Development Of A Computerized Inventory Management System For Stores Operations In Abia State College Of Education (Technical) Arochukwu, Nigeria

Susan N. Okorie Ph.D
Department of Accounting Education,
Abia State College of Education (Technical)
Arochukwu, Nigeria

AK. Jibril Ph.D
Department of Electrical/Electronic Technology,
Abia State College of Education (Technical)
Arochukwu, Nigeria

Abstract—Presently, Abia State College of Education (Technical) Arochukwu maintains a paper-based inventory management system. The system is time consuming, costly, inefficient. Cumbersome, having data insecurity problems as well as prone to misplacement of inventory records. Consequent upon these challenges, the researchers proposed a computerized inventory management system that will help to solve the challenges faced by the paper-based system. The process of the development of the computerized inventory management system began with careful examination of the existing system, interviewing the clerk manning the inventory system as well as review of the relevant literature in both print and online publications. The knowledge and experiences gathered at this stage of development were used in the subsequent stages of development. The information gathering stage was followed by the requirement analysis, design and development. The developed system has three modules which include received products module, issued products module and supplier module respectively. MySQL database was used in building the database for the project. The design was implemented using Java programming language and developed in netbeans(8.2) IDE(integrated Development Environment).The developed system is capable of generating reports concerning products received as well as products issued. The developed system in addition can take managerial decision concerning placement or not placement of order based on the quantity of products on hand. The developed system was tested using real data and was found to be functional and efficient. The developed system is a desktop application, implying that the three users of the system, namely, inventory staff, admin and College bursar cannot use the system simultaneously and at different places. Therefore, the researchers recommends the development of a web-based inventory management system for the College for more effective and efficient inventory management

Keywords—Inventory, inventory control, Inventory Management System Software, Abia State College of Education(Technical) Arochukwu

1.0 Introduction

Inventory refers to raw materials, semi-finished goods (work in progress) or finished goods that are being held for any length of time inside or outside a company or organization. In service and non-profit oriented organizations, tools, spare parts, office supplies and consumables are also referred as inventory. [1] described inventories as mainly collection of resources of an organization that has a money value held for the purpose of future use such as production and/or sales. Inventory exist in two forms, namely, the tangible and intangible item. Tangible item according to [2] is a physical item actually kept within the facility while intangible item exist within company's records. Inventory fall into three major categories, the raw material, work in progress and finished goods [3]. Manufacturing companies use raw materials to produce finished goods while service or distribution-oriented companies use finished goods to satisfy customer wants or needs. Inventory is therefore indispensable commodity of whatever type and function of organization. [4], [5] identified five reasons for holding stock (inventory); economies of scale, balancing supply and demand, specialization, protection from uncertainties and buffer interface.

Despite the advantages or motives for keeping inventories, they are not without some disadvantages. For example, inventories have holding cost to include bank charges, factory space, heat, lighting, handling and recording costs, insurance and taxes [6]. Other disadvantages associated with holding inventory include losses due to theft, ordering cost, deterioration, damages, cost of money sitting idle and inventory becoming obsolete among others [7]. These inventory carrying costs have negative effects on the profitability of an organization. One logical solution is for organization to keep small amount of inventory. However, keeping small amount of inventory can lead to stock out in event of unprecedented customer demand which will in turn lead to sale loss. It is therefore, plausible for organizations to strike a balance between reducing the amount of inventories which will lead reduce in inventory carrying cost and at the same time avoiding the risk of stock-out. Organizations and companies achieve this balance through inventory management.

In simple terms, inventory management is about don't keep too much stock and at the same time don't keep too little stock. However, in broad sense, inventory is concerned with planning, organizing and controlling the movement of stocks from their initial purchase to destination [8]. In a broader way [9] maintained that the scope of inventory management concerns the fine lines between replenishment lead time, carrying costs of inventory, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, physical inventory, available physical space, quality management, replenishment, returns and defective goods, and demand forecasting. Inventory management has three basic components. These include inventory planning, financing management and inventory control.

The objectives of inventory management include: (1) to ensure that the supply of raw material and finished goods will remain continuous so that production process is not halted and demands of customers are duly met. (2) to minimize carrying cost of inventory, (3) to keep investment in inventory at optimum level, (4) to reduce the losses against deterioration, obsolescence and wastage etc., (5) to make arrangement for sale of slow moving items, and (6) to minimize inventory ordering costs, etc [10].

There exist positive correlation between effective inventory management and companies (or organizations) performance and profitability. There are many studies that supported this assertion. In specific, [11] in his study of 91 Indian Machine Tool Enterprises as reported by [12] evaluated the relationship between inventory management practices and inventory cost established that effective inventory management practices have a positive impact on the inventory performance of businesses and also have an eventual effect on the performance of the overall businesses processes. In another study, [13] found that the main variable raw materials inventory management designed to capture the effect of efficient management of raw material inventory by a company on its profitability is significantly strong and positive and impacts on the profitability of the manufacturing firms in Ghana.

As stated earlier, inventory management has three basic components of which inventory control is one of them. [14] defined inventory control as the supply of goods and services to a place with the correct quantity and quality. [15] stated that inventory control is critical to retain liquidity and avoid overstocking. There is positive correlation between inventory control and company's profitability. [16] affirmed that as they states that better inventory control means effective operations of a firm resulting in cost reduction and ultimately increasing on profit. [17] identified six objectives of inventory control to include (1) to maintain a large size of inventory for efficient and smooth production and sales operation, (2) to maintain a minimum investment in inventories to maximize profitability, (3) to ensure a continuous supply of raw materials to facilities uninterrupted production, (4) to maintain sufficient stocks of raw materials in periods of short supply and anticipate price change, (5) to maintain sufficient finished goods inventory for smooth sales operation and efficient customer services, (6) to minimize the carrying cost and time and (7) to control investment in inventories and keep it at an optimum level. Organizations apply variety of techniques to control inventories. Such

techniques according to [18] include: Always Better Control (ABC) Analysis , Fast Moving, Slow Moving and Non-moving (FSN) Analysis. Economic Order Quantity (EOQ). Maximum - Minimum Technique. Bin Card system (KAN – BAN), Materials Requirement Planning (MRP). Just In time (JIT). VED Analysis.

Inventory control involves counting and recording, updating as well as taking decision to order or not to order inventory among others. There are two types of inventory counting; physical (periodic) and perpetual inventory systems. Physical system as the name implies involves physical count of items in inventory at periodic intervals. The number of an item received minus the number of the same item counted physically gives the number of the item at hand. Perpetual inventory system on the other hand keeps track of removals from inventory continuously, thus monitoring current levels of each item. An order is placed when inventory drops to a predetermined minimum level [19]. The recording can be manual or computerized. But manual recording is associated with many shortcomings. Such shortcomings include less efficient, capital and labour intensive and prone to errors among others. Hence, most organizations use computerized inventory management system.

There are many studies that shows influence of computerized inventory management system on organizations efficiency and performance. For example, the study conducted by [20] revealed that inventory management automation affected the performance of the supermarkets and that there was a positive linear relationship between inventory management automation and the performance of the supermarkets. This study therefore, set out to develop a computerized inventory management for stores operations in Abia State College of Education (Technical) Arochukwu for more efficient service delivery.

The paper is organized as follows: The introductory section is followed by the problem section which itemized the problems associated with the current paper-based inventory management system maintains by the College.

Next, was the literature review section that reviewed the relevant materials related to this project. The literature review is followed by methodology section which briefly described the process of the design of the new system. The implementation phase listed the programming language and the Integrated Development Environment (IDE) used in developing the system. This followed by testing and evaluation phase. A sample of the outputs of the developed system was presented under results section. The paper ended with conclusion and the further scope of the project.

2.0 Problem Statement

Presently, the store unit of Abia State College of Education (Technical) Arochukwu (ASCETA) maintains paper-based inventory management system. The recent expansion of her academic programmes and building structures led to increase use of inventories which translate to more inventory management activities. This makes the present inventory management system more time consuming, more laborious, more costly, inefficient and more prone to errors in updating records. Inaccurate records associated with manual inventory management usually lead to either stock-out or holding off to much inventory. Stock-out or holding unnecessary stock affect performance of ASCETA. Another problem associated with manual or paper-based inventory control is loss, misplacement or damage of list of items to be added or removed from inventory. A computerized inventory management system is less time consuming, more efficient, less labourious, more cost -effective and more accurate than manual one. It make removal and addition of items in perpetual inventory system easier. Hence, this study set out to develop a computerized inventory management system for stores operations in Abia State College of Education (Technical) Arochukwu.

3.0 Objectives of the Study

The main objective of the study is to develop a computerized inventory management system for stores operations in Abia State College of Education (Technical) Arochukwu. In specific, the study sought to:

1. determine the software requirements
2. design the software.
3. develop the software.

4. test the software.
5. determine user's satisfaction with the performance of the software.

4.0 Literature Review

This section reviewed some studies that explained procedures for the development of inventory management softwares. Such studies provided the researchers with features of inventory management softwares. They also provide researchers with knowledge that help them in the development of their software for management of inventories in Abia State College of Education (Technical) Arochukwu.

[21] developed a computer inventory system for use of departmental stores of a University. The system was developed under the following phases:

1. *Preliminary investigation and analysis phase:* consisted of: i) understanding the existing system, ii) determining true nature of the problem, iii) objectives/advantages of the proposed system, iv) determining system requirements

2 *Design phase involved the following steps:* I) determining of software and hardware requirements, ii) design input and output forms, iii) reports

3. *Development phase embodied the steps listed below:* i) development of computer progmmme, ii) testing of computer programme with sample data, iii) testing of computer programme with real data

[22] presented an integrated and systematic approach towards the management of independent demand inventories using computer database systems. [22] explained that computers can use data on receipts and withdrawals of materials to maintain the amount of stock on hand for all the inventory items controlled by the computer system. A software application can be used to keep track of stock balance and perform other functions. Such as reporting items that are below their reorder levels and recommending the economic quantity to buy or produce. [22] further explained that Computer programs are used to control the level of inventories and to provide materials at the right time and quantity. Computer can handle and process various historical data on price levels, lead-time analysis, replenishment period demand analysis, vendors' delivery

performance, and so on very easily. Various controlling tools such as ABC analysis and EOQ determination can be programmed into the computer so that tedious and time-consuming calculations are avoided for ease of inventory controlling. Factors such as safety stock, maximum stock level and reorder points require statistical analysis; and when thousands of items have to be carried, it will be quite impossible to control them manually. The computer may also print or display a list of items, each day, showing that replenishment is needed as the on-hand balance is under the reorder level. Sometimes preferred vendor identification for each item is stored in the database, so that the computer can automatically prepare tulle purchase orders to be sent; or alliteratively an Electronic Data Interface, as it was explained, can be used to automatically transmit orders.

[23] designed a computerized inventory management system for supermarkets. The objectives are: (1) to study the functions of inventory management system, (2) to explore the challenges being faced by the manual system, (3) to design a computerized inventory management system that solves the problem inherent in the manual system with the use of Microsoft access and Microsoft Visual Basic (4) to implement the supply products data on the computerized inventory management system to ensure its functionality.

5.0 Methodology

This study adopted water fall model with feedbacks. The waterfall model consists of linear sequence of phases, in which the previous phase must be completed before the next one can begin. The completion of each phase is marked with the signing off of a project document for that phase [24].The phases in waterfall model are requirements analysis, system design, implementation, system testing (verification), system deployment and maintenance. Requirements analysis phase is the first phase of development where all the software requirements from client are gathered, analyzed and documented. Design phase concerned with the description of the structure of the software to be implemented, the data which is part of the system, the interfaces between the system components and sometimes the algorithms used

[25].Implementation phase involves coding the software (programming). In system testing phase, the software developed is tested in order to find out whether it meets the specifications given by client. Deployment phase concerned with handing the developed software to the client for production use [24]. Maintenance phase on the other hand is characterized by changing codes as result of client's improper requirement determination, mistakes during design process and changes in client's requirements among others. Software development in waterfall model as already seen imposed that the previous phase must be completed before the next one. But in real situation some inadequacies in the requirements analysis may become evident during design, construction or testing necessitating further requirements analysis, some potential reworking of design and further software construction and test [26]. To address these defects or shortcomings, waterfall model with feedback was proposed with feedbacks between phases(back arrows as shown in figure 1.A feedback signifies an undocumented but necessary change in a later phase, which result in a corresponding change in the previous Feedbacks (back-arrows in figure 1) between phases are possible, and indeed likely. A feedback signifies an undocumented necessary phase. Such backtracking should but rarely does, continue to the initial phase of requirement analysis [26].
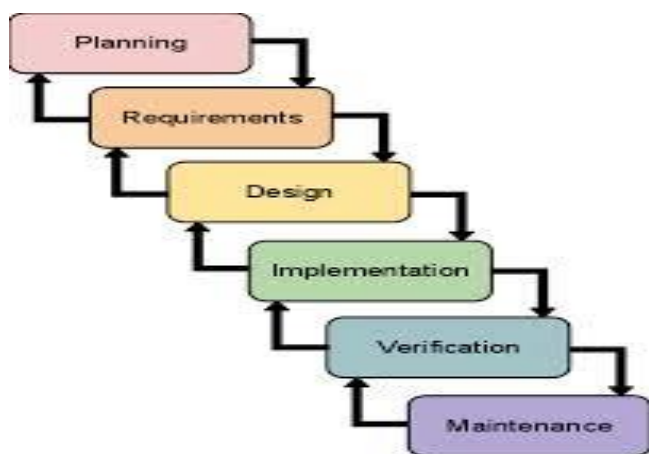
Figure 1: Waterfall Model with feedbacks

.5.1 Software Requirement Specifications

The authors observed the current manual inventory system, interviewed the store officer

responsible for the management of the system and reviewed both print and online publications. The information and the experience gathered in this phase enable the authors to formulate the following software and hardware requirements of the new system to be developed:

5.1.1 Hardware Requirements

(a) RAM: 1 GB or above

(b) Hard disk: 4 GB or above

(c) Processor: 2.4GHZ or above

5.1.2 Software Requirements

The following specification are needed
  (a) Window 10
  (b) MySql
  (c) J.D.K
  (d) J.R.E.
  (e) Netbeans (eg. Version 8.2)
  (f) Connector J 5.6

4.1.3 System Users

1.Admin
2. Inventory Clerk
3.College Bursar

5.1.4 Functional Requirement Specifications

Admin
  1. Login and logout.
  2. View, add, delete, update and print general and admin usernames and passwords
  3. View received products, released products and suppliers

Inventory Clerk
  1. Login and logout.
  2. View, add, delete, update and print inventory clerk username and password
  3. View, add, delete, update and print received products, released products and suppliers

College Bursar
  1. Login and logout.
  2. View received products, released products and suppliers

5.1.5   Non-Functional   Requirement Specifications

  1. Provide data security
  2. Be efficient during operations
  3. Be portable
  4. Be reliable
  5. Maintainable

5.2 Design
5.2.1 System Physical Architecture

The system follows a client-server architecture with two layers; the application and the database layer. The application layer (usually referred to as the front-end) is the, Graphical User Interface (GUI) while the database layer (called back-end) is the database system (MySQL). The architecture is shown in figure2.
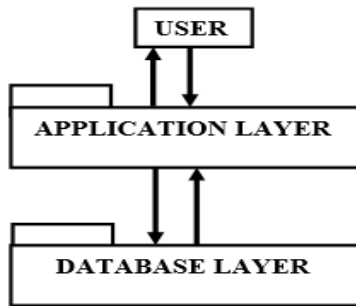

Figure 2: Two   Layer Architecture

5.2.2 Use Case

Use case diagram documents the basic functions of the software. Figure 3 shows the use case that documents the basic functions of the system.
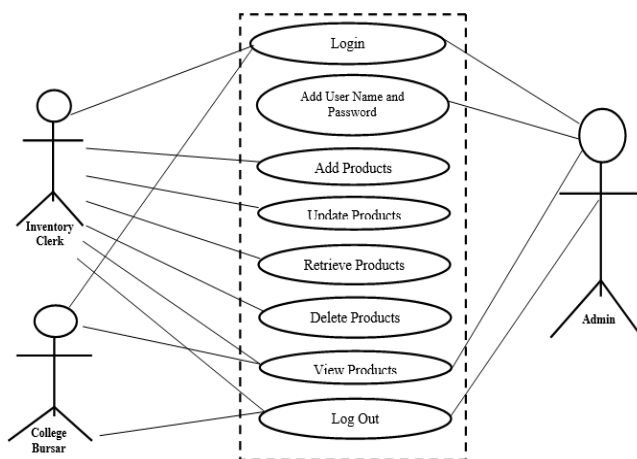
Figure 3: Use case

5.2.3 Input Forms Design

The system was designed with seven input forms, namely, general login form, general username and password manipulation form, admin login form, admin username and password manipulation form, Inventory clerk login form, inventory username and password manipulation form, received products input form, issued products input form and supplier input form respectively.

5.2.3.1 General Login Form

The general login form contain JFrame with JPanel on it. JTextField for username and JPasswordField for password were positioned on the JPanel appropriately. The two fields were labeld appropriately with two Jlabels bearing username and password respectively. Additional Jlabels were used for writing the name of the institution as well as the name of the system. The JtextField and JpasswordField will enable users to enter their usernames and passwords. Another Jlabel carrying the College logo was positioned near the center of the JPanel. Three Jbuttons with letters login, reset and exit inscribed on them were positioned at the lower part of the JPanel(see figure 5).The JtextField, Jpassword and Login button enable the users such as inventory clerk/officer, admin and College bursar to gain entry into the system after entering correct username and password, The default username and password for the general login form concerning admin, bursar and inventory clerk are as follows: **admin** and **admin**, **clerk** and **clerk** and **bursar** and **bursar** (see figure 6). However, the three users can change the usernames and passwords for security reasons.

5.2.3.2 General Username and Password Manipulation Form

The username and password of the three users of the system namely, clerk, admin and College Bursar must be stored in the password table of the database. To do so, there must be availability of a form that will enable admin to achieve this activity. The form named General Username and manipulation form contain components such as username. textfield, paswordfield, add, delete, update, reset, back and exit buttons It also contain a Jtable so that the admin can view the outcome of the manipulation. The default usernames and passwords of the three users to be stored in the database password table and JTable will be as follows: **admin** and **admin**, **clerk** and **clerk** and **bursar** and **bursar** (see figure 6). However, the three users can change the usernames and passwords for security reasons.

5.2.4.3 Admin Login Form

The admin login form is to allow only admin to enter into the username and password form where username and password of the three users can be added to the database password table. The design and the structure of the admin login form is the same as that of the general login page described in 5, 2, and 3.1. The default username and password for the admin login form is **admin** and **admin**. An admin can change these username and password for security reason.

5.2.3.4 Admin Username and Password Manipulation Form

The design and the structure of the admin username and password manipulation form is the same as that of the general username and password manipulation form. The only difference between the two is that while general username and password manipulation form contain admin and admin, bursar and bursar and clerk and clerk default values in database table, admin username and password on the other hand contain only admin and admin stored in the database table as username and password respectively.

5.2.4.5 Inventory Clerk Login Form

Only inventory clerk will responsible for adding, deleting, updating and retrieving records in received products, released products and supplier forms. Therefore, there shall be an inventory clerk login form. The design and the structure of the inventory clerk login form is the same as that of the general login page described in 5, 2, and 4.1. The default username and password for the inventory clerk login form is **clerk** and **clerk**. An inventory clerk can change these username and password for security reason.

5.2.3.6 Inventory Clerk Username and Password Manipulation Form

Inventory clerk username and password manipulation form has the design and structure of general login username and password manipulation form. It has username and password of clerk and clerk in the JTable. An inventory clerk can change these username and password for security reason.

5.2.4.7 Received Products Form

The received products form collects data on the products purchased and send them to the database. Therefore, it contain Jframe with JPanel on it and textfields on the JPanel that will collects such data. The labels for the textfields are as follows;PROD_ID,PROD_DESCRPT,COND_ON_ARRIVAL.PROD_INDATE,

PROD_QRCVD, PROD_QRMVD, PROD_QOH,PROD_MINI,PROD_UNIT_PRICE_,SUPP_ID,PRO_MINI_ORDER,PROD_REORDER and RECEIVED BY. In addition, the form contained submit data button that will enable transfer of data from respective textfields to various tables in the database. Reset, back, next and exit buttons were then be added to the form (see figure 7). Figure 8 shows the view of received products.

5.2.4.8 Issued Products Form

The issued products form will collects the data of the products approved by the College bursar to be released to various departments and schools within the College. The data collected from the form will be send to the tables of the respective departments and units. The design and the structure of this form is the same as that of received products form, except in the number of submit buttons and next buttons. Figure 9 shows the view of products issued to the registry department.

5.2.4.9 Supplier Form

The products to be stored in the inventory system are purchased and supplied by supplier. There is therefore need for complete information of the supplier. This formed the basis of inclusion of suppliers in formation in the inventory system. The information about the supplier will be collected using supplier input form. The form contained textfields, labels and buttons. The buttons are submit, reset, back and exit. The textfiels on the other hand has the following labels (see figure 7): SUPP_ID, COMP_NAME, ADDRESS, PHONE NUMBER and EMAIL ADRESS respectively. The input forms received products, released products and supplier have been fitted with input validation mechanism which ensures that only the required data entered into the system. Figure 10 shows the view of the products supplied by some suppliers.

5.2.5 Main menu

Main menu is a screen that contains sub-menus buttons leading to various aspects of the system. The main menu was made up of Jframe with JPanel on it. A Jlabel carrying word "Main menu" was positioned on top part of the JPanel. 26 Jbuttons carrying different inscriptions were positioned on the JPanel. Each of these Jbuttons will lead users to new screens when clicked. Back and exit buttons were positioned at the button of the JPanel (see figure 11).

5.2.6 Database Design

. MySQL database was used to build the database system for the project. The choice of MySQL database was as result of the fact that it is an open source, free, fast, easy to use and capable of storing vast amount of data. The design of the database depend heavily on the types of the information required by the project. Such types of information in turn determine the number of tables to be housed by the database. The tables then form the structure of the database. Figure 4 show a sample of the tables that formed the structure of the database. It can be seen that each table contain various columns.
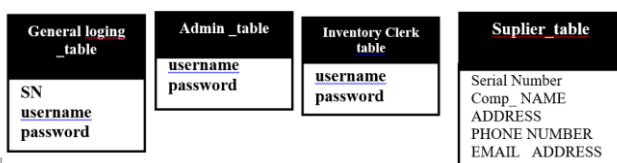
Figure 4: A sample of database table diagrams

5.2.7 Calculation of PROD_QOH and Decision on Placement of Order

The relationship between the three variables in the inventory table of the database is as follows;

$$PROD\_QOH=(PROD\_QRCVD)-(PROD\_QRMVD)................. (1)$$

Where:

PROD_QOH=Product Quantity On Hand

PROD_QRCVD=Product Quantity Received

PROD_QRMVD=Product Quantity Removed

PROD_MINI= Minimum Quantity of Product to be kept (to be set by the organization)

PROD_MINI_ORDER=Minimum Quantity of Product to order

In the course of operations in the College, the above three variables in equation (1) changes continuously. Therefore, the software was designed in such a way that the values in the PROD_QRCVD and PROD_QRMVD columns are continuously adjusted manually whenever new products are received or products are removed. Each time PROD_QRCVD or PROD_QRMVD changes, the value of PROD_QOH also changes and the value of PROD_QOH is compared with that of PROD_MINI in other to take decision on whether to place for order (PROD_MINI_ORDER) or not. That is when PROD_QOH falls below PROD_MINI, the system direct reorder. However, when PROD_QOH greater or equal to PROD_MINI, the system direct no placement of order. This calculation and decisions are accomplished by using calculate 'PROD_QOH & TAKE DECISION ON PLACEMENT OF ORDER' button (see figure 7).

5.3 Implementation

Implementation is a process of building a new system. It involves writing program codes, developing database and database tables, testing the new system, setting it up with data, training users and eventually switching over to the new system (Bennett, McRobb, 2010).

5.3.1 Writting Program Codes

The program codes for the system were written in Java programming language. The codes were written in Java under netbeans (8.2) IDE environment. In specific, the authors used netbeans window to first create the project and named it as Inventory. They then created numerous files, with each representing a class. For each JFrame(file) created, the authors drag components from the palette of the netbeans and drop them on the JFrame according to the design. The authors then used Java codes to create the functionalities of each Jframe as well as linking them together. Finally, the authors correct any anomaly before moving the next step.

5.3.2 Building Database

The system database and its tables were created using workbench.

5.3.3 Outputs

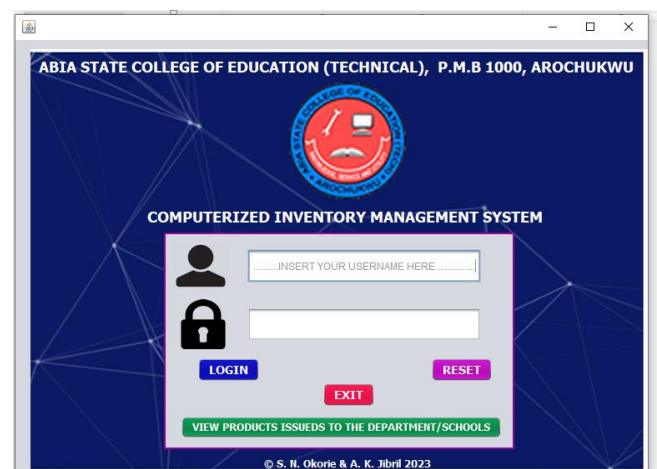The following are a sample of the outputs of the system when running.

Figure 5: General Login form

Figure 6: A view of usernames and passwords stored in general login table

Figure 7: Supplier and Products Received Form

Figure 8: Report of Office Supplies received by Inventory Clerk

Figure 9: Report of Office Supplies issued to registry department

Figure 10: Supplier View

Figure 11: Main menu Interface

5.3.4 System Testing

Various types of tests were conducted on the new system in order to measure its effectiveness and efficiency, the tests include

5.3.4.1 Unit Test

This project adopted object oriented programming paradigm and as such, class in form of input form, and main menu among others were considered as units. Therefore, each unit of the

project was tested before moving to the next one. In specific, the functionality of back, reset, exit, submit next and login buttons of each input form or menu of the project were tested.

5.3.4.2 Integration/Sub-system Test

To insert product or supplier records into the database tables, the authors used both input form and database (sub-system or integration) to accomplish this purpose. The authors tested a sample of records inserted into database tables and found that the inserted records were there.

5.3.4.3 Complete System Testing

After completing the project, the authors tested the complete system and found that it satisfied it's both functional and non-functional requirements.

5.3.4.4 Acceptance

The authors first trained the potential users of the developed system on how to use it and then handed over it them for evaluation. The result of their evaluation was shown in table 1.

Table 1: *Mean and Standard Deviation of Responses of Bursary Staff on their Satisfaction with the Performance of the new developed Software.*
N=32

S/N	Item	$\overline{X}$	SD	Remark
	Functional Software Requirements			
	Admin			
1	The software enable admin to login and logout	3.80	0.50	Agree
2	The software enable admin to add new username and password	3.65	0.51	
3	The software enable admin to update username or password	3.80	0.50	Agree
4	The software enable admin to delete username and password	3.65	0.51	Agree
5	The software enable admin to view username and password	3.65	0.51	Agree
	Inventory Clerk			
6	The software enable Inventory Clerk to login and logout	3.94	0.29	Agree
7	The software enable Inventory Clerk to add new Inventory Clerk username and password	3.65	0.51	Agree
8	The software enable Inventory Clerk to update Inventory Clerk username and password	3.57	0.52	Agree
9	The software enable Inventory Clerk to delete Inventory Clerk username and password	3.50	0.78	Agree
10	The software enable Inventory Clerk to view Inventory Clerk username and password	3.73	0.49	Agree
11	The software enable Inventory Clerk to add new supplier information	3.73	0.49	Agree
12	The software enable Inventory Clerk to update supplier information	3.49	0.09	Agree
13	The software enable Inventory Clerk to delete supplier information	3.49	0.09	Agree
14	The software enable Inventory Clerk to view supplier information	3.73	0.49	Agree
15	The software enable Inventory Clerk to add new received product information	3.77	0.65	Agree
16	The software enable Inventory Clerk to update received product information	3.73	0.49	Agree
17	The software enable Inventory Clerk to delete received product information	3.52	0.30	Agree
18	The software enable Inventory Clerk to view received product information	3.73	0.49	Agree
19	The software enable Inventory Clerk to add issued product information	3.73	0.49	Agree
20	The software enable Inventory Clerk to view issued product information	3.65	0.51	Agree
	College Bursar			
21	The software enable College Bursar to login and logout	3.83	0.39	Agree
22	The software enable College Bursar to view all the views in the main menu	3.73	0.49	Agree
	Non-Functional Software Requirements			
23	The software is well organized	3.57	0.52	Agree
24	The Software window environments are attractive	3.49	0.09	Agree
25	The software buttons are responding to mouse click quickly	3.57	0.52	Agree
26	The feedback massages provided by the software through dialog boxes are self- explanatory	3.49	0.09	Agree
27	I felt comfortable when using the developed software	3.65	0.51	Agree
28	It is easy to navigate to different parts of the software	3.57	0.52	Agree
29	The software provided adequate data security	3.58	0.42	Agree
30	The software produce accurate calculated results	3.42	0.29	Agree
	Recommendation			
31	The developed software can be used to manage College inventories	3.83	0.39	Agree

N=Number of respondent SD=Standard Deviation $\overline{X}$ =Mean

The data from table 1 above shows that the evaluator's agreed that the software performed the functions that was designed to performed. This is evident from the fact that all the items in

the table had mean values greater than the cut-off point of 2.50. Furthermore, the values of the standard deviations (SD) were very small. This signifies that the opinion of evaluators were very close for all the items. Finally, the mean value of item 31 was found to be 3.83. This value implies that the evaluators unanimously recommended that the developed software can be used to manage the College inventories.

6.0 Conclusion

The paper presented the development of a computerized inventory management system. In specific, the paper presented the systems architecture, use case, input forms, database. The paper also presented the designs of input forms, main menu and database as well as their implementations. A brief description of the tests on the new system was also presented. An initial performance evaluation from the potential users of the developed system shows that the new developed system is effective and efficient. The evaluators therefore recommended the use of the developed software for the College inventory management.

7.0 Need for Web-based Inventory Management System

The inventory management system developed is a desktop application. This implies that the three users; admin, inventory clerk and the College bursar have to use the same computer in order to interact with the system. This approach will definitely reduce the efficiency of the system as one user has to wait the other using the application to finish before using it. Furthermore, a user cannot use the application wherever she/he find himself. This call for the development of a web-based inventory management system for the College to solve the problems identified.

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