AN AUTHENTICATED INVENTORY MANAGEMENT SYSTEM FOR SOSUMO INDUSTRY IN BUJUMBURA CENTRAL MARKET (BURUNDI)

BY

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A RESEARCH PROJECT SUBMITTED TO THE FACULTY OF INFORMATION AND COMMUNICATIONS TECHNOLOGY IN PARTIAL FULFILLMENT FOR THE REQUIREMENTS OF THE AWARD OF BACHELOR OF INFORMATION TECHNOLOGY DEGREE OF KAMPALA INTERNATIONAL UNIVERSITY

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DECLARATION

I Baragondoza Marcel Ghislain, declare that the project report entitled "**An Authenticated Inventory Management System for SOSUMO Sugar Industry in Bujumbura Central Market (Burundi)"** is my own original work and has not been submitted to any Higher Education Institute for award of degree.

Baragondoza Marcel Ghislain

Signature:.....

Date.....

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APPROVAL

This project entitled "**An Authenticated Inventory Management System for SOSUMO Sugar Industry in Bujumbura Central Market (Burundi)**" has been under my Supervisor.

Ms. Nabbanja Teddy

Signature.....

Date.....

DEDICATION

This great piece of collaborated academic work is dedicated to my family, lecturers and those who have supported me all the way since the beginning of my studies specially my parents and the guardians.

And above all, to God Almighty who has made it possible for me to reach this far.

ACKNOWLEDGEMENT

I greatly thank the almighty God for his love and protection throughout my studies and the entire project.

My wish to acknowledge especially my supervisor Ms. Nabbanja Teddy for his guiding role throughout this project and my studies, sincere gratitude to him, may he be blessed and protected by the almighty Father God.

Special thanks to my parents and guardians who helped me to pay my school tuition and supported me in everything.

I would like to thank all the lecturers who have taught me throughout the three years.
Lastly, I wish to thank all my classmates. It has been great to have you as classmates. You have made the course enjoyable.
All those who are in this acknowledgment gave support, love and care without them, I couldn't have made it. **GOD BLESSES YOU ALL.**

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ABSTRACT

This study focused at An Authenticated Inventory Management System for SOSUMO Sugar Industry in Bujumbura Central Market (Burundi) which will handle effectively and efficiently the management of inventory information. The system was able to address the following problems; many inventory management systems are operated manually by group of people. In such situations many people involved in the process of managing the industry such a way that to keep records regarding the books of accounts (borrowers), check the books manually, keep records on issued books etc. all these have to be carried out manually and manual record keeping was also not a reliable method as people tend to forget things. On the borrower's point of view, in manual system borrower can't find a book exactly at once as they are not ordered well. The researchers used the following techniques and approaches in order to achieve the objectives of the study. It covers the requirements elicitation process, system analysis and design, implementation, testing and validation. The system design used two-tier client server architecture whereby the database was implemented using MS.Acccess whereas the interface was implemented using VB 6.0. The significance of the study is to make the Inventory Management, Process and Storage much simpler. And also improve on the speed with which the inventory processes is done.

CHAPTER ONE

INTRODUCTION

1.1 Background

Information Technology has revolutionized the life of human beings' and has made the lives easier by the various kinds of applications. In the light of the rapid changes with the use of IT, there are many tools, technologies and systems have been produced and invented.. In the modern world, time is short so if there are many processes taken place at same time within a place there is a need for integration of all the processes, creation of paperless environment also ensures efficient task management. Nowadays all the businesses are shifting to computer based system.

The purpose to having a computer based system is, it helps to increase the market share and it's very easy for customers to use. It is increasing the demand among the customer. This project is concerned with developing a sales and inventory information system in SOSUMO sugar industry Bujumbra Burundi. In this system the management becomes more efficient & easier to handle with its reliable system components.

Control of inventory, which typically represents 45% to 90% of all expenses for business, is needed to ensure that the business has the right goods on hand to avoid stock-outs, to prevent shrinkage (spoilage/theft), and to provide proper accounting. Many businesses have too much of their limited resource, capital, tied up in their major asset, inventory. Worse, they may have their capital tied up in the wrong kind of inventory. Inventory may be old, worn out, shopworn, obsolete, or the wrong sizes or colors, or there may be an imbalance among different product lines that reduces the customer appeal of the total operation.

Inventory control systems range from eyeball systems to reserve stock systems to perpetual computer-run systems. Valuation of inventory is normally stated at original cost, market value, or current replacement costs, whichever is lowest. This practice is used because it minimizes the possibility of overstating assets. Inventory valuation and appropriate accounting practices are worth a book alone and so are not dealt with here in depth.

The ideal inventory and proper merchandise turnover will vary from one market to another. Average industry figures serve as a guide for comparison. Too large an inventory may not be justified because the turnover does not warrant investment. On the other hand, because products are not available to meet demand, too small an inventory may minimize sales and profits as customers go somewhere else to buy what they want where it is immediately available. Minimum inventories based on reordering time need to become important aspects of buying activity. Carrying costs, material purchases, and storage costs are all expensive. However, stock-outs are expensive also. All of those costs can be minimized by efficient inventory policies.

Escalating market instability calls on firms to be increasingly reactive and flexible, and implies the development of new forms of industrial organization in agro-food chains. In this context, the control of products from supply areas to processing plants, and from plants to markets is a critical factor of efficiency. Because numerous elements interact within the supply chain, such as industrial capacities, production risks and diversity of farm structures, finding organizational solutions that satisfy the objectives and constraints of all stakeholders is not a simple process.

The sugar industry faces such co-ordination problems, especially when a large number of cane suppliers are involved. Millers organize their cane supply to ensure regular mill operation throughout the entire season in accordance with milling capacity, and may also take into account variability in cane quality, to maximize sugar production. Decisions made by the miller's impact on the choices growers make regarding their harvest capacities and management. Depending on the cane payment system in place, these decisions could affect grower incomes as well.

For optimal sales and inventory management processes, you need robust functionality for managing your logistics facilities. Support for inventory management helps you record and track materials on the basis of both quantity and value. Warehouse inventory management functions cover internal warehouse movements and storage. Using this software we can reduce costs for warehousing, transportation, order fulfillment, and material handling – while improving customer service.

You can significantly improve inventory turns, optimize the flow of goods, and shorten routes within your warehouse or distribution center. Additional benefits of inventory management include improved cash flow, visibility, and decision making.

This software is user friendly and hence easy to use. Employees can plan, enter, and document warehouse and internal stock movements by managing goods receipts, goods issues, storage, picking and packing, physical stock transfers, and transfer postings.

1.2 Problem Statement

Many inventory management systems are operated manually by group of people. In such situations many people involved in the process of managing the industry such a way that to keep records regarding the books of accounts (borrowers), check the books manually, keep records on issued books etc. all these things have to be carried out manually and if the management is large in content handling is also a problem. On the other hand keeping large amount of maintenance workers may cost a lot and it will not be efficient for management. Manual record keeping is also not a reliable method as people tend to forget things. On the borrower's point of view, in manual system borrower can't find a book exactly at once as they are not ordered well. Sometimes user might be searching for a book that is not available in the office in such situations people get annoyed or depressed. Therefore there should be a reliable way to manage the Inventory Management System for SOSUMO Sugar Industry in Bujumbura Central Market (Burundi).

1.3 Objectives

1.3.1 General Objective

The main objective of this project was to develop a system that can handle and manage the activities involved inventory in an efficient and reliable way. Less managing personnel and easy searching availability are major goals in this project.

1.3. 2 Specific Objectives

i. Study and identify requirements for building a new system.
ii. To carry out systems development and implementation.
iii. Validate the system developed during the course of study.

1.3 Research Questions

The study was guided on the following research questions:

- What is the current system being used in managing sales and inventory?
- How is information collected and kept at SOSUMO Sugar Industry?
- How will the proposed system be develop, implement and tested in order to meet the requirements?
- How relevant will be the proposed system

1.4 Scope of the Study

The scope of this system is to provide user efficient working environment and more output can be generated through this. This system provides user friendly interface resulting in knowing each and every usability features of the system. This system helps in tracking records so that past records can be verified through them and one can make decisions based on the past records. This system completes the work in a very less time resulting in less time consumption and high level of efficiency.

This system is developed in such a way that even a naïve user can also operate the system easily. The calculations are made very quickly and the records are directly saved into databases and the databases can be maintained for a longer period of time. Each record can be retrieved and can be verified for the future transactions.

Also this system provides high level of security for data leaking as only admin people can access the database no changes can be made in it until it verifies the user login id and password.

1.5 Significance

The significance of the study was to make a system that can handle and manage the activities involved inventory in an efficient and reliable way, Process and Storage much simpler. And also improve on the speed with which the sales and inventory process is done.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This enhanced getting the relevant information about the study as per the topic, of which the knowledge got from there helped to realize "what" or "what was not" to take consideration in the system designed. Various already existing projects were evaluated, websites were visited and information system journals and reports were read in realizing the first objective. This chapter consists of three sections that report on previous studies pertaining to supply chain management, inventory management, and apparel manufacturing to explore meaningful concepts and variables for the study. The first section includes a general overview of supply chain management (SCM) and SCM activities. The second section provides a general overview of inventory management (i.e., definition, type, and role of inventory, inventory control models) and the review of relationships between SCM and inventory management. The third section provides a general overview of apparel manufacturing followed by the review of SCM and inventory management in apparel industry, and key issues (i.e., product characteristics, production system, retail customers).

2.1 Reasons for Forming Supply Chain Management

Practices experienced in the traditional management of the supply chain raised the need for conversion to a new paradigm of supply chain management (SCM). The traditional supply chain and manufacturing processes relied on experience and intuition of managers and were designed with long supply cycle times, large batch sizes, capacity based on annual volumes, volume-driven technology, and numerous suppliers for the same parts on the short-term base contracts. With traditional management processes, the goal of business activities was to maximize the efficiency of an individual functional unit by achieving competitive edges based on cost reduction. Under the traditional supply chain, efforts of manufacturers to meet the increased changing of customer requirements caused decreased margins, poor service performance, increased overhead costs, poor production process reliability, increased downtime due to changeovers, and high inventory levels of raw materials and finished product. None of these conditions are viable in a competitive market. Most product supply systems are out of balance

with customer requirements (Lummus, Vokurka, & Alber, 1998). Davis (1993) listed reasons why SCM needs renewed attention: reduced profit margins due to pressure from increasing competition, needs for administrating multisided manufacturing, cut-throat marketing channels, maturation of the world economy, customer service demands for quick and more reliable delivery, and pressure to reduce inventories. According to Cooper and Ellram (1993), SCM is designed to solve these problems and is important to reduce inventory investment in the chain, to increase customer service, and to help build a competitive advantage for the channel. With a changing management focus, companies also began to realize that maximization of efficiency in one department or one functional unit is less desirable than optimal performance for the whole company. Needs for effective vertical integration and consumers' desire for a wider variety and complexity of products have led to demand for SCM (Lummus, Vokurka, & Alber, 1998).

2.2 Definition

According to Cooper & Ellram (1993) defines SCM as "An integrative philosophy to manage the total flow of a distribution channel from the supplier to the ultimate user ... greater coordination of business processes and activities ... across the entire channel and not just between a few channel pairs." (p. 13)

2.3 Key Management Processes in the Supply Chain

According to Davis (1993), key business processes of SCM can be grouped into three activities: supply, transformation, and demand. *Transformation* refers to a broader meaning than *manufacturing* in that the term encompasses material handling and distribution functions. Harrington (1999) also identified four distinct management processes in the supply chain as plan, source, make, and deliver. In Harrington's discussion, *source, make,* and *deliver* are execution processes that form a link in the supply chain, and *plan* is a process of managing the customer-supplier links. Manufacturers are involved with both the interfaces with second tier suppliers and with customers. The purchasing-manufacturing interface and the manufacturing-warehouse/distribution interface have been most widely studied in the articles which SCM (Bechtel & Jayaram, 1997; Cooper & Ellram, 1993). The role of manufacturers in the supply chain is critical for the efficiency of the whole supply chain because they have to build a direct relationship with suppliers as well as with customers and handle both interfaces efficiently.

2.4 Inventory Management

Inventory management includes a company's activities to acquire, dispose, and control of inventories that are necessary for the attainment of a company's objectives.

The management of inventories concerns the flow to, within, and from the company and the balance between shortages and excesses in an uncertain environment (Tersin, 1988).

According to McPharson (1987, p360), in apparel manufacturing, "inventory management systems are designed to obtain concise and accurate information for control and planning of planned goods, issues, cuts, projections, WIP and finished goods."

Inventory management has been a concern for academics as well as practitioners, in that overall investment in inventory accounts for relatively large part of a company's assets.

Inventory may account for 20 to 40% of total assets (Tersin, 1988; Verwijmeren, Vlist, and Donselaar, 1996). Inventories tie up money, and success or failure in inventory management impacts a company's financial status. Having too much inventory can be as problematic as having too little inventory. Too much inventory requires unnecessary costs related to issues of storage, markdowns and obsolescence, while too little results in stock outs or disrupted production. Besides, long-run production associated with a high level of inventory conceals production problems (e.g., quality), which can damage a company's long term performance (Vergin, 1998). Therefore, the primary goal of inventory management has been to maximize a company's profitability by minimizing the cost tied up with inventory and at the same time meeting the customer service requirements (Lambert, Stock, & Ellram, 1998).

Traditionally, inventories caused conflicts between functional units within a company or between companies. For example, within a company, purchasing, production, and marketing people want to build a high level of inventory for raw material cost reduction, efficient production run, and customer service level, while warehousing and finance people want to reduce the inventory level for storage space and economic reasons (Tersine, 1988). As global competition between suppliers in the open markets has increased, power has been shifted from suppliers to customers (Verwijmere, Vlist,

Donselarr, 1996). Therefore, the customers' need to reduce the inventory based on frequent small lot orders has resulted in their partners holding the inventory (Thomas,

1998).

2.5 Roles of Inventory

Traditionally, a relatively high level of inventory has been kept in a company.

The reasons for building inventory can be found in inventory's five functional roles: economies of scale, balance of supply and demand, specialization in manufacturing, protection from uncertainties, and inventory as buffer (Lambert, Stock, & Ellram, 1998; Schroeder, 1993; Tersine, 1988; Vergin, 1998). First, purchasing or producing a bulk of items (i.e., economies of scale) enables a company to cut costs by allowing setup cost reduction, price discounts, and spreading the factory overhead expenses. Second, inventory provides balance between supply and demand. Supply and demand do not always match at any given time for reasons such as seasonal demand pattern or seasonal supply pattern. To maintain a stable workforce and production scheduling, and to avoid problems due to capacity limits, production can be used to build inventory. Peak demand can be anticipated by building inventories in excess of current demand. Third, inventory enables a manufacturer to specialize in the item by obtaining focused factory and learning-curve effects. Focused factory is a small factory dedicated to a specific product with a single product line to maximize productivity and quality. According to learning26 curve effect, a worker can gain skill and efficiency from their own experience from the repetitious practice with the long product runs. Fourth, inventory serves to protect uncertainties in demand and supply. Inventory is necessary in case demand for finished goods fluctuates or if the suppliers' ability to meet the buyers' demand is not reliable. Raw material inventory is required in case of supply shortage and price increases. WIP inventory is needed to avoid a shutdown and stabilize workflow. Finished goods inventory improves customer service levels by avoiding stockouts due to variability in demand and manufacturing lead-time. Lastly, inventory is used as buffer in the supply chain. It takes time to transit inventory from one operation to another within a company or one node to another in the supply chain (i.e., supplier to manufacturer, manufacturer to distributor, and distributor to customer). A certain amount of inventory throughout the chain ensures the independence of each operation team or channel member. Raw materials inventory isolates the supplier from the user, in-process inventory isolates production departments from each other, and finished goods inventory isolates the customer from the manufacturer.

2.6 Inventory Management in the Supply Chain

Inventory management is one aspect of SCM. The main goal of SCM is to better manage inventory throughout the chain via improved information flow aimed at improved customer service, higher product variety, and lower costs (Lawrence & Varma, 1999; Vergin, 1998). Verwijmeren, Vlist, and Donselaar (1996) used the term "Networked Inventory Management" (p.16) for the inventory aspect of SCM. The efficiency of SCM can be measured by inventory performance such as the speed of inventory passing through the chain and the load of inventory throughout the chain (Jones & Riley, 1985). Inventory of various forms from raw materials through WIP to finished goods is fed into the chain from suppliers, production, and subsequently distribution centers to customers (Alber & Walker, 1997). This flow of inventory requires responsibilities of channel members for the planning, acquisition, storage, movement, and control of materials and final products (Tersine, 1988). High levels of inventory are found when the chain members less communicate due to lack of information sharing between chain members and inefficiency of SCM.

Whether a supply chain is efficiently managed or not well managed can be determined by looking at the indicators of inventory management such as inventory turnover ratio. Inventory turnover ratio has been a useful indicator to measure the efficiency of inventory management of an industry. If other information such as absolute value of total sales volume and on hand inventory is given together, inventory turnover ratio can tell more about the efficiency of a company's performance (Pearson, 1994). Manufacturers, the main interest of this study, have the most difficult and complex inventory problem as they deal with raw material acquisition, transformation of the material into final finished goods, and movement to the customer. These consecutive activities require manufacturers to control production scheduling and timing that are not easily accomplished due to uncertainties in supplier performance, manufacturing process, and customer demand. Manufacturers could not reduce their buffer stocks without trusting in their partnerships and sharing forecasting information on actual demand at retail level because of the "bullwhip effect"(Nahmias, 1997, p.791), which means the effect of retail sales fluctuation grows larger as it traverses to upstream chain members. More customer requirements for broader product coverage and greater delivery capabilities escalate manufacturers' problem in production process complexity and forecasting of future demand.

3.0 Database Management Systems (DBMS)

Database Management System is defined as the software that handles all access to the database (Amia, A. 2006). A user issues an access request, using some particular data sub-language typically known as SQL. The Database management system intercepts that request and analyses it. The DBMS inspects in turn, the object versions of the external schema for that user, the corresponding external or conceptual mapping. The Database management system executes the necessary operations on the stored database. Furthermore, a relational database as the provision of the expression of relations among data elements as formal Mathematical relation (Amia, A. 2006).

A relation appears as a table of data representing all occurrences of the relationships among the data elements of attributes of the relation. **A tuple** is a complete set of related fields. A tuple is intended to increase the productivity of the application programmers by eliminating the need to change the application program when a change is made to the database (Amia, A. 2006).. An **entity relationship model** is a diagram which illustrates entities and relationship between entities (Amia, A. 2006). An entity as a thing which can be distinctly identified. Entity can be used to denote an objective, a person, place, thing, an event or even a concept; which can be distinctly identified. This is an object of interest to the organization and objects of similar types which are characterized by similar attributes. Entities are classified into regular and weak entities. **A weak** entity is an entity that is existence – dependent on some other entities, in the sense that it cannot exist if that other entity does not also exist. **A regular** entity is an entity that is not weak.

3.1 Database

A Database as a collection of non redundant data, which can be shared by different application systems (Laudon, K.C.and Laudon, J.P. 1988). Also a database is a collection of data as well as programs required to manage data. Database creation and maintenance is a gradual and continuous procedure being influenced by system software such as database management systems. Database users state their requirements to the database suing the Data Description Language (DDL) and the Data Manipulation Languages (DML) via the database management system. The database management system surely provides an interface between the users programs and contents of database. During the creation and subsequent maintenance of the

database content, the DDL and DML are used for the following, add new files, expand the database, delete the absolute records, adjust data, and expand the data base capacity, link up the data items and many others (Laudon, K.C.and Laudon, J.P. 1988).

3.2 Database Models

A data model can be described as a description of the data container and a methodology for sorting and retrieving data. It is usually a set of Mathematical algorithms and concepts. The analysis and design of these data models has been the cornerstone of the evolution of databases (Laudon, K.C.and Laudon, J.P. 1988). This model was developed by Dr. Codd at IBM in the late 1960's. This is a mathematician who applied his knowledge of mathematical concepts to databases and came up with this concept of a 'Relational Model of Data for large shared Data Bank. Databases that meet these rules are classified as a "true" or "complete" Relational database Management Systems (RDBMS) (Laudon, K.C.and Laudon, J.P. 1988).

3.3 Relational Database Management System (RDBMS)

Relational database management systems are a type of Database management that store data in tables called relational tables (Laudon, K.C.and Laudon, J.P. 1988). Tables are related by sharing a common field. A database is considered to be a collection of inter-related data and programs. **Data integrity** is the term used to describe the reliability of data. Data stored in a relational data base are more likely to be correct because of the following:

- They are validated as they entered using data validation rules to ensure that entities are within appropriate bounds.
- Database security ensures that only authorized people can access the update data.

Modules. Modules are written in Visual Basic (VB) a programming language used to develop windows applications. A module is a collection of Visual Basic statements and procedures that are organized and stored together to be accessed as a unit (Laudon, K.C.and Laudon, J.P. 1988).
Data. Data are facts or raw materials from which a conclusion can be drawn. Data is required in the operations of any organization and the same or similar data may be required in various facts of its functioning . Data is the available organizational resources. Good data and information retrieval technology can improve the organization's (school) ability to compete in an industry, deliver products to consumers, and evaluate opportunities.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This section describes the techniques and approaches are used to achieve the objectives of the study. It covers the requirements elicitation process, system analysis and design, implementation, testing and validation.

3.1 Sample

The researcher got information from both the staff and management. These are the people who provided accurate information needed to develop this system. By visiting the office and interviewing the staff and management allowed the researcher to get relevant information.

3.1.1 Sample selection

Cluster sampling was used in this research. Cluster sampling is a sampling technique in which the entire population of interest is divided into groups, or clusters, and a random sample of these clusters is selected. Each cluster must be mutually exclusive and together the clusters must include the entire population.

The main reason for using cluster sampling is that it usually much cheaper and more convenient to sample the population in clusters rather than randomly.

3.2 System Study and Investigation

There is a thorough study of the existing system in order to understand its loop holes before modification of the system. This was achieved by being present while the staff performing sales and inventory processes that should be submitted on certain date and collecting all the necessary information from the intended end users of the system, like the cashier and administrator. This was achieved through interactions, use of questionnaires, interviews, observations and participation in the current system.

3.3 Literature Review

This enhanced getting the relevant information about the study as per the topic, of which the knowledge got from there helped to realize "what" or "what was not" to take consideration in the system designed. Various already existing projects were evaluated, websites were visited and information system journals and reports were read in realizing the first objective.

3.4 Questionnaires

In this approach, printed questionnaires are given to some of the staff and the management to fill in the blank spaces. This will help the researcher to know the operation of the by-then existing system and also know how best the new system will be impressing. This approach is focused at realizing the first and second objective.

3.5 Interviews

Interviews are conducted by personal contact between the researcher and the management the interviewees, of whom were staff members. This is so as to get a wider understanding of the flow of processes at the company. This was the most successful approach since every fact was extracted as it involved face to face interaction.

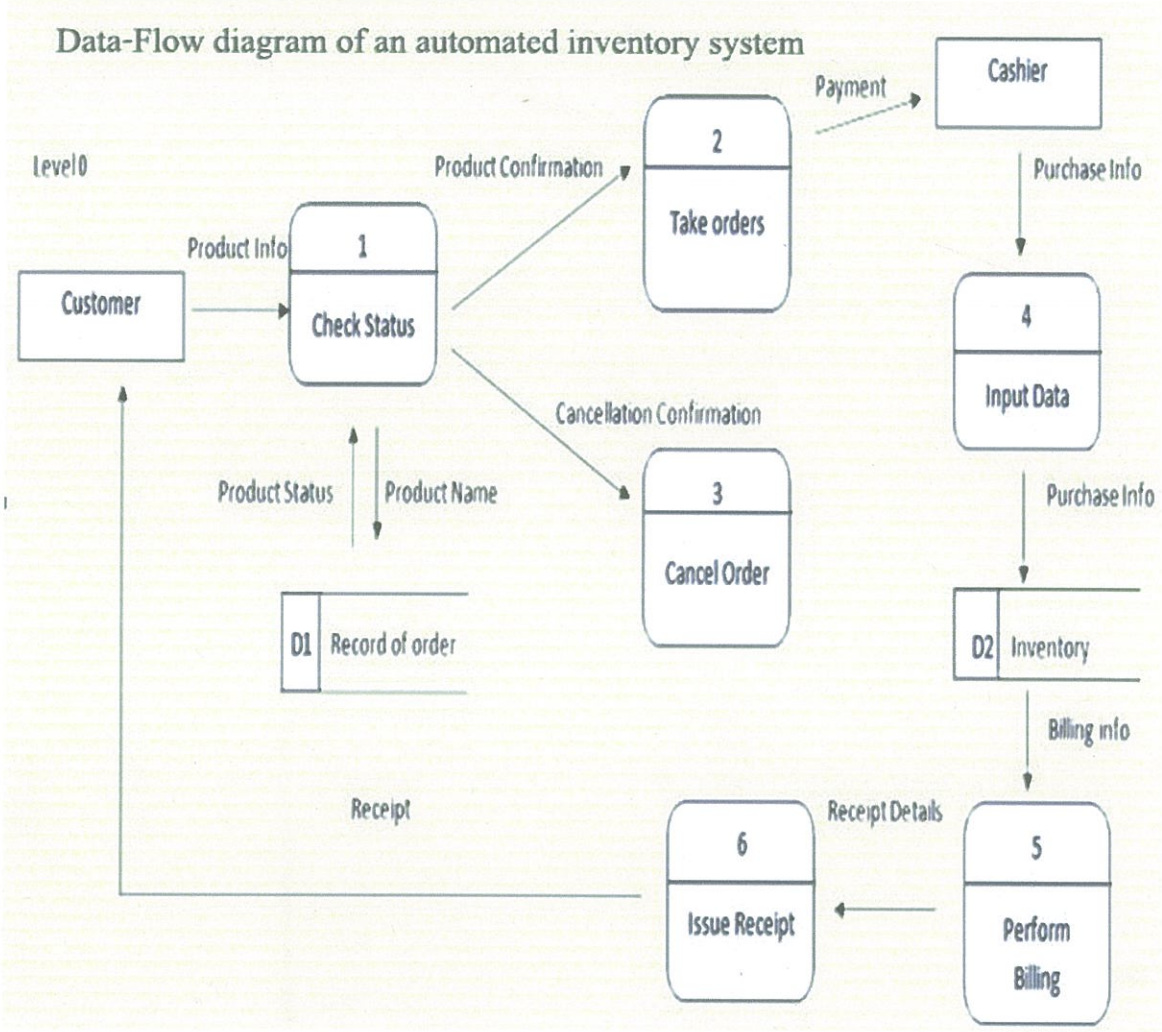
3.6 Observation

This method was used as an additional approach to clearly and fully understand the flow of processes in the existing system. It helped the researcher to determine requirements that could not easily be expressed by the interviewees due to lack of technical knowledge.

3.7 System Analysis and Design

During the analysis phase, data analysis and design was made using data processing models like data flow diagrams, entity relationship diagrams and context models. This is so as to clearly understand the flow of information between processes geared by the three fold design; the conceptual, logical and physical designs.

3.7.1 Data Flow Diagram for Sales and Inventory System



3.8 Consultations

Proper project research will be done under the guidelines and directives from technical people like the Lecturer, Professors and the supervisor to get a better understanding of the techniques for employing the system development

CHAPTER FOUR

SYSTEM ANALYSIS AND DESIGN

4.0 Introduction

In this chapter involves the design technicalities and procedures that were used to clearly study the existing system, which was a drive to coming up with a new system. It involves all the structured diagrams used to model the existing and the newly designed system.

4.1 Requirements Elicitation and Analysis

This process involved deriving the system requirements through observation of the existing system, discussions with the potential staff and management. It involved the researcher working with the stake holders to understand the application domain, the services that the system should provide and the operational constraints. This resulted into an insight of the system models.

4.2 Requirements specification

This involved activities of translating the information collected during system analysis phase into a document that defined a set of requirements. There are two types of requirements which were looked at, namely; user requirements and the system requirements.

4.2.1 User requirements

User requirements were described as statements in natural language plus diagrams of the services the system was to provide and its operational constraints. User requirements were divided into two categories of which are; Functional and Non Functional requirements.

4.2.1.1 Functional requirements

The functional requirements explained what the system does (the services the system should provide). The system shall do the following;

1. Shall accept inputs of customer details which involve name, address, bio data and any other related personal information.
2. Shall Store the input information into one data storage are specified on the active database server.
3. Shall permit subtractions, additions and modification of the stored information.

4.2.1.2 Non-Functional Requirements

Non-functional requirements were described as the constraints on the services the system was to provide. These included the following;

1. Users shall have an authentication process where they have to login in order to access the system functionalities.
2. All users or staffs shall have user accounts on the system and should undergo straining.
3. The system shall provide a brief alert message for wrong login details, a successful or unsuccessful storage and update of data.
4. The system shall perform these processes with the most appropriate system speed and allow portability.
5. Shall provide proper security and authentication of all the data stored on the system.

4.2.2 System Requirements

These are the hardware and software specifications in terms of security and operations which the system requires so as to be able to perform its expected functionalities properly.

4.2.2.1 Hardware Requirements

The table below shows the hardware requirements.

Table 4.2 Hardware Requirements

Hardware	System Requirement
Central processing Unit (CPU)	Intel Pentium 3 or higher / Core 2 duo for the DB server.
Memory	128 MB of RAM or higher/ 1GB or higher for the server.
Disk space	40GB or more /160GB or more for the server.
Monitor	15 inc or above
Motherboard	Intel or better

4.2.2.2 Software requirements

The table below shows the software requirements

Table 4.2: Software Requirements

Software	Systems Requirement
Operating system	Widows 2000/XP,vista or higher
Database management system	Visual basic 6.0 or higher, Oracle, QBasic and Mysql.

4.3 System design

This section explained the various methods that were used to both model the current and the proposed system. It includes the use of context, process and data flow diagrams accompanied with entity relationship modeling for the database design.

4.3.1 Context models

These were used to illustrate the operational context of the system. They were aimed at showing what was outside the system boundaries. The architectural model manifested below showed the system relationship with other systems.

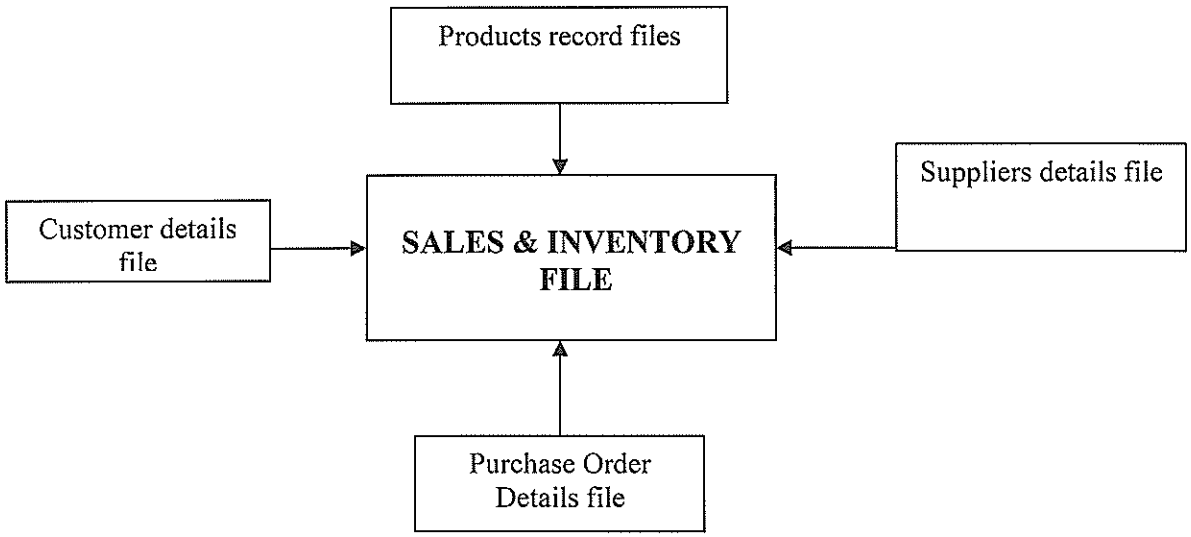


Figure 4.1: Context diagram for current system

4.3.2 Weaknesses of the existing system

After studying the operational context and information flow of the existing system, the following weaknesses were identified.

i. Since the inventory data is collected manually and kept in files/papers, it's prone to loss and destruction in case of any disaster.

ii. There is shortage of storage space for the files since there are so many customers who are registered at the SOSUMO Sugar Industry daily.

iii. Keeping the records in the files makes it hard for the staff to search or reference the customers' records when doctors ask for them in the end this leads to poor decision making.

iv. It takes a very long time to get the details of customers' information on modification, searching and updating. Deleting and re-entering of data becomes hard and untidy since it involves rubbing and crossing.

4.3.3 Proposed System Modeling

The same methods as discussed above were also used to model the expected system in order to understand the expected system's operational context and anticipated flow of processes.

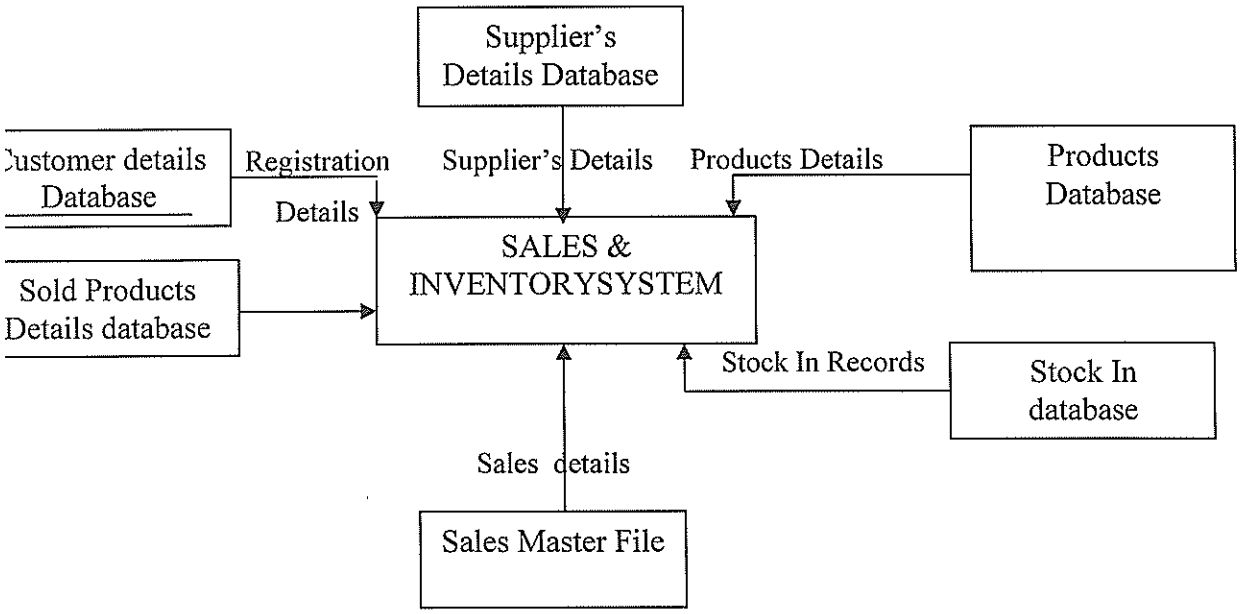


Figure 4.2: Context diagram for the designed system

4.3.4 Processes and sub-processes involved in the System

1.0 Customer Detail

⇒ Enter Customer details

⇒ Update records

2. 0 Supplier Detail

⇒ Enter Suppliers details

⇒ Update records

3.0 Stock In Details

⇒ Enter Stock details

⇒ Update records

4.0 Products Details

5.0 Category Details.

4.3.5 Entities involved in the system

1. Customer
2. User Account
3. Supplier
4. Stock In
5. Sales Master file
6. Products
7. Purchase Order
8. Sold Products
9. Category

4.3.6 Data Flow Diagram for the System

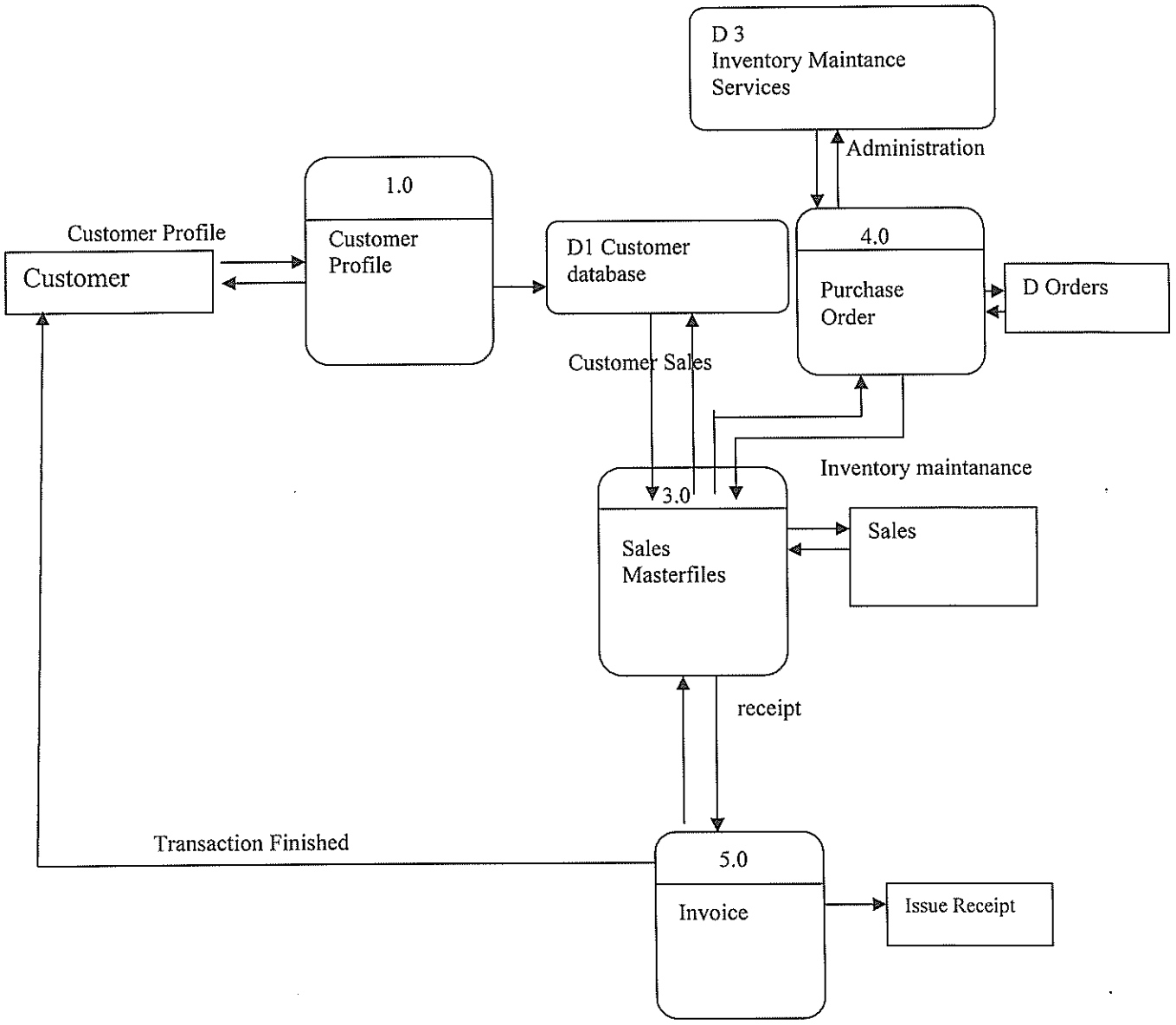


Figure 4.3. Data flow diagram for the system

4.4 Database Design

Entity relationship models were used, where entities with their corresponding attributes were identified; relationships between entities were recognized and mapped to come up with the resultant relations.

4.4.1 Conceptual Design

4.4.1.1 Definition of entities

The terminologies used to describe the meaning entities are as follows;

Customer: Is a person is a client who needs service or goods.

Admin: Is a person who is in charge of daily business processes of an organization.

Purchase Order: Is an order made to make a request

Coursework: Is a piece of work or assignment given by the lecturer.

4.4.2 Entities and their attributes

Customer

No.	Field type	Size	Data type	Constraint
1	Customer ID	3	int	Not Null, PK
2	Customer FullName	30	varchar	Null
3	Address	30	varchar	Null
4	Contact Number	40	varchar	Null

Supplier

No	Field type	Size	Data type	Constraint
1	SupplierID	3	int	Not Null, PK
2	SupplierName	30	varchar	Null
3	Contact Number	30	varchar	Null
4	Address	30	varchar	Null
5	Contact Name	30	varchar	Null

UserAccount

No	Field type	Size	Data type	Constraint
1	UserID	30	Varchar	Not Null, PK
2	FirstName	30	varchar	Null
3	LastName	30	varchar	Null
4	UserType	30	varchar	Null
5	Password	30	varchar	Null
6	Username	30	varchar	Null
7	Confirm	30	varchar	Null

Products

No	Field type	Size	Data type	Constraint
1	ProductID	5	int	Not Null, PK
2	ProductName	30	varchar	Null
3	Description	40	Varchar	Null
4	Category	50	Varchar	Null
5	Supplier	40	Varchar	Null
6	Quantity	3	Int	Null
7	SupplierPrice		currency	Null
8	Unit	5	int	Null
9	Wholesale		Currency	Null
10	Retail		Currency	Null
11	Date		datetime	Null

SalesMasterfile

No	Field type	Size	Data type	Constraint
1	SalesID	3	int	Not Null, PK
2	ProductID	30	varchar	Null
3	ProductName	30	Varchar	Null
4	Qty	40	varchar	Null
5	Date		Datetime	Null
6	TotalAmount		Currency	Null
8	Price		currency	Null

4.4.3.1 Entity Relationship Diagram

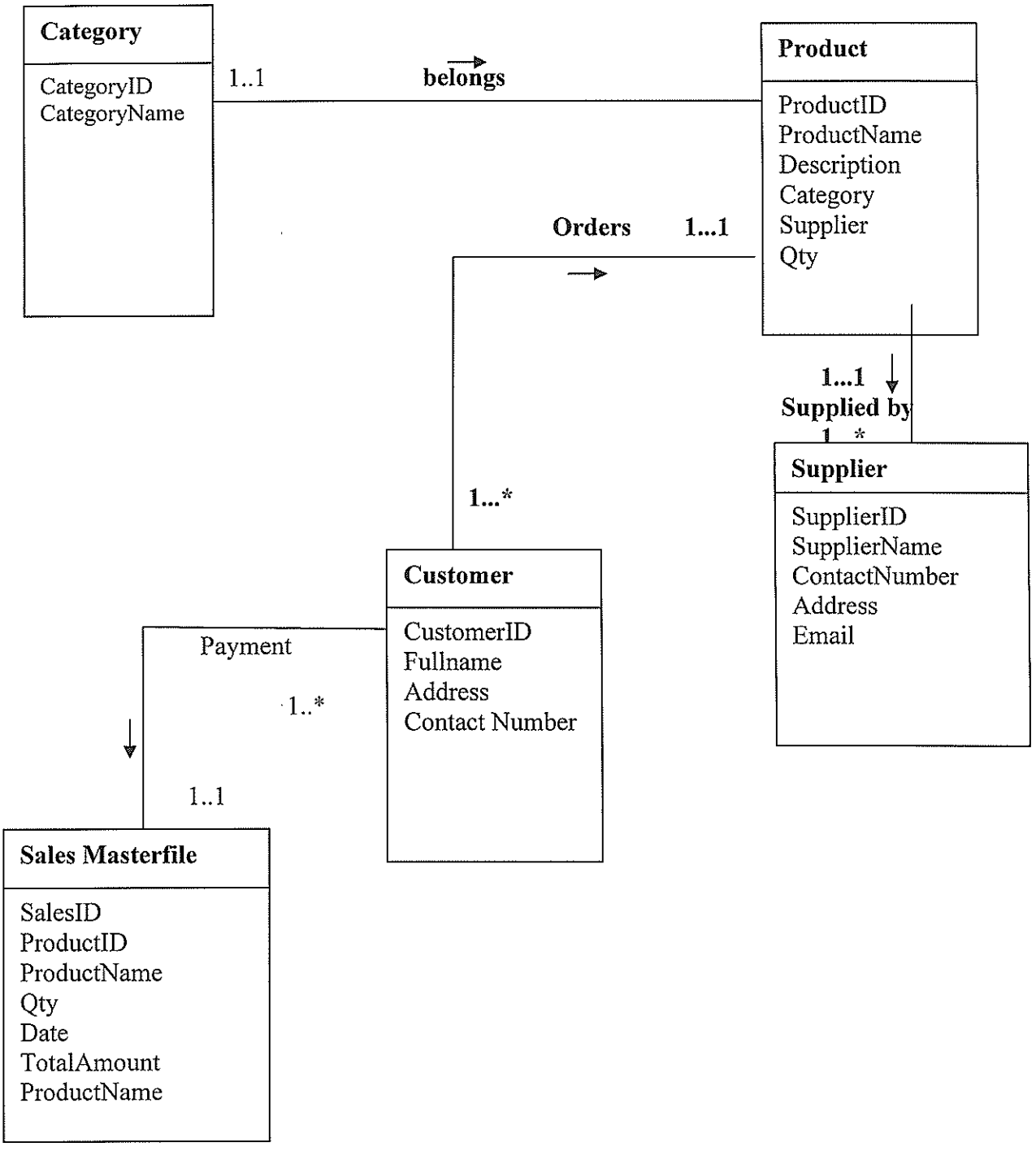
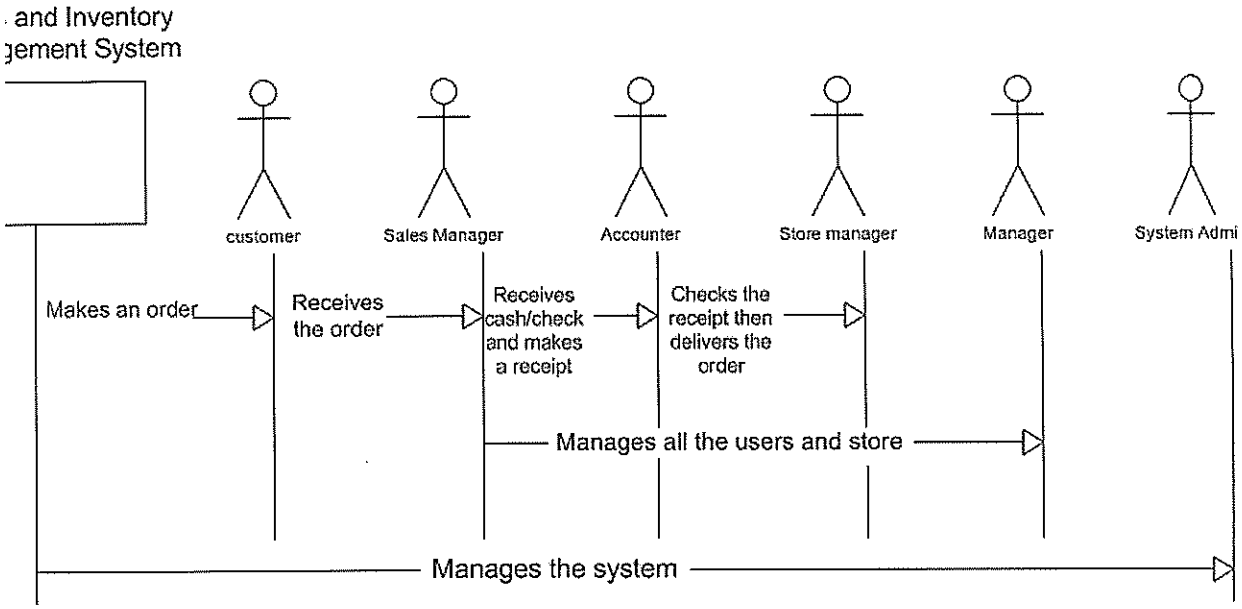


Figure 4.5 entity relationship diagrams for the system.

4.4.3.2 ***Sequence Diagram***



Course event:

Manager manages all the users and store

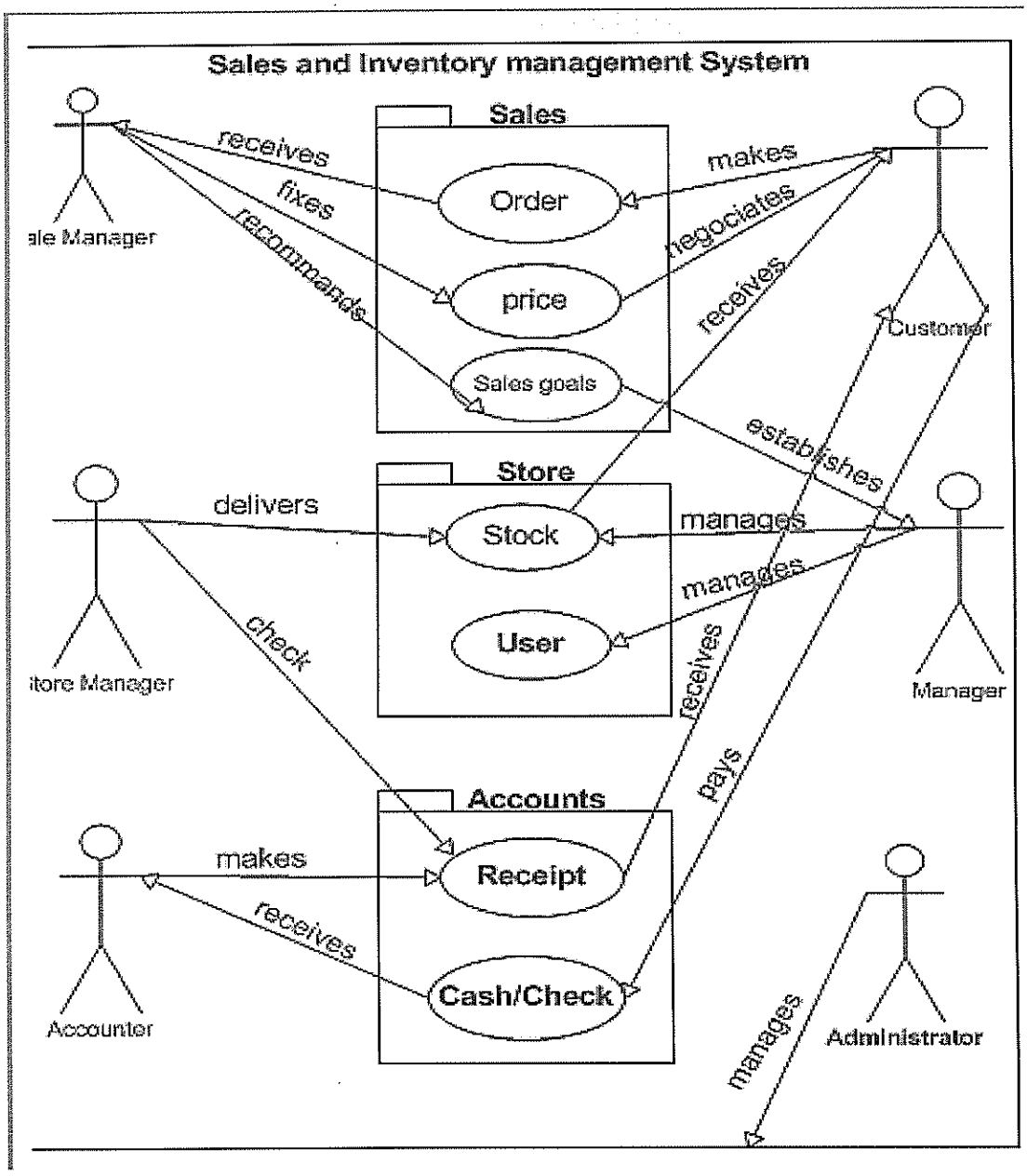
Sales manager receives the order. from customer

Store manager checks the receipt then delivers the order.

2. System Administrator manages the system.

4. Accountant receives cash and check and makes a receipt

4.4.3.3 ***Use Case Diagram***



Course event:

Manager manages all the users and store

Sales manager receives the order. from customer

Store manager checks the receipt then delivers the order.

2. System Administrator manages the system.

4. Accountant receives cash and check and makes a receipt

4.5 Physical Design

This is involved converting the relations into real table designs where fields were assigned corresponding field types and sizes.

4.5.1 Description of relations (Data dictionary)

Table 4.3 Customer Details table

No.	Field type	Size	Data type	Constraint
1	Customer ID	3	int	Not Null, PK
2	Customer FullName	30	varchar	Null
3	Address	30	varchar	Null
4	Contact Number	40	varchar	Null

Table 4.4 Supplier Details table

No	Field type	Size	Data type	Constraint
1	SupplierID	3	Int	Not Null, PK
2	SupplierName	30	varchar	Null
3	Contact Number	30	varchar	Null
4	Address	30	varchar	Null
5	Contact Name	30	varchar	Null

Table 4.5 User Account Details table

No	Field type	Size	Data type	Constraint
1	UserID	30	Varchar	Not Null, PK
2	FirstName	30	varchar	Null
3	LastName	30	varchar	Null
4	UserType	30	varchar	Null
5	Password	30	varchar	Null
6	Username	30	varchar	Null
7	Confirm	30	varchar	Null

Table 4.6 Products Details table

No	Field type	Size	Data type	Constraint
1	ProductID	5	Int	Not Null, PK
2	ProductName	30	varchar	Null
3	Description	40	Varchar	Null
4	Category	50	Varchar	Null
5	Supplier	40	Varchar	Null
6	Quantity	3	Int	Null
7	SupplierPrice		currency	Null
8	Unit	5	Int	Null
9	Wholesale		Currency	Null
10	Retail		Currency	Null
11	Date		datetime	Null

Table 4.7 Sales Masterfile Details table

No	Field type	Size	Data type	Constraint
1	SalesID	3	Int	Not Null, PK
2	ProductID	30	varchar	Null
3	ProductName	30	Varchar	Null
4	Qty	40	varchar	Null
5	Date		Datetime	Null
6	TotalAmount		Currency	Null
8	Price		currency	Null

CHAPTER FIVE

SYSTEM IMPLEMENTATION

5.0 Introduction

This chapter focused on converting the design procedures and diagrams to a code which was executed at the backend of the database, constructing the necessary interfaces (Forms) that enhanced user interaction with the system, building reports and the evolution of the database tables. A description follows.

5.1 Forms

These allowed the user to be able to input or add the necessary data and retrieve the existing one with the use of the commands provided on the forms. Below are some of the forms that were constructed

5.1.1 Login Form

This was an authentication form that ensured system security whereby, for the user to login, had to supply valid user name and password then clock Ok. For invalid user name and password, the system was able to respond by denying access.

Figure 5.2 System login form

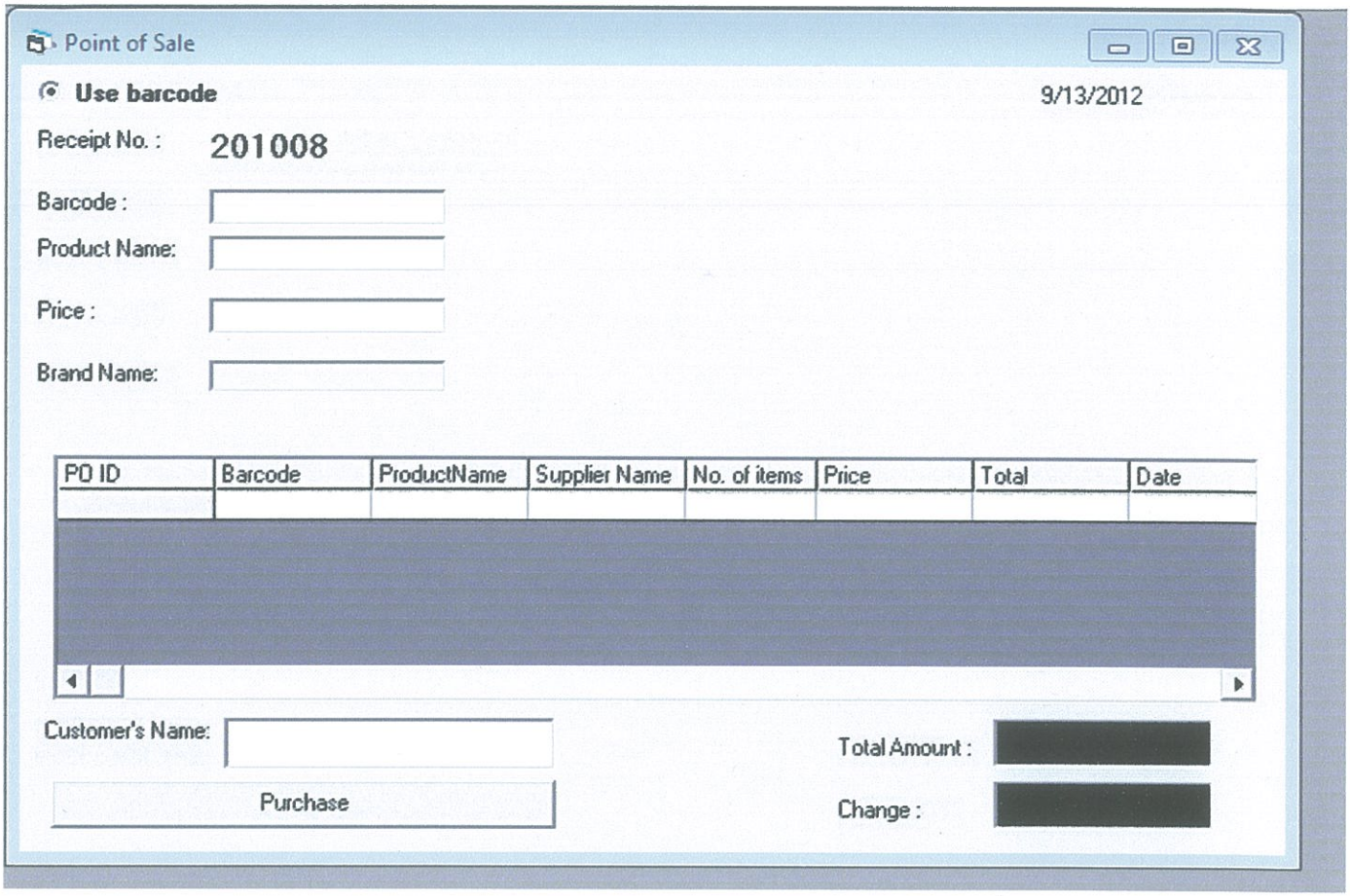
5.1.2 The Menu Form

The Menu Interface which also acts as the admin interface was set to appear after logging in.

Figure 5.3 MENU form

5.1.3 Sales details Form.

This captures sales details of the customer.



5.2 Database tables

Tables were created and their fields bound to the corresponding text boxes on the corresponding forms. When data is entered in the forms it's saved in the corresponding table in the database. Below are some of the tables.

5.2.1 Category database table

This table contains all category details

tbl_category

CategoryID	Category	Add New Field
1	Bags	
2	Sachets	

Table 5.1 Category details database table

5.2.2 Supplier database table

This table contains all supplier details

tbl_supplier

SupplierNo	SupplierName	Address	ContactNo	Add New Field
1	Bunjura Suagar Works	Bujumbura	033-50-20	
2	Burundi Sugar Ltd	234	56-55-554	
*	(New)			

Table 5.2 Supplier database table

5.3 Reports

As a way of generating output, reports were generated and this application allows those reports to be printed in case of need for information. Below are some of the sample reports.

5.3.1 Product's details report

This report is generated to show all the details about a given product.

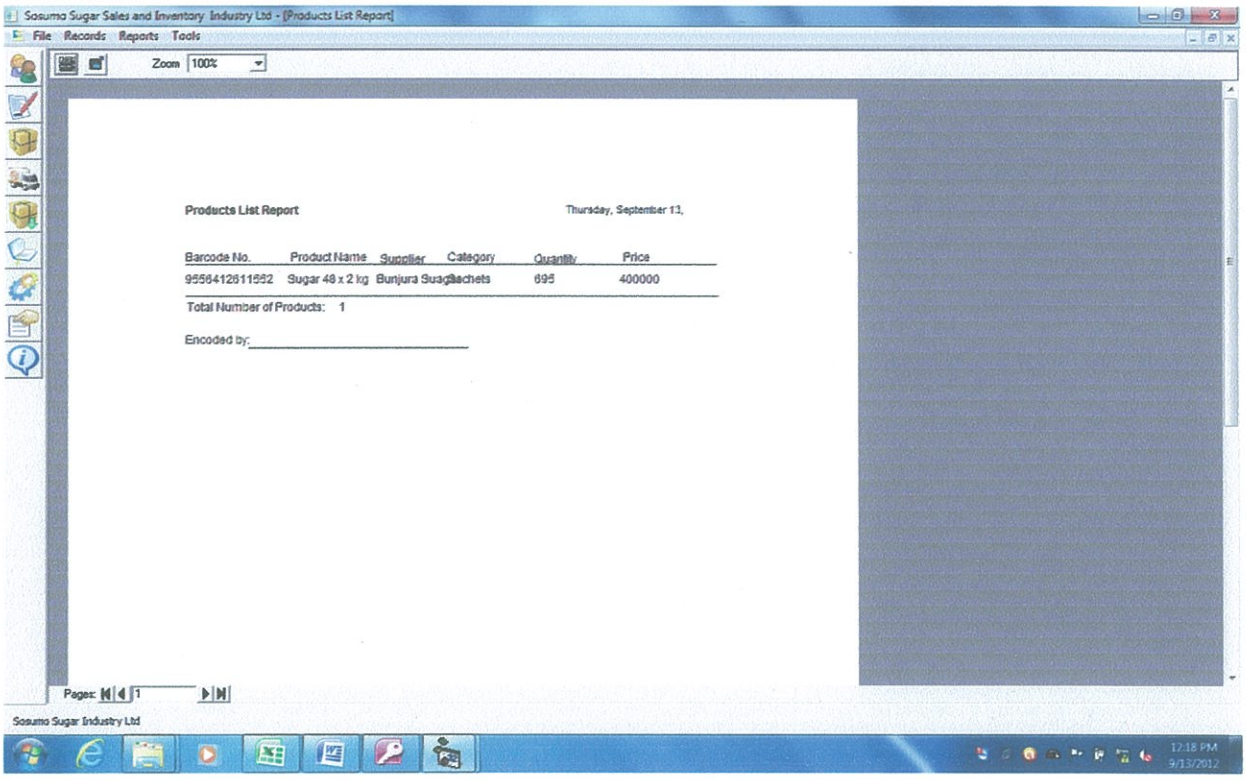


Figure 5.3 Product Detail Report

5.3.2 Sales report

This report is generated to show all the details about a given sales.

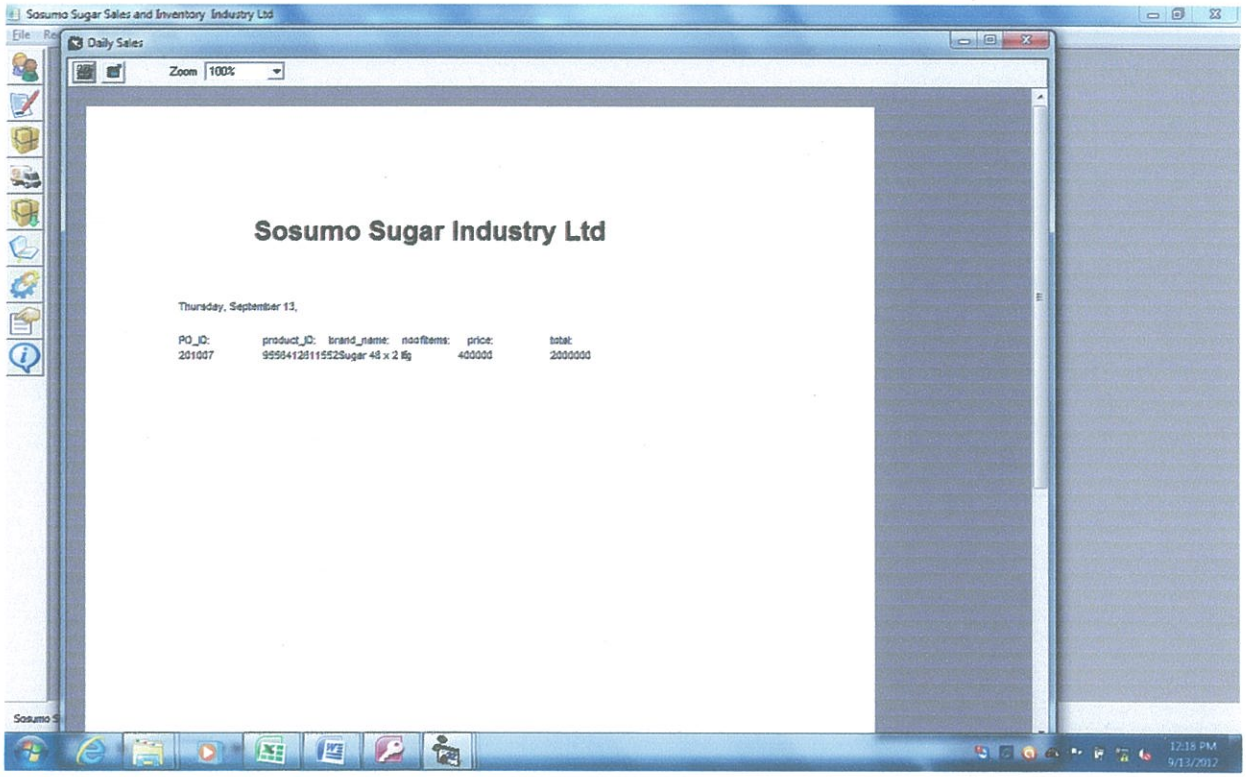


Figure 5.4 Sales Report

CHAPTER SIX

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter assesses and evaluates the findings from the project research. It includes the problems faced by the researcher in the overall process of undertaking the research and gives the recommendations that are in line with our observations plus the way forward to solving the problems in a Sales and Inventory Information System in motor oil industry.

6.1 Conclusions

The main objective of the study was to develop a Sales and Inventory Information System in motor oil industry, and this has been a success.

6.2 Recommendations

The following recommendations are to be ensured to enhance an organized, flexible, maintainable and robust system in place.

- ⇒ The system users should be properly trained on how to use the system and also recommended to keep their authentication like user names and pass words as a secret to avoid intrusion into the system.
- ⇒ The system should be provided with viable hardware and a strong power management and backup system like UPS (Uninterruptible Power supply) to cater for power losses and failures.

6.3 Limitations

During the study, a number of challenges or limitations were encountered among of which are;
Since the organization is located in a rural area, it was found very difficult and costly for the researcher to reach the place to collect the necessary information during the study.

6.4 Future Research

The study was based on project objectives and they were met successfully. However, functions like data backup, allowances for password changing by the user and support of multiple users are still limited. Therefore, future researchers should implement them.

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APPENDICES

APPENDIX A: PLAN AND EXECUTION OF ACTIVITIES.

1. Writing a concept paper
2. Project proposal approval and presentation.
3. Requirements analysis
4. System design
5. System construction
6. System testing
7. Report writing
8. Project presentation.

APPENDIX B:

TIME SCHEDULE

No.	Activity	Duration	Deliverable
1.	Writing the concept paper.	August 2011 (3 weeks)	Concept paper approval
2.	Writing the project proposal	August - Feb 2012 (2 weeks)	Proposal approval.
3.	Requirements analysis and elicitation	April(2012)	Requirements documentation.
4.	System and software design.	April 2012	System models
5.	System implementation	April 2012	software
6.	Software testing	May 2012	Customer feedback
7.	Final testing and integration	June 2012	Software acceptance
8.	Software documentation.	July 2012	Software document

APPENDIX C:

PROJECT BUDGET

No.	Item	Amount (UGX)
1.	Transport	100.000
2.	Printing	50.000
3.	Photocopying	25.000
4.	Binding	30.000
5.	Internet surfing	40.000
6.	Phone calls	10.000
	Total	**255.000**

APPENDIX D:

INTERVIEW GUIDE FOR STAFF OF

SOSUMO Sugar Industry Ltd:

1. How do you find the current system?
2. Who handles inventory work?
3. Which information do you capture on sales and inventory?
4. Do you think that information is enough in case you want to trace the inventory details?
5. How good is the current record keeping system as far as delivering efficiency?
6. What are the problems with the current system?
7. How many sales and purchase order are made in a day?
8. Where do you keep the files after recording sales and inventory information?
10. If one wanted to design an automated system for you, would you be interested?
11. Who would use the system if at all it's developed?

APPENDIX E:

QUESTIONNAIRE

STAFF
Name .....

Gender
Male ☐ Female ☐

Contacts.....

Section .....

Occupation .....

How long have you worked with SOSUMO Sugar Industry Ltd?
.....

Have you ever worked with any other sales and inventory system elsewhere?
Yes ☐
No ☐

How good is the current inventory system?

.....
Is it delivering the expected efficiency?
Yes ☐
No ☐

Would you welcome the introduction of an automated records management system?
Yes ☐
No ☐