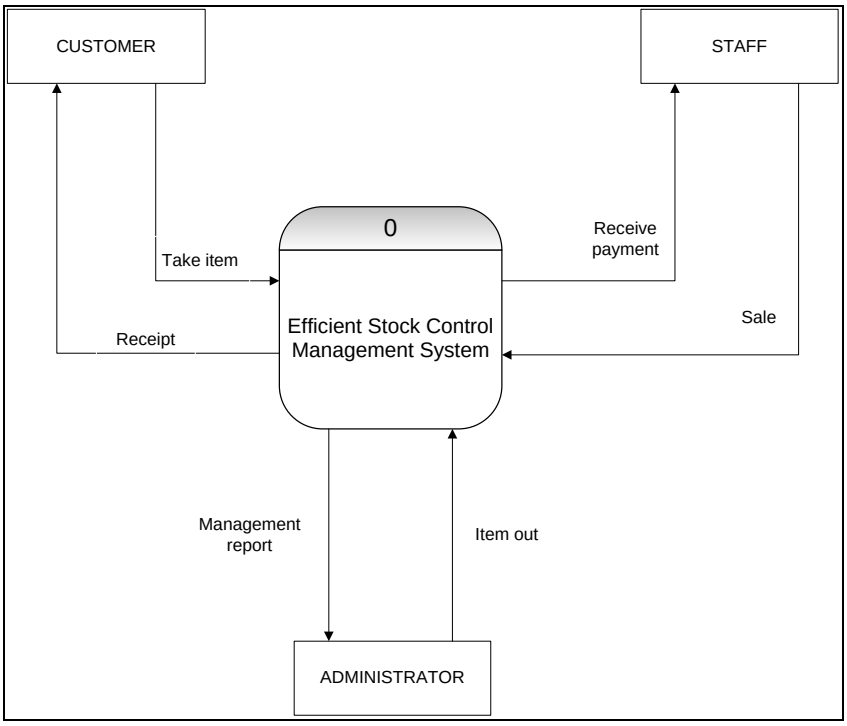

Figure 2.2.2 Context Diagram of inventory system

The context diagram above, Figure 2.2.2, represents the system of SK Tanjong Mas shop. Firstly, the customer takes items that he/she wants. Then, staff will receive the payment and enter the code of item in the system. After that, item is reduced based on quantity that has been taken out, entered by staff. In addition, customer can ask for the receipt. The staff collects the payment just after the customer satisfied with the items. Later, the administrator can retrieve the management report about the daily sale or item out.

Refer to Figure 2.2.3 below, it is about physical data flow in the system. First process is to collect payment. Customers will take items and bring it to staff. Then, staff will enter the code each items to calculate price and reduce the quantity of good from stock. Update sales database is the second process. Staff will receive the payment from customers just after they satisfied with the total amount of items they buy. Update inventory database is the third process.

The next process is update inventory database, once staff key in the code of items sold. Inventory data from process two will enter this process and the inventory data will formatted. After that, the data will be kept in the inventory database. Produce management report is the last process. Goods sold amount from sale database will be keyed-in into produce management report. With that, daily inventory depletion amount also will be entered into produce management report. This report can also be accessed by administrator.

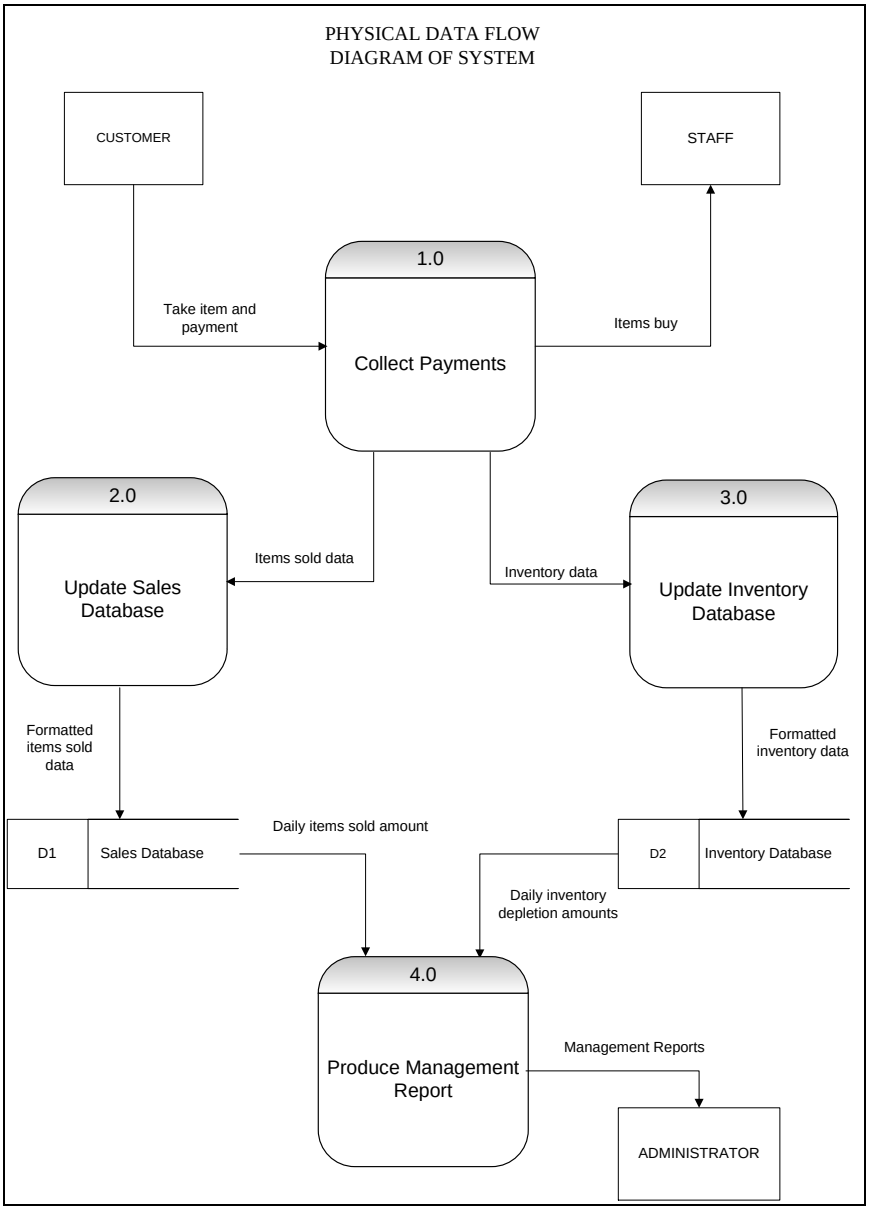

Figure 2.2.3 Level-0 Data Flow Diagram for inventory system

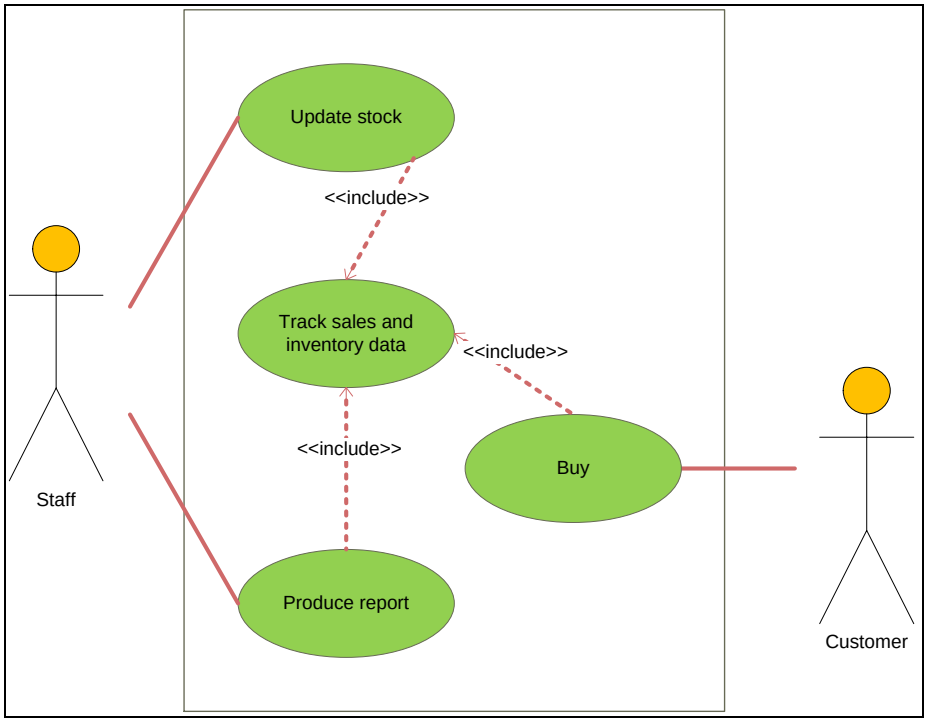

Figure 2.2.4 A use case diagram for an inventory system

Mainly, from Figure 2.2.4 of use case diagram, the process between user and customer does involve the system when the customer wants to make payment of the item(s) he/she buys. A staff will enter code of the product to identify the price and at the same time, the quantity of that product will reduce by one item and automatically update the data in the system. If the customer request for a receipt, the staff will print out the receipt.

In the end of sale day, staff can generate report as to recheck whether the information in the system is tally or not with the stock in rack. When the quantity of item reach the certain level, the system will give trigger message and there will be a highlight on the word of item that is in shortage. So, this will alert the staff to order items.

2.3 Method and Material

2.3.1 Technique/Theory/Modeling

The techniques used in inventory system will apply probability to avoid uncertainty of stocks whether over-or under of goods that should be available in-store. Moreover, forecasting formula should be applied to recognize the behavior of items is on demand or not. Then, a technique is required to predict or purpose when to order and how much to order of goods. This can be done by knowing the pattern of items by looking of the previous sale.

System Development Life Circle (SDLC) is chosen as the suitable methodology to ensure the project success. SDLC is a conceptual model used in project management that describe the stages involved in an inventory management system development project from initial to completed application. Various SDLC methodologies have been developed to guide the processes involved such as Rapid Application Development (RAD) and Waterfall.

Waterfall is one of the SDLC which follows a linear and sequential method to deliver software product. This model suggests some advantages such as simple and easy to implement, easier to manage, and each phase is executed one at a time.

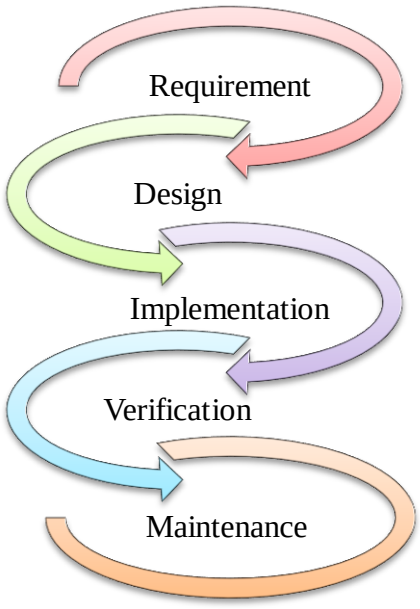

Figure 2.3.1 Waterfall phase

Requirement:

The first step is to identify the problem, determine its cause, and outline a strategy for solving it. The requirements are gathered from the end user at the start of the software development phase. With given a clear problem definition, analysis begins. The objective of analysis is to determine exactly what must be done to solve the problem.

This phase helps to define the project scope, project planning, initial risk and also project description as well as other solutions to the customer requirements and cost-benefit that rational to these alternatives. Involvement of carrying out detailed study of the customer requirements and meet to the particular requirements of the proposed system. Typically, the system's logical elements such as its boundaries, processes, and data, are defined.

Design:

The purpose of design is to determine how the problem will be solved. Here, the focus shifts from the logical to the physical. Processes are converted to manual procedures or computer programs. Data elements are grouped to form physical data structures, screens, reports, files, and databases.

This phase completes the analysis by creating action diagrams defining the interaction between processes and data. System procedures are designed and preliminary layouts of screens are developed. It involves translating the identified requirements into a logical structure, called design that can be implemented in a programming logic.

Database design is one of the most important design considerations to identify how data will be stored and presented in the database. Database is where any activities in system need to be stored when data is processed. There are four database tables to operate this system: User Table, Item Table, Sale Table and Out Table.

User table will determine all users in the database whether they are administrator or staff. Depending on the rank the user will have access to some information that another user will not have or the otherwise.

Table 2.3.1 UserTable

Physical Name	Data Type	Req'd	PK	Notes
username	CHAR(10)	☑	☑	username identifies User
password	CHAR(4)	☐	☐	password is of User

Item table represents information of each item may have. The item table contains the following fields:

Table 2.3.2 ItemTable

Physical Name	Data Type	Req'd	PK	Notes
code	CHAR(6)	☑	☑	code identifies Item
category	CHAR(10)	☐	☐	category is of Item
type	CHAR(10)	☐	☐	type is of Item
description	CHAR(20)	☐	☐	description is of Item
price	DOUBLE	☐	☐	price is of Item
in	INTEGER	☐	☐	in is of Item
out	INTEGER	☐	☐	out is of Item
stock	INTEGER	☐	☐	stock is of Item

Sale table represents information of every transaction sale has. This activity consist payment. The sale table contains the following fields:

Table 2.3.3 SaleTable

Physical Name	Data Type	Req'd	PK	Notes
resit	CHAR(10)	☑	☑	resit partly identifies Sale
code	CHAR(6)	☐	☐	code identifies Sale
username	CHAR(10)	☐	☐	username is of Sale
tarikh	DATETIME	☐	☐	tarikh is of Sale
type	CHAR(10)	☐	☐	type is of Sale
quantity	INTEGER	☐	☐	quantity is of Sale
price	DOUBLE	☐	☐	price is of Sale

Out table represents information of each item is taken out from stock. This activity does not include payment. The out table contains the following fields:

Table 2.3.4 OutTable

Physical Name	Data Type	Req'd	PK	Notes
code	CHAR(6)	☑	☑	code identifies Out
username	CHAR(10)	☐	☐	username is of Out
quantity	INTEGER	☐	☐	quantity is of Out
reason	CHAR(20)	☐	☐	reason is of Out

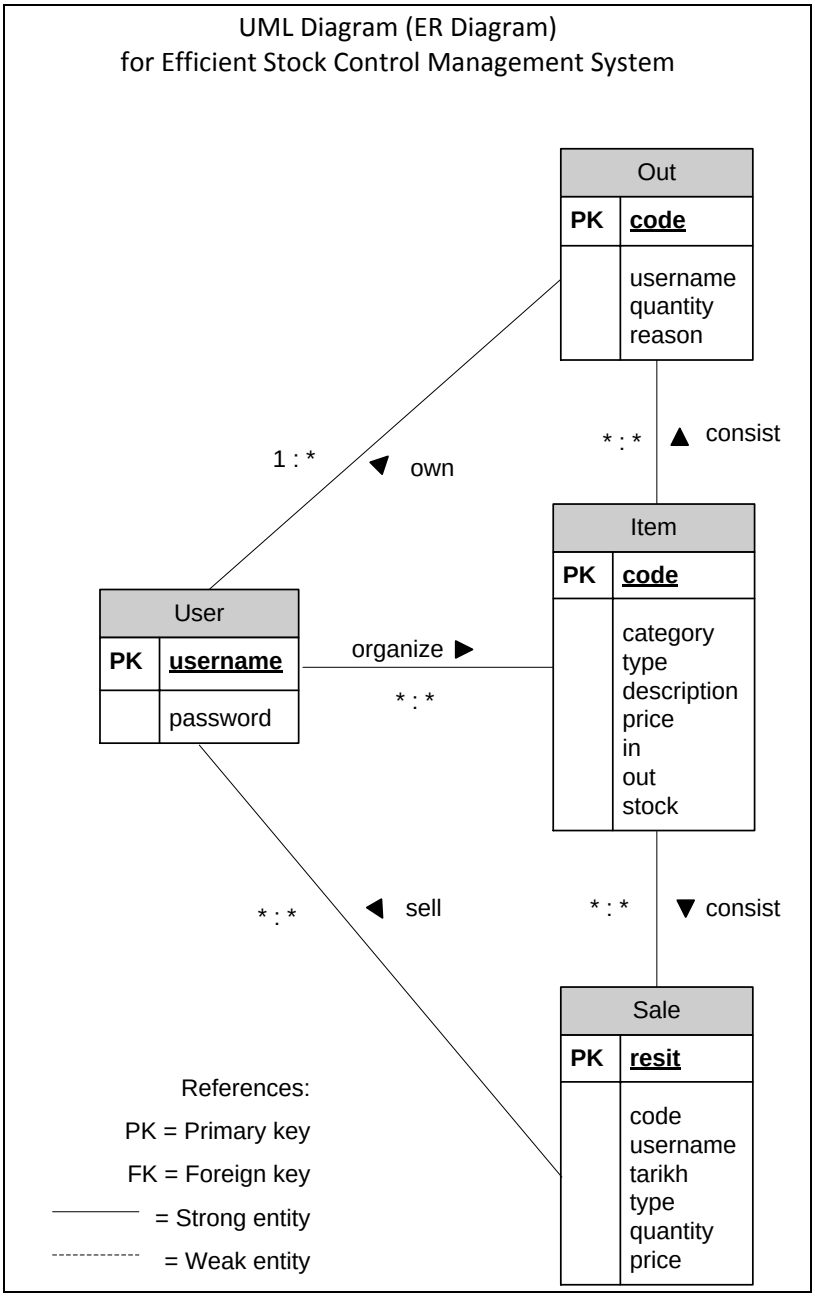

Figure 2.3.2 Entity Relationship (ER) Diagram of system

Implementation:

The system is created during development. (*Note:* Because the entire process is called the system development life cycle, some experts prefer to use other labels, such as system creation, for this stage.) Programs are coded, debugged, documented, and tested. New hardware is selected and ordered. Procedures are written and tested. End-user documentation is prepared. Databases and files are initialized.

Table 2.3.5 Hardware requirements

No.	Item name	Specification
1.	Laptop	Acer Aspire 4810TZ
2.	Processor	Intel Pentium processor SU4100, 1.3 GHz Hard disk: 250 GB Memory: 3 GB DDR3
3.	Barcode scanner	MS9590 VoyagerGS
4.	Printer	HP Deskjet 2050 J510 Series
5.	USB Flash Disk	Kingston Data Traveler 8GB

Table 2.3.6 Software requirements

No.	Item name	Description
1.	Windows 7	Operating system
2.	Microsoft Office • Microsoft Word 2010 • Microsoft Visio 2010 • Microsoft Project 2010 • Microsoft Access 2003 • Microsoft Publisher 2010	 • Project documentation and report • Flow chart designing • Project planning • Database • Poster
3.	Microsoft Visual Studio 2010	Main software for system application development, programming tool

Verification:

Once the system is developed, it is tested to ensure that it does what it was designed to do. After the system passes its final test and any remaining problems are corrected, the system is implemented and released to the user. Varieties of action are needed, then it comprised integrating and testing all the modules developed in the previous phase as a complete system. Integration and testing is done that involves integrating and testing all the modules developed in the previous phase as a complete system.

Maintenance:

After the system is released, maintenance begins. It implicates converting the new system design into operation. The objective of maintenance is to keep the system functioning at an acceptable level. This may involve implementing the software system and training the operating staff before the software system is functional.

2.4 Development Plan

2.4.1 Discussion and Analysis

As to attain the first objectives of this technical project which is to develop an automated system for stock management, an efficient stock control management system is established to help users in easy control of goods and effective way to calculate products, thus to identify losses of sales. The system is created using software application of Microsoft Visual Studio 2010 and Microsoft Office Access 2003 (MS Access) is used as the database.

Compared to Oracle, the system uses MS Access because it is cheaper and very easy to use as we can quickly develop a small, single user database. Although Oracle is specially designed for multi-user applications and very good in transactional control, this system is only required small amounts of data then it is adequate to just use database that stores data in a single file. Besides, the budget also is not large. So, it is plenty to use cheaper but operative database.

In order to improve performance and efficiency in handling school shop inventory that still uses manually, implementing a computerized inventory management system is the most convenient way. The data could be easily search and less used of paper based. The efficient stock control management system has several slots to satisfy all the objectives of creating the system such as automatically calculate the amount of sales items.

Moreover, by means of to manage and keep track goods in storage, every movement of items whether in or out of database, is via the system. Just need to check the system by clicking the button to produce report and with that the total of items should be with tally with remaining stock in rack and also can know how much the items are left and sold.

For reducing losses and errors during ordering, the system will change the cell colour in data grid view if the amount of items reaches several levels that need to take action. It will trigger the staffs and make them more alert about the quantity in stock. Then, for selling goods, any errors can be abridged by using system to identify every items that out from the rack.

2.5 Testing Plan and Result

2.5.1 Implementation of proposed solution

From the first phase of methodology of Waterfall in System Life Cycle (SDLC) which is gathering requirements, the user specifies a system that can

a. help her to easily keep and manage data
b. track the products in and out of system
c. trigger message if the items less
d. predict what, when and how much to order goods from supplier
e. produce report of inventory

Furthermore, she suggests of requiring the system that can be used by Windows operating system. The system wills only support items that is sold in the school shop such as sport t-shirt and stationary.

Referring to proposed solution to achieve the objectives, it is in same track to fulfill the user requirement. Actually with the proposed solution, all the user requirements are accomplished:

- Create a computerized system using software application of Microsoft Visual Studio 2010 and take Microsoft Office Access 2003 (MS Access) as the database to make sure the data could be easily search and manage compared to manual system it uses today, then less used of paper based.
- In order to keep track the products in and out of system, the efficient stock control management system has several slots to satisfy all the objectives of creating the system such as automatically calculate the amount of sales items, produce report of data and use proper module of system to enter goods in database.
- The system is generated with program to change the cell colour in data grid view if the amount of items reaches several levels that need to take action. It will give

trigger message, if the items are reached certain level, to staffs and make them more alert about the quantity in stock. Then, for selling goods, any errors can be reduced by key in appropriate data to take out from the rack.

- Check the system by clicking the button to produce report and with that the total of items should be with tally with remaining stock in rack and also can know how much the items are left and sold.

The purpose of design is to determine how the problem will be solved. Processes are converted to manual procedures or computer programs. It involves translating the identified requirements into a logical structure, called design that can be implemented in a programming logic.

2.5.2 How the system works

Basically, efficient stock control management system only involves one main user that is the staffs. However, there will be one another user in database, the administrator, who has privilege to the whole system. The system starts with a user log in to the system as to make sure only authorized users are eligible to enter to the system. This is to secure the system from outsider that will make any changes to the system. In reality, the system can be log in by staffs only. Although there is another user that is customer, it is external used because the staff will be the medium between customer and system.

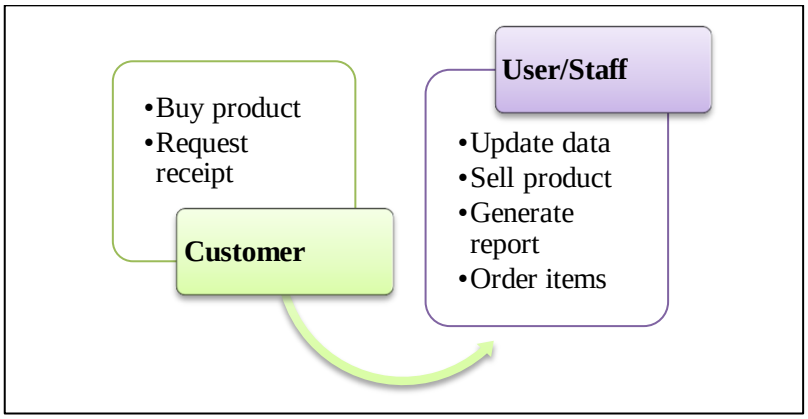

Figure 2.5.1 Process between user and customer

UserTable

ID	Username	Password	Click to Add
1	admin	1234	
2	staff	5678	
(New)			

Figure 2.5.2 Some of information in database

Figure 2.5.3 Home module

Coding of Home Module

```
Public Class FormHome

    Dim loginerror As String

    Public Function Login()

        Dim DBConn As New ADODB.Connection

        Dim User As New ADODB.Recordset

        Dim Username As String
        Dim userDB As String
        Dim passDB As String

        Dim UserFound As Boolean

        DBConn.Open("Provider = Microsoft.Jet.OLEDB.4.0;" & _
                    "Data Source = '" & Application.StartupPath
& "\psm.mdb'")
```

```
        User.Open("UserTable", DBConn,
ADODB.CursorTypeEnum.adOpenStatic,
ADODB.LockTypeEnum.adLockOptimistic)

        UserFound = False
        Login = False
        Username = "Username = '" & txtUser.Text & "'"

        Do
            User.Find(Username)
            If User.BOF = False And User.EOF = False Then

                userDB = User.Fields("Username").Value.ToString

                passDB = User.Fields("Password").Value.ToString

                If userDB <> txtUser.Text Then
                    User.MoveNext()
                Else
                    UserFound = True
                    If passDB = txtPass.Text Then
                        User.Close()
                        DBConn.Close()
                        Return True
                    Else
                        loginerror = "Invalid Password"
                        User.Close()
                        DBConn.Close()
                        Return False
                    End If
                End If
            Else
                loginerror = "Invalid Username"
                User.Close()
                DBConn.Close()
                Return False
            End If
        Loop Until UserFound = True

        User.Close()
        DBConn.Close()
        Return False

    End Function

    Private Sub Button1_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnLogin.Click
        If Login() = True Then
```

```
            MessageBox.Show("Logged In!", "Login Message")
            Me.Hide()
            FormMenu.Show()
            If txtUser.Text = "admin" Then
                FormMenu.btnOut.Visible = True
                'FormSale.Show()
            End If
        Else
            MessageBox.Show(loginerror, "Login Message")
        End If


    End Sub

    Private Sub ExitToolStripMenuItem_Click(ByVal sender As
System.Object, ByVal e As System.EventArgs) Handles
ExitToolStripMenuItem.Click
        Dim warning As String
        warning = MsgBox("Are you sure to exit?",
MsgBoxStyle.YesNo, "Exit")
        If warning = vbYes Then
            End
        End If

    End Sub

    Private Sub btnReset_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnReset.Click
        txtUser.Text = ""
        txtPass.Text = ""
    End Sub

    Private Sub FormHome_Load(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles MyBase.Load

    End Sub
End Class
```

Figure 2.5.4 Menu module for administrator. Out button is enabled when the system is log in by administrator. Only administrator is authorized to take the items out from system.

Figure 2.5.5 Menu module for staff. Out button is disabled when the system is log in by staff.

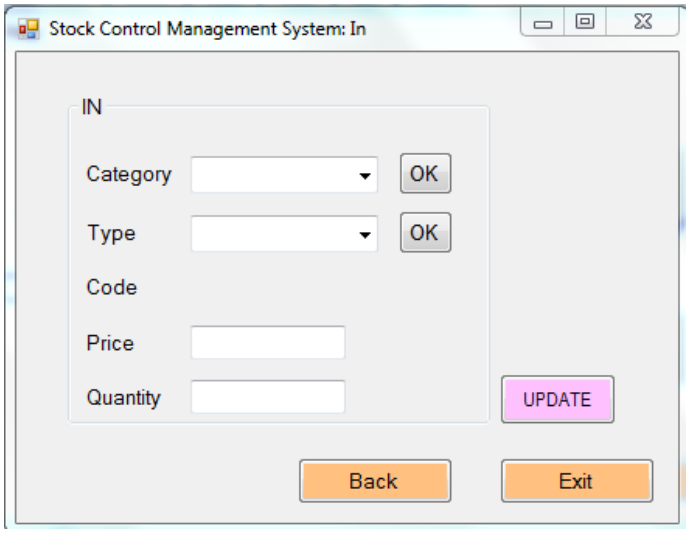

Figure 2.5.6 In module

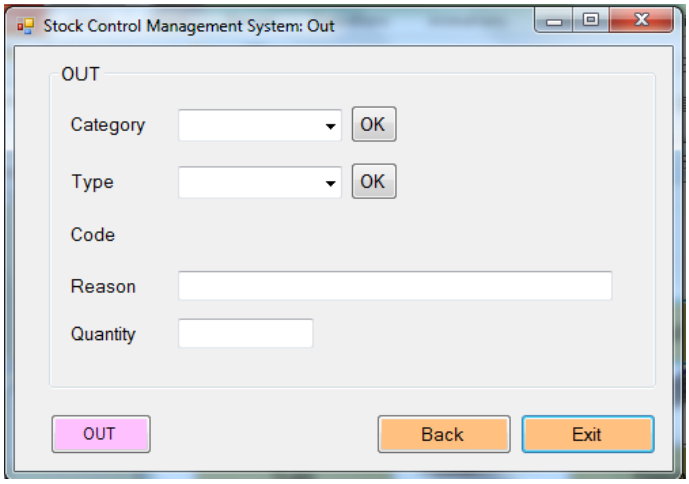

Figure 2.5.7 Out module

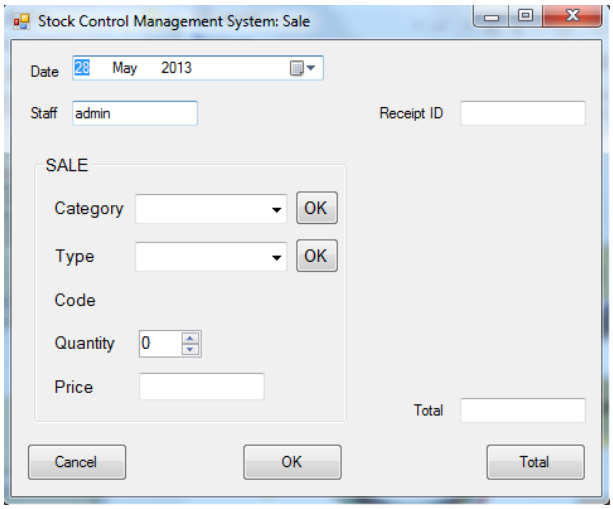

Figure 2.5.8 Sale module

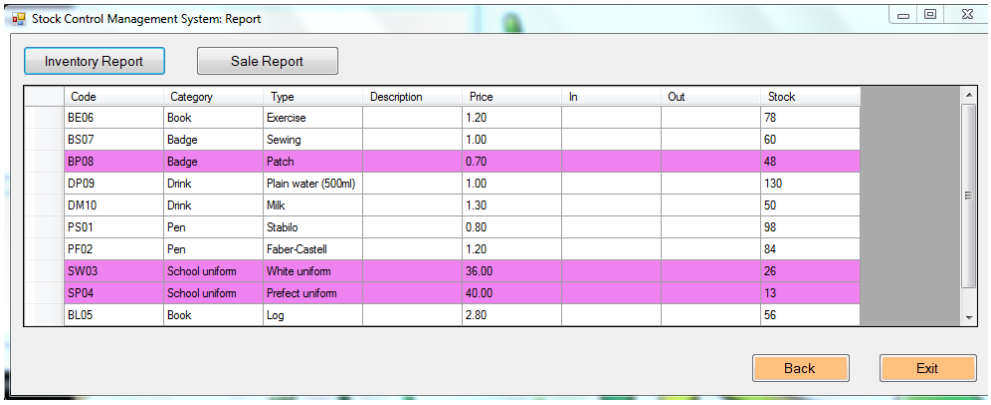

Figure 2.5.9 Report module once *inventory report button* is clicked

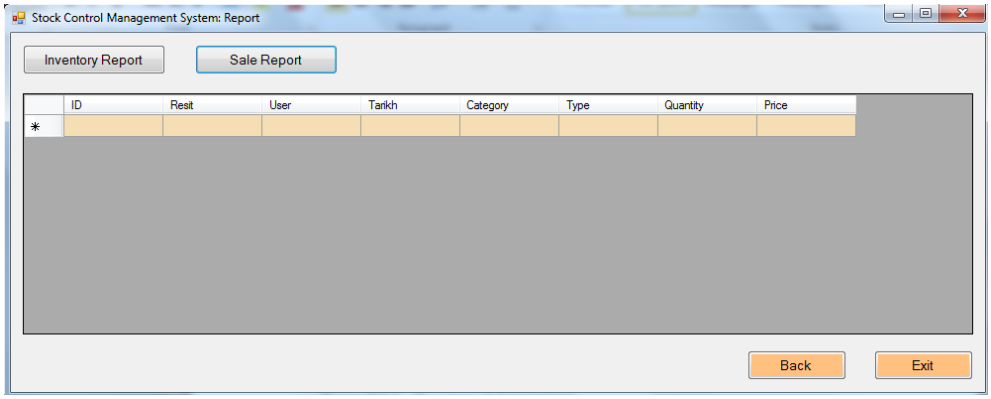

Figure 2.5.10 Report module when *sale report button* is clicked

Coding of Report Module

```
Imports System.Data.OleDb

Public Class FormReport
    Dim con As New OleDbConnection

    Private Sub btnBack_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnBack.Click
        Me.Close()

    End Sub

    Private Sub btnExit_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnExit.Click
        Dim warning As String
        warning = MsgBox("Are you sure to exit?",
MsgBoxStyle.YesNo, "Exit")
```

```
        If warning = vbYes Then
            End
        End If

    End Sub

    Private Sub FormReport_Load(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles MyBase.Load
        con.ConnectionString = "Provider =
Microsoft.Jet.OLEDB.4.0; data source = psm.mdb"
        con.Open()

        Me.ReportViewer1.RefreshReport()

    End Sub

    Private Sub dataGridShow()
        Dim ds As New DataSet
        Dim dt As New DataTable
        ds.Tables.Add(dt)
        Dim da As New OleDbDataAdapter

        da = New OleDbDataAdapter("select *     from ItemTable",
con)
        da.Fill(dt)

        dataGridItem.DataSource = dt.DefaultView

        Me.dataGridItem.Columns("ID").Visible = False
        Me.dataGridItem.Columns("Reason").Visible = False

        con.Close()

    End Sub

    Private Sub dataGridShow2()
        Dim ds As New DataSet
        Dim dt As New DataTable
        ds.Tables.Add(dt)
        Dim da As New OleDbDataAdapter

        da = New OleDbDataAdapter("select *     from SaleTable",
con)
        da.Fill(dt)

        dataGridSale.DataSource = dt.DefaultView
        con.Close()
    End Sub
```

```
    Private Sub dataGridItem_CellFormatting(ByVal sender As
Object, ByVal e As DataGridViewCellFormattingEventArgs) Handles
dataGridItem.CellFormatting

        For i As Integer = 0 To dataGridItem.Rows.Count - 1
            If dataGridItem.Rows(i).Cells("Stock").Value < 50
Then
                dataGridItem.Rows(i).DefaultCellStyle.BackColor
= Color.Violet
            End If
        Next

    End Sub

    Private Sub btnItem_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnItem.Click

        dataGridSale.Visible = False
        dataGridItem.Visible = True
        dataGridShow()

    End Sub

    Private Sub dataGridSale_CellFormatting(ByVal sender As
Object, ByVal e As DataGridViewCellFormattingEventArgs) Handles
dataGridSale.CellFormatting

        For i As Integer = 0 To dataGridSale.Rows.Count - 1
            If dataGridSale.Rows(i).Cells("Quantity").Value < 50
Then
                dataGridSale.Rows(i).DefaultCellStyle.BackColor
= Color.Wheat
            End If
        Next

    End Sub

    Private Sub btnSale_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnSale.Click

        dataGridItem.Visible = False
        dataGridSale.Visible = True
        dataGridShow2()

    End Sub
End Class
```

2.5.3 Limitation of System

There are also several weaknesses with efficient stock control management system:

- The system is not working in real time or online. It needs to be installed in a machine that could be the main reference to monitor all the in and out of products in inventory.
- The system will not automatically order the shortage goods in inventory as the system is only internally to staff of school shop only.
- It just adding the items in data system by scanning the barcode, thus it still needs human interaction to classify the items and put some description on it.

2.5.4 Advantages of Finding

There are several strengths with efficient stock control management system:

- Process data and information faster than manual system that the school has today as to achieve the meaning of efficient.
- Inventory software can provide accurate up-to-date information about inventory thereby improving sales forecasts.
- Inventory management will trigger when the safest time to make order without affect customer satisfaction and cost, keeping stock low just ample to meet demand. Thus, can avoid excessing of stock.

PART 3

CONCLUSION

3.1 Achieve Objective

In this thesis, it is vital to achieve the first objective of the research which is to develop an automated system for stock management as the system will reduce the burden of human power and uncontrolled of goods in the store. Moreover, it is necessary to address the second objective of the research which is to improve performance and efficiency in handling inventory as well as to manage and keep track goods in storage because there is a need of more man power and take time to arrange stock with manual system.

The third objective is to recommend any techniques to reduce losses and errors during ordering and selling goods. As known, human always make mistake but with the management system and barcode scanning, it is believed that this problem will be diminished and proportion to gain more profit is high.

3.2 Application of Result

The Efficient Stock Control Management System using Barcode processes data and information faster than manual system that the school has today as to achieve the meaning of efficient. Next, the word control assures the system to focus more on triggering of items that less that certain level in inventory. Then, the control system able to gain or predict real profit without incorrect calculate of revenue and expenditure. Plus, the system is predictable to manage inventory appropriately.

3.3 Recommendation

In the future, for recommendation, more academic articles and journals regarding inventory system and used of barcode can be referred to. Besides, the stock management system can also be used in larger industry such as shopping complex and huge warehouse. During this time, suppliers will be included in the system. Thus, when there is shortage in inventory, the system will directly trigger the supplier.

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APPENDIX A

Permission letter

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Engineering • Technology • Creativity

Fakulti Sistem Komputer & Kejuruteraan Perisian
Faculty of Computer Systems & Software Engineering

RUJ. KAMI *(OUR REF.)* :
RUJ. TUAN *(YOUR REF.)* :

UMP.12.02/13.11/01/07 (97)

23 November 2012

KEPADA SESIAPA YANG BERKENAAN

Tuan/Puan,

TAJUK	:	**DATA GATHERING OF USER REQUIREMENT FOR PSM**
NAMA PELAJAR	:	**NOORUL AHLAMI BINTI KAMARUL ZAMAN**
KAD PENGENALAN	:	**910222-03-6168**
TAHUN/PROGRAM	:	**3/IJAZAH SARJANA MUDA SAINS KOMPUTER (SISTEM KOMPUTER & RANGKAIAN) DENGAN KEPUJIAN**

Adalah dengan hormatnya dimaklumkan bahawa pelajar di atas ialah pelajar berdaftar Fakulti Sistem Komputer & Kejuruteraan Perisian, Universiti Malaysia Pahang.

2. Sukacita kiranya pihak tuan/puan dapat memberikan kebenaran bertulis serta data dan maklumat yang berkaitan untuk pelajar menyiapkan projek berkenaan. Untuk makluman tuan/puan, projek ini ialah satu keperluan bagi kandungan kursus berkaitan.

Sekian, segala kerjasama dan perhatian tuan/puan didahului dengan ucapan ribuan terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan tugas,

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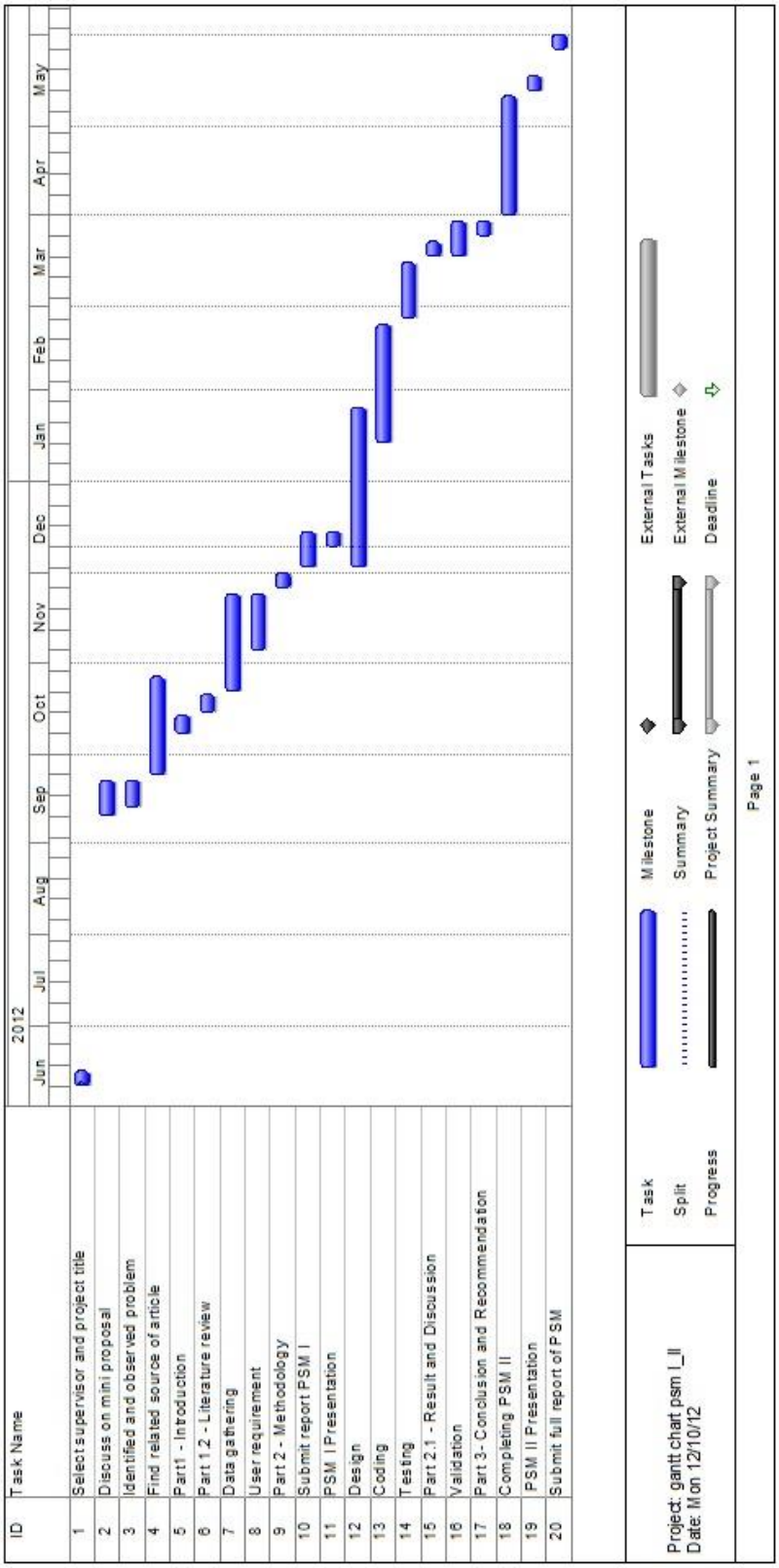
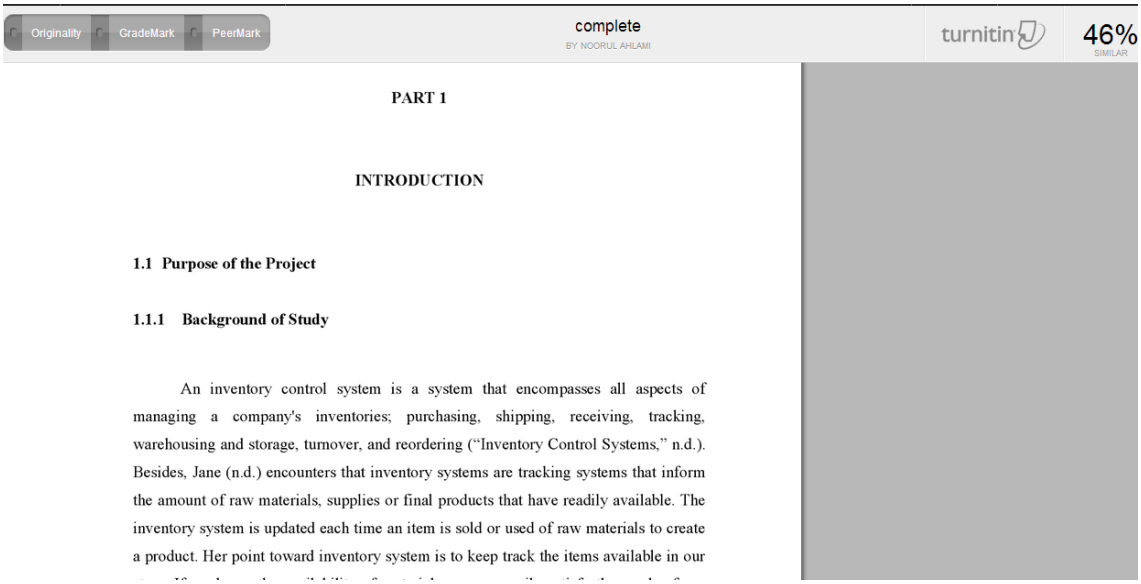
APPENDIX B

Gantt Chart of PSM Activities



APPENDIX C

Percentage of Plagiarism using TurnItIn



PART 1

INTRODUCTION

1.1 Purpose of the Project

1.1.1 Background of Study

An inventory control system is a system that encompasses all aspects of managing a company's inventories; purchasing, shipping, receiving, tracking, warehousing and storage, turnover, and reordering ("Inventory Control Systems," n.d.). Besides, Jane (n.d.) encounters that inventory systems are tracking systems that inform the amount of raw materials, supplies or final products that have readily available. The inventory system is updated each time an item is sold or used of raw materials to create a product. Her point toward inventory system is to keep track the items available in our