INVESTMENT AND ACCOUNTING MANAGEMENT SYSTEM

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By

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ABSTRACT

The core aspect behind developing Investment and Accounting Management System was a result of inefficiency of the manual system that was used at the organization. The main aim was to develop a computerized system that will curb the problems currently encountered by using the existing manual system by integrating information systems process. The instruments which were used to come up with the system include MySQL database, Adobe dreamweaver 6, javascript and xampp. Various feasibility studies were carried out to identify if it is worthy to build the new system. Feasibility studies has shown that the available hardware and software can be used with the new system without facing any challenges and also that the benefits of the new system outweigh its costs. Information gathering methodologies were used to identify how the old system works. These include interviews, questionnaires and observations. The system was designed by making much emphasis on the architectural, physical, database and logical design. The system was tested using various testing techniques which encompasses black box and white box testing. Validation and verification processes were carried out and proved that the system meets that expected standards. The system was finally installed using the parallel run conversion method. The system needs to be maintained for it to provide best results. The users of the system are recommended to stick to the basics learnt during the training, and should they face any problems, they should consult the system administrator.

DECLARATION

I RUKARA. OWEN (R14785F) do hereby declare that I am the sole author of this dissertation. I authorize the Midlands State University to lend this dissertation to other institutions or individuals for the purpose of scholarly research.

Signature………………………….   **Date ……………………………..**

APPROVAL

This dissertation "Investment and Accounting Management System" by **Rukara Owen** meets the regulation governing the award of the degree of **BSC Information Systems Honours Degree** by Midlands state university and is approved for its contribution to knowledge and literary presentation.

Supervisor……………………………………………

Date………………………………………………….

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I foremost give praise to the Lord Jesus, for it is by his grace for me to reach this far. Special thanks dedicated to my supervisor Mr. P. Mupfiga who initiated the direction and support through the course period of my project research. I also acknowledge that through his support I will be somebody better in my research studies. More love to my family who cares much about my life and believes that in any way I will make it through the work of Christ in me the hope of Glory.

DEDICATION

Mostly I dedicate all the best to my wife who is so loving and caring.

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LIST OF ACRONYMS

CEO……………………………………………………………. Chief executive officer

ORGANOGRAM …………………………………………..Organizational structure

NPV……………………………………………………………. Net Present Value

ROI …………………………………………………………….Return on investment

SQL ………………………………………………………Structured query language

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CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

Delta Investment and Accounting Management System is an Electronic system that will automatically adhere to the accounting principles of double entry; it will automatically prepare and update Control Accounts after a transaction as well as providing a suspense account section to correct errors that cannot be revealed by a trial balance. The system will provide information for on-going control of business activities and formalization of management plans by preparing budgets, provide a section for interpretation of accounts by using ratios as well as automatically prepare financial statements and quickly reveal the financial position of the organization by simply clicking a button. This chapter will explore all the functions to be provided by the proposed system for it to be justifiable. The chapter will also explore the Methods and Instruments that are going to be used to come up with the new proposed system as well the methods that are to be employed to gather data of how the current manual system operates.

1.2 BACKGROUND OF THE STUDY

As the revolution change from century to century computers have become popular due to the emerge of a global economy, transformation of the business enterprise and the emerge of digital firms. This development to the computer age enables the use and the increase of the electronic way of operating as the market tends to be growing year by year.

1.2.1 BACKGOUND OF THE ORGANISATION

Delta Pvt Ltd started operating some 69 years ago as a company named "Rhodesian Breweries Limited". It goes even way back to 1898, when the first brewery plant was seen on one of the streets of the then Salisbury now Harare. The foundation stone was laid by the Salisbury Lager Beer Brewery and Ice Factory. Listing of the organization was done in 1946 on the trading centre and the name was then changed to the current Delta in 1978.The organization operates a wide range of products ranging from non alcoholic beverages, alcoholics, malting, packaging materials as well its fleet of

distribution trucks. It is also into contract farming for the production of sorghum through contracting of willing farmers who are given all the inputs and then will have to sell their crop to the organizations' agric services.

1.2.2 ORGANISATIONAL STRUCTURE

An organizational structure can be defined as a chart that shows the formal relationship that exist in an organization (Jewell, 2004). It shows how authority is delegated, the lines of commands that exist in the organization, span of control, as well as whether decision making is centralized or decentralized. The chart eliminates the potential of conflict in an organization with regard to who reports to who and the area of responsibilities and accountability (Jewell, 2004). Fig 1.1 highlights the organizational chart of Delta Pvt Ltd. Delta Pvt Ltd use a line organizational structure.

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                        │  Managing Director  │
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         ┌─────────────────────────┼──────────────────────────────┐
         │                         │                              │
┌────────────────┐       ┌────────────────┐              ┌────────────────┐
│ Finance        │       │ Administrator  │              │ Human          │
│ Director       │       │ Director       │              │ Resources      │
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        │  ┌──────────┐          │  ┌──────────────┐             │  ┌──────────────┐
        ├─▶│ Finance  │          ├─▶│ Logistics    │             ├─▶│ Operations   │
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        └─▶│ IT Officer│         ├─▶│ Administration│            ├─▶│ Training     │
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                                 └─▶│ Marketing    │             └─▶│ Security     │
                                    └──────────────┘                │ Officer      │
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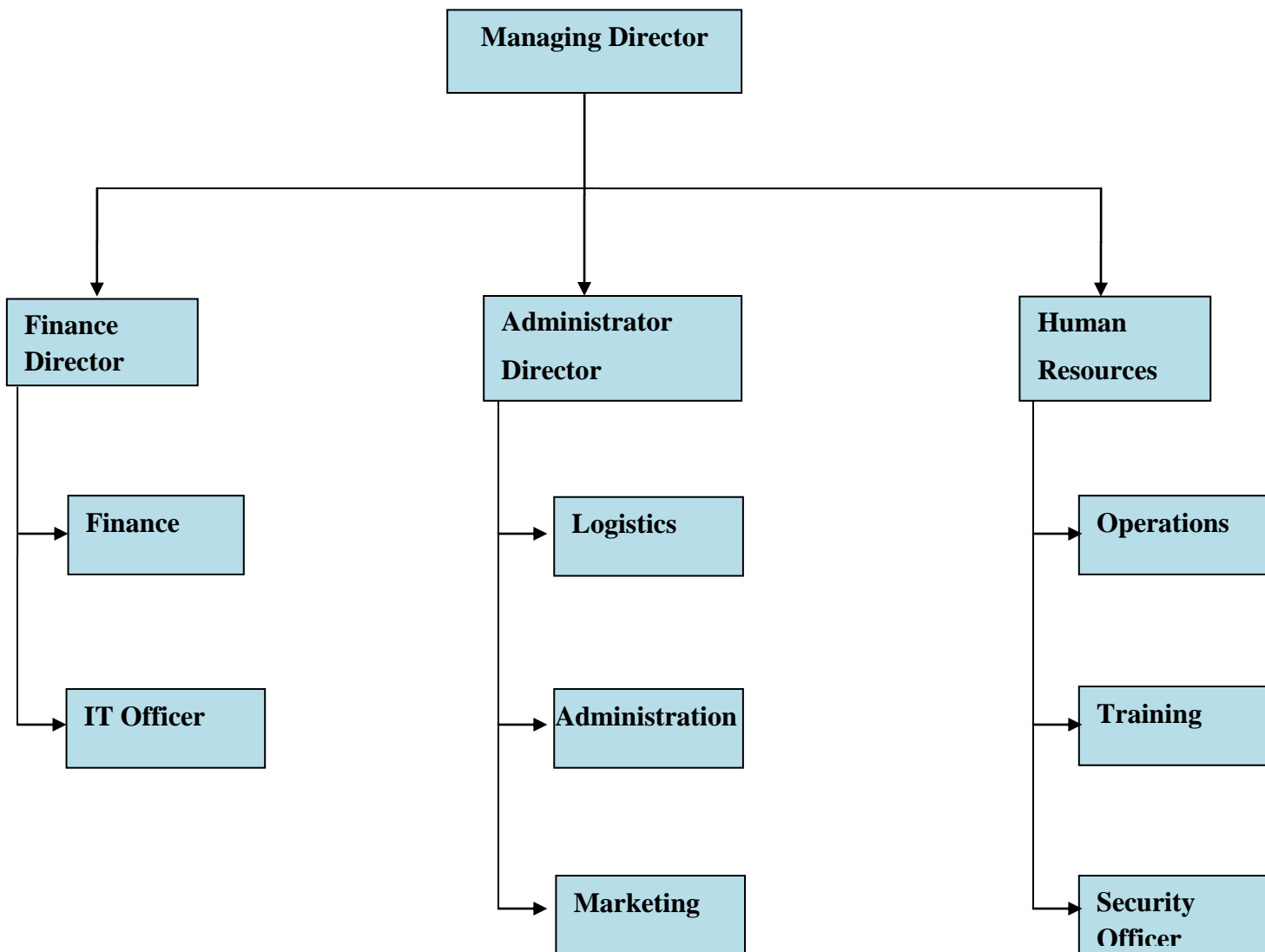
Fig 1.1 Organogram of Delta Pvt Ltd.

1.2.3 VISION

McCarthy and Hatcher (1996) insist that a vision is the state of seeing things in trance.
According to brown (2010) a vision entails a deep sight of things in trance. The vision
statement of Delta Corporation Limited is as follows:

"To be the most admired Beverages Business in Zimbabwe."

1.2.4 MISSION STATEMENT

Obrien (2001) postulates that a mission statement is a statement of purpose of an organization and its reasons of existing. A mission statement is the goal to be delivered in the long run by the organization (Blaxter, 2006). The mission statement for Delta Corporation Limited is as follows:

"*To grow the value of the business in real terms on a sustainable basis through owning and nurturing brands that are the first choice of the consumer.*"

CORE VALUES

Delta Pvt Ltd values are as follows:

- Integrity
- Professionalism
- Respect
- Accountability
- Responsibility

1.3 PROBLEM DEFINITION

The existing Investment and Accounting Management System used by Delta Private Limited is manual and has induced a number of manual oriented problems which have caused discreditation of the system. Due to the use of a manual system, the system users may fail to adhere to the accounting principles of double entry thus causing arithmetic accounting errors. The existing manual system takes time to prepare Control Accounts thus it takes a lot of time to carry an independent internal check to detect errors and deter fraud. Due to the use of the current manual system, it is difficult to detect errors that cannot be revealed by a trial balance and these errors cause false financial reports of the company. The suspense account is usually prepared at the end of the financial year thus delaying the correction of errors. The current system does not account for budgeting thus it does not provide information for on-going control of business activities and also there is lack of formalization of management plans. The existing system does not have the section for interpretation of accounts by using ratios. This has caused difficulties in

analyzing past events, planning for the future and to acquire loans as the Bankers and Finance Houses may want to access the credit worthiness of the business. The financial position of the organization is only revealed once per year as the financial statements are only prepared at the end of the trading year thus giving risk to the business as the causes of adverse business operation are not regularly checked.

1.4 AIM

The research study aims to develop a computerized Investment and Accounting Management System that will curb the problems currently encountered by using the existing manual system by integrating information systems process.

1.5 OBJECTIVES

- To develop a computerized system that would automatically prepare and update Control Accounts after a transaction so as to quickly detect errors and deter fraud.
- To develop a computerized system that will provide information for on-going control of business activities and formalization of management plans by preparing budgets.
- To develop a system that has a section for interpretation of accounts by using ratios. This will help in analyzing past events, planning for the future and to acquire loans as the Bankers and Finance Houses may want to access the credit worthiness of the business.
- To develop an automated system that prepares financial statements and quickly reveals the financial position of the organization by simply clicking a button.
- To develop a system that will show the level of investment by using investment techniques such as payback period, accounting rate of return and net present value.
- To develop a system that will give the financial report and aid in decision making.

1.6 METHODS AND INSTRUMENTS

The following three methods highlighted will be used to gather information on how the current manual system is operated.

1.6.1 DATA COLLECTION METHODS

Interviews

McMullan (2009) defined an interview as a shared conversation which is carried out to obtain specific information in line with the research objectives. Interviews carried out were mostly directed to the management team.

Observation

McMullan (2009) asserts that observation entails observing how the system is performing by either overt or covert. Observation was carried out to see how the current system actually operates.

Questionnaire

McMullan (2009) defined questionnaires as structured questions written down by the examiner and directed to the respondents so as to get essential information to solve a particular problem. Questionnaires were directed to both staff and management.

1.6.2 INSTRUMENTS

The proposed system will be developed using the following tools.

- MySQL – Is a database tool that allows the development and manipulation of databases.

- Adobe Dreamweaver 6 – A development application that facilitates the development of graphical web based interfaces (Jawadekar, 2004).

- JavaScript- A client-side language used to develop dynamic web pages.
- XAMPP is an application that provides the database as well as the testing server (Macfeland, 2010).

1.7 JUSTIFICATION AND RATIONALE

The proposed system will offer a lot of benefits that are essential for business processes. Improved record keeping will benefit the management to electronically record transaction details by automatically adhering to the accounting principles of double entry thus minimizing arithmetic accounting errors. The use of Control Accounts will help the organization by acting as an independent check on the arithmetical accuracy of the aggregates of the balances for sales and purchases, provide total debtors and creditors quickly, detect errors and minimize fraud. The proposed system will be of value to the management as it will disclose information that is not available from inspection of profit and loss accounts and balance sheets alone. This will be achieved by preparing cash flow statements. The system will also provide information for on-going control of business activities and formalization of management plans by preparing budgets such as sales budgets and cash budgets. Interpretation of accounts section will be provided the system through the use of ratios. This will help in analyzing past events, planning for the future and to acquire loans as the Bankers and Finance Houses may want to access the credit worthiness of the business.

1.8 CONCLUSION

The major problems encountered due to the use of the current manual system have been pointed out and the solutions that can be employed as a remedy to these problems have been proposed. The developer has also mentioned the methods and instruments to be used for gathering data as well as the developing tools that will be used to develop the proposed system. The next chapter is going to focus on the planning and analysis of the existing system, particularly the social, economic and technical feasibility studies together with assessing the viability of the proposed system to see if it is worthy doing.

CHAPTER 2: PLANNING STAGE

2.1 INTRODUCTION

Planning can be defined as an on-going process which focuses on selecting the most favorable alternatives amongst developed plans which usually arise in a decision making situation. Planning clarify the reasons for pursuing the development of the proposed system and provides the guidelines and benchmarks to be followed in coming with the new system. The planning phase outlines how the system developer will pursue in building the proposed system. This chapter will cover important key aspects which include the project's feasibility study, reasons for pursuing developing the proposed system as well as the business values that will be brought as a result of using the proposed system. Business value refers to how the organisation will articulate its operations in the long run by largely concentrating on the health of the organisation. Feasibility study largely focuses on whether it is vital to continue developing the proposed system as well as determining the potential alternatives that may be chosen as solutions to make the project successful.

2.2 BUSINESS VALUE

Kendall and Kendall (2002) defined business value as the financial position of an organisation mainly pertaining values that define the health of a business over a long period of time. Stakeholder analysis is a vital process that is crucial in defining the business value of an organisation. This section outlines the benefits to be acquired by Delta Corporation upon making use of the proposed system.

Making use of the proposed system will result in Costs Reduction mainly stationery costs as the system will not be operated basing on paperwork. The system will not require the use of bond papers, pens and other stationery unless the management needs part of the system's inputs or outputs to be on hard copy. Manually operated systems are characterised by intensive labour and usually they require more staff to be involved in data capturing and processing. By abandoning the old manual data capturing system and utilising the benefits that accrue by using the proposed compurised system, the

organisation will not need too many staff to operate the system thus reducing labour related costs such as wages and salaries.

Making use of the proposed system will improve business processes and facilitates easy monitoring of day to day transactions. The system will automatically give warnings if there is a great variance in ratios used compared to those which are recommended. The computerised system will also use control accounting to detect and deter fraud thus reducing the risk of incurring unnecessary costs through fraud. In manual systems, the operations report will be obtained after a long period of calculations.

The use of a proposed computerised system will also benefit the management as they will automatically get operations reports any time upon requesting to the system. This serves time as there is no need for strenuous calculations. Decisions can also be quickly made as the system monitors every transaction and also give aggregate monthly reports.

2.2.1 WHY DEVELOP THE SYSTEM

The use of computerised information systems has taken the world by a storm; as these systems are now regarded as an essential tool in any organisation's business processes. Many businesses are transforming their manually operated transaction systems and taking a major step in using decision support system as well as conquering the benefits of management information systems.

Due to the use of computerised information systems many organisations have earned large economies of scale by operating globally transforming communications and business networks to a computerised global platform. This has brought what is now referred to as digital economy. The most important benefits of using information technology can be proved basing on the competitive advantage that information technology offer, the organisational operational excellence as well as the ability to collaborate with the stakeholders globally. The following reasons outline the importance of pursuing developing the proposed system.

The proposed system will offer a lot of benefits that are essential for business processes. Improved record keeping will benefit the management to electronically record transaction details by automatically adhering to the accounting principles of double entry thus minimizing arithmetic accounting errors. The use of Control Accounts will help the organization by acting as an independent check on the arithmetical accuracy of the aggregates of the balances for sales and purchases, provide total debtors and creditors quickly, detect errors and minimize fraud. The proposed system will be of value to the management as it will disclose information that is not available from inspection of profit and loss accounts and balance sheets alone. This will be achieved by preparing cash flow statements. The system will also provide information for on-going control of business activities and formalization of management plans by preparing budgets such as sales budgets and cash budgets. Interpretation of accounts section will be provided the system through the use of ratios. This will help in analyzing past events, planning for the future and to acquire loans as the Bankers and Finance Houses may want to access the credit worthiness of the business.

In this regard there will be an improvement in the business processes as well as enrichment in customer relationship management. Developing and making use of the proposed system will curb the challenges that are faced by the organisation due to the use of the current manual system and provide valuable business solutions that would be of benefit to the organisation.

2.3 FEASIBILITY STUDY

Kendra (2008) defined feasibility study as a process of surveying the possible paybacks that will be obtained upon undertaking a project. It is vital to carry out the feasibility study before allocating resources to the project because the feasibility study highlights whether it is worth to continue with the project or not. Feasibility study takes into account the factors that affect the outcomes of the proposed system and suggests whether investing in the proposed system is viable.

2.3.1 TECHNICAL FEASIBILITY

Pressman (2005) defined technical feasibility analysis as process of determining whether the technologies and resources being used will make the project viable or not. Hofstrand (2002) asserts technical feasibility as determining whether the organization is able to develop the proposed system. Technical feasibility also assesses whether the technologies used meet the newly standard technologies and whether the resources available will be sufficient up to the end of the project. The technical feasibility evaluation is also applied to the hardware and software components.

2.3.1.1 TECHNICAL EXPERTISE

Technical expertise involves providing technical support to the developers and applying various policies of the organization mainly coding standards and ways to minimize and curb technical problems. Delta Corporation has the following advantages, due to many employees within the firm; diverse skills and knowledge, involvement of different people in developing the system and capability of cultivating a wide range of technical solutions. The systems developers are well equipped with a variety of programming languages which include visual basic .Net, PHP, C# and designing languages such as Hyper Text Markup Language, Javascript and Cascading Style Sheets which makes it easier to provide support for the project. However, there is no need for organization to hire external programmers as they can recruit from within.

2.3.1.2 HARDWARE AND SOFTWARE REQUIREMENTS

The term hardware refers to the physical components of a computer which are tangible. Software refers to a set of instructions which tell the computer what to do. The table shown below outlines required hardware and applications necessary for the development of the proposed system.

Table 2.1 Hardware and Software requirements

Elements	Quantity	Available	Comment
Hardware requirements			
LaserJet printer	3	Yes	No additional printers needed
Router	1	No	1 router is needed
HP Laptops	8	3	Portable Laptops are required
Network cables	-	No	Should be provided in bulk
Software requirements			
XAMPP	1	No	Testing Server
Adobe Dreamweaver	1	No	Development Software
MySQL	1	No	Allows development and manipulation of databases

2.3.2 ECONOMIC FEASIBILITY

Pressman (2005) defined economic feasibility as the process of comparing the cost of the project against the benefits that the organisation will gain during the lifetime of the project. Economic feasibility is carried out in relation to capital appraisal workings and its aspects are measured in monetary terms. The outcomes of economic feasibility are also compared in relation with other factors to come up with the aggregate decision of whether it is vital to continue with the project or not. If the costs of developing and running the system are more than the benefits gained from using the system, it would not be worthwhile to continue with the project. Many organisations carryout economic feasibility study before they start working on developing the new system that is they carry out an analysis of whether their investment will be profitable to the business. It is only recommended to develop the system if the benefits outweigh the costs of the project.

2.3.2.1 BENEFITS

Hoffer et al (2002) defined benefits as positive outcomes that add value to the organisation. Benefits can be categorised into two broad categories namely tangible and intangible.

2.3.2.2 TANGIBLE BENEFITS

Hoffer et al (2002) stipulated that tangible benefits are consumed after the completion of the project and they can be converted into financial terms. These benefits include reduced travelling expenses (consumption of fuel, vehicle servicing, wages and salaries) as well as a reduction in stationery expenses. Using the proposed system will reduce stationery costs since every staff member will have access to online business service. The proposed system has a life span of three years.

Table 2.2 Tangible benefits

Details	Costs of using the old manual system ($US)	Estimated costs after employing the proposed system ($US)	Benefit (3 years)
Travelling	26 500	15 500	11000
Ordering Costs	2010	1 900	100
Stationery Costs	5 000	4 500	500
Communication	3 500	3 100	400
Overall total	37 **000**	**25 000**	**12010**

2.3.2.3 INTANGIBLE BENEFITS

Kendra (2008) stated that intangible benefits are the gains obtained by the organisation due to the employment of a particular project and cannot be expressed in monetary terms. Although intangible benefits do not have a monetary value and cannot be stated on the balance sheet of the organisation they add value to the business.

Intangible benefits fall into two categories which are short or long run and they both aid a firm to realize large scale of economies. Delta Corporation can acquire the following intangible benefits due to making use of the proposed accounting system.

- Increase employee morale as the computerised system is less strenuous as compared to the manual system.
- Data can be easily accessed everywhere as the system can be used on different platforms which include tablets and smart phones.
- The proposed system will enhance and improve communications thus facilitating coordination within departments
- The proposed system will also aid in improving business processes.

2.3.2.4 COST OF DEVELOPING THE SYSTEM

Kendra (2008) pointed out that developing costs are those costs incurred throughout the development life cycle of the system. The costs are termed developmental costs because they are only incurred during the development process and will not be incurred when the development process is over. The table below shows the cost price and quantity of the materials required to come up with the required software. Delta Corporation is going to acquire additional computers which are to be used in different sections of the organization to facilitate coordination.

Table 2.3 Development Costs

Item	Quantity	Price $US
Hardware requested		
Routers	1	2685
Laptops(core i7)	5	7600
HP Laserjet printer	5	1250
Network cables	100 metres	400
Software Requested		
XAMPP(Testing Server)	1	free
Adobe Dreamweaver	1	free
MySQL Database	1	free
Total		**11 935**

2.3.2.5 OPERATIONAL COSTS

Lucey (1996) defined operational costs as day-to-day costs incurred when running a business. These costs are incurred repeatedly and they can be put into two categories-direct and indirect costs. The table below shows operational costs to be incurred in running the system.

Table 2.4 Operational Costs

Item	Cost ($US)
laser jet cartridges	1255
System installation	250
Maintenance costs	8000
Server Upgrade	1 500
Updating Software	650
Total	**11 655**

2.4.2.6 COST BENEFIT ANALYSIS

Kendall and Kendall (2002) defined cost benefit analysis as an in-depth analysis of the gains and risk that come as a result of employing the proposed project. Cost benefit analysis will reveal whether it is worth for Delta Corporation to consider the project or not by comparing the benefits that will accrue from using the system and the costs of developing and running the system. The conclusion is then drawn after deducting costs of developing and operational costs from the overall benefits, both tangible and intangible, of using the newly proposed computerised system. The table below shows two variables, costs and benefits, used for cost benefit analysis.

Table 2.5 Cost Benefit Analysis

	2016	2017	2018
Costs			
System development costs	14000	-	-
System Operational costs	12010	15500	16000
Total costs	**26000**	**15500**	**16000**
Benefits			
Tangible benefits	31700	28500	29000
Intangible Benefits	**-**	**-**	**-**
Overall Benefits	**31700**	**28500**	**29000**
Profit	**5700**	**13000**	**13000**

2.4.2.7 INVESTMENT TECHNIQUES

Drury (2010) defined investment techniques as the sequences of which the organization obtains cash inflows and outflows for a specific period under consideration. Return on Investment, Pay Back Period and Net Present Value are the three Investment appraisal techniques that are going to be used to measure the risks associated with employing the proposed system.

2.4.2.7.1 RETURN ON INVESTMENT(ROI)

Laudon and Laudon (2010) refers to Return on Investment as a technique used to measures the success of the projects. Return on Investment is expressed in percentages.

Return On Investment $=$ $\dfrac{\text{Total benefits} - \text{Total costs}}{\text{Total costs}} * 100$

Year 2017

Total benefits =   31700

Less Total Costs   26000

Profit   5700

ROI = 21. 92%

Year 2018

Total benefits =   28 500

Less Total Costs   15 500

Profit   =   13 000

ROI =83.87%

Year 2019

Total benefits =   29 000

Less Total Costs   16 000

Profit   =   13 000

ROI = 81.25%

The project is considered viable because satisfactory profits will be generated between year 2018 and 2019.

2.3.2.7.2 THE PAYBACK PERIOD

Lucey (1996) defined payback period as the time interval, usually number of years, of which the project's cash inflows will cover up its initial outlay.

Table 2.6 Payback period

YEAR	ANNUAL CASHFLOW	CUMULATIVE
0	(60 000)	(60 000)
1	10 000	(50 000)
2	20 000	(30 000)
3	30 000	--
4	40 000	40 000

The payback period for the proposed project is 3 years therefore investing in such a project is considered less risk.

2.3.2.7.3 NET PRESENT VALUE

Lucey (1996) asserts that net present value is an investment measuring technique which assesses the value of money, using discounting factors, throughout the projects period. Net present value is the difference between total cash inflow and cash outflow.

Table 2.7 Net Present Value

Year	Annual Cashflow $	10% Discount Rate	Cumulative $
0	(60 000)	1	(60 000)
1	10 000	0.909	9 090
2	20 000	0.826	16 520
3	30 000	0.751	22 530
4	40 000	0.683	27 320
Net profit			15 460

The reduction of cash inflows by 10% also resulted in profitability so it is worth considering the project.

2.3.3 SOCIAL FEASIBILITY

Social feasibility measures the extent to which the proposed system will bring social change Whitten et al (2004). Social changes which may be brought about due to adopting the use of the proposed system include how the society be affected by the new system, how the system will affect operations, employee performance and prospects as well as user confident. The proposed system will be certified social feasible if it brings positive changes to these variables. The proposed investment and accounting system will enhance the following:

- Building user confidence and enhancing good performance by reducing the need to carry out strenuous arithmetic calculations. The system will accept user input and automatically calculates reports for any period of time under request. The management can quickly make decisions based on the reports provided by the system. System validation also increase user confident.

- Social responsibility amongst the staff members as they can confidently cast their grievances through the use of the system.

- Employee prospects will be enhanced because the employees will be computer literate and they will build IT skills and will be able to harness this technology with their day to day operations.

- The system will performance faster and beneficial to the organisation as it will notify the financial position of the organisation that might not be revealed from inspection.

It will be socially feasible to consider and undertake the project if it positively make changes to these variables.

2.3.4 OPERATIONAL FEASIBILITY

Whitten et al (2004) defined operational feasibility as the extent to which the proposed project will facilitate efficiency and effectiveness of business processes within an organization. Operational feasibility how the proposed system will implement essential

solutions to solve problems taking into consideration the opportunities highlighted throughout the scope definition. Operational feasibility study of the proposed investment and accounting management system will concentrate on measuring the system performance to find out whether the system will operate in line with the organization's objectives. Operational feasibility study should also consider information as the users of the system should be granted with detailed information. It is also important to develop a platform for preparing control accounts so as to quickly detect errors. There is also need for verification of the cost efficient of the system. The operational feasibility study should also consider control that is the level of safety to be provided by the proposed system. The system will control access to information through the use of access levels and passwords. Control is also offered on data capturing platforms of the system by validating user input so as to keep accurate records and provide the desired system output.

2.4 RISK ANALYSIS

Risk analysis uses existing information to measures the degree of effects that is brought about by the occurrence certain definite events (Whitten et al., 2004). Two forms of risk analysis that can be performed are qualitative and quantitative risk analysis. Risk analysis is usually conducted on areas where hazards are mostly likely to occur and involving strategic planning. Stakeholders risk and technical risk are the two categories of areas where hazards are mostly likely to occur. Risks associated with system projects involve:

- Rapid changes in technology. The software should be regularly upgraded for it to suite rapid changes in technology.
- Resistance to change by employees. Employees need to be taught the benefits that will be achieved by employing the new system. They need to be explained how the new system will improve business processes.
- Modification of computer programs due to viruses. Antivirus need to be installed on all computers to reduce the effects of viruses.
- Failure to develop the project within the stated time frame. Sufficient resources need to be mobilized in time so as to avoid delays in developing the new system.

2.4.2 TECHNICAL RISK

Technical risks refer to those risks that arise due to technical failure in hardware. All softwares have minimum system and hardware requirements and there is need to make sure that the available hardware supports the software to be developed. Appropriate hardware need to be acquired if there is no appropriate hardware to support the software. Upgrading the software may result in the need to acquire new hardware.

2.4.3 RISK PLANNING

Risk planning refers to devising strategies that try to prevent the risks from occurring. Risk planning can be termed risk communication meaning consulting the stakeholders about how to curb the prevailing risk hazards or alerting them about the potential risks that can be experienced.

AVOIDANCE STRATEGIES – These are measures employed to avoid risks by alerting the stakeholders on the factors that facilitate risks in developing the proposed software. The risk of data loss might be reduced by employing the pilot conversation method.

CONTIGENT PLANS – refers to plans which focus on the possible future events that cannot be predicted with certainty. The risks cannot be avoided but they can be dealt with. For instance conflicts amongst team members is not predictable but can be dealt with.

MINIMISATION STRATEGIES– These are attempts put in place to reduce the effects of risks for instance measures can be put in place to minimize the effects of viruses. The main objective of risk planning is to minimize risks by employing appropriate strategies.

2.5 STAKEHOLDERS ANALYSIS

Whitten et al, (2004) defined a stakeholder as an individual or firm that can influence or be affected by the operations of the business organization. Stakeholder risk analysis is a

key element in managing stakeholders. Management, system analysts, system users, programmers are all referred to as stakeholders.

SYSTEM USERS – System users are those people who interact with the system and they play an important role in the development of the system. They include subordinates, administrative staff as well as outside stakeholders who may have granted a platform to use the system. These system users input data, access information, send and receive messages through the system. There may be poor transmission of messages due to system failure.

MANAGEMENT – The management is responsible for planning and organizing resources, controlling and monitoring the progress of the system development process. Failure in management might cause failure in developing the project within the stipulated time frame and may result in already obsolete software.

PROGRAMMERS AND ANALYSTS– Programmers are responsible for turning the concepts outlined into a real system by writing codes. Programmers need to be well versed with the current programming languages for them to develop up-to-date softwares which suite the current environment. System analysts are responsible for analyzing the operation of the system in relation to the organizational objectives by giving users access to identify the system requirements.

EMPLOYEES – refers to the subordinates who can influence or be influenced by the behavior of the organization. They can resist change if they feel that the system is going to completely change the way they operate or if they feel they can lose jobs when the new system is adopted.

2.6 WORK PLAN

A detailed work plan serves as an inclusive blue print for piloting the strategic planning effort on undertaking a particular project.

Table 2.8 Work plan

Events	Commence	Completion date	Duration(days)
Proposals	04- 06-16	18-06-16	14
Planning	19-06-16	09-07-16	21
Analysis	10-07-16	02-08-16	21
Design	03-08-16	24-08-16	21
Implementation	25-08-16	08-09-16	14
Documentation	04- 06-16	08-09-16	Events phases
Maintenance	08-09-16	--	Continuous

2.6.1 GANTT CHART

Shelly and Rosenblatt (2010) defined a Gantt chart as a graphical representation which shows the length of the activities in relation to time. The phases are executed in sequential order meaning each phase will start after the previous. Phases are allocated different time frames depending on the complexity of the phase or the amount of tasks to be performed on the phases.

Events (Weeks)	1	2	3	4	5	6	7	8	90	10	11	12	13
	1	2	3	4	5	6	7	9		1	2	3	
Proposals	█	█											
Planning's			█	█	█								
Analysis's						█	█	█					
Designs									█	█	█		
Implementations												█	█
Documentations	█	█	█	█	█	█	█	█	█	█	█	█	█
Maintenances													Ongoing process

Fig 2.1 Gantt chart

2.7 CONCLUSION

The aspects of feasibility study have clearly highlighted the viability of considering the proposed project. Economic, technical, social and operational feasibility studies have proved that it is worth considering the proposed project. The investment appraisal techniques used-payback period and discounting factor- have backed the feasibility studies carried out and highlighted the possible cash inflows that the project will bring.

CHAPTER 3: ANALYSIS STAGE

3.1 INTRODUCTION

The scope of the project has been determined in the planning phase and the necessity to explore the main source of the problem to be solved has emerged. The relationships of all the information gathered using various sources will be undressed into components parts by carrying out a logical inspection of the data as well as assessing and evaluating it. The attention was mainly given on examining how the current manual system operates as well as determining the problem faced by the organization by employing the existing system as well as evaluating the information gathering techniques used to collect the data.

3.2 INFORMATION GATHERING METHODOLOGIES

McMullan (2009) defined information gathering methodologies as procedures and guidelines that designate how the available information was acquired. These methodologies can also be referred to as values that can regulate a given discipline. Sufficient information should be acquired as it is needed to carry out analysis as well as evaluations on the operations of the existing system and identify the sections of the system that might need immediate attention. Information gathering methodologies that were employed to come up with the research on how the current system works consists of questionnaires, interviews and observations. This section is going to explore a strong argument on these methodologies.

3.2.1 OBSERVATION

McMullan (2009) asserts that observation entails observing how the system is performing by either overt or covert. Observation also encompasses the assembling of data by getting ready of various events carried out, inspecting the behavior of the system and noting the natural setting of the physical features. Overt arises when viewing the system and observing how it operates noting any unfavorable outcomes. Covert occurs when the observer is concealed because the system users will not know that they are being observed. The two forms of data assembling - overt and covert- were applied but covert was mainly used to avoid the system users from changing their behavior if they are watched. All major activities were noted and these involves how the various departments

coordinate, recording of daily transactions, creation of suspense accounts as well as the recording of the closing stocks. Further clarification of all the various activities which are the main components will be done in the appendix D supplementary section. The main aim of observing the various activities carried out when operating the existing system was to facilitate the reliability of the research by widening its validity. Observation also helps to prove if the findings and conclusions drawn from the data collected by means of other data collection methodologies are significant to be used and whether that data aids the credibility of the research.

3.2.1.1 ADVANTAGES

- Observations enhance validity of the research study which is the main reason of conducting the research study. This facilitates the research objectives to be understood by the observer while still at the planning phase.
- The real behaviour of what the staff do was noted which greatly differs from what they say they do. The process of examining employees' actions helped examine the extent to which organisation activities were coordinated.
- Observations also added flesh to the research study in the sense that the users' behaviour was noted and their reaction towards the system.

3.2.1.2 DISADVANTAGES

- Biased information concerning the behaviour of the staff may be obtained because the staff may change behaviour if they are watched and pretend to execute their roles in the recommended or standard way.
- Observations may be time consuming as in other cases it may need many days to observe the whole system and this usually depends on the complexity of the system. The observer may not be easily granted access to note the relationship between the top management and the system and more time may be consumed while liaising with the superiors to be granted access to observe the managers.

3.2.2 INTERVIEWS

McMullan (2009) defined an interview as a shared conversation which is carried out to obtain specific information in line with the research objectives. The examiner is the one who initiates the interview and should clarify the questions in order for the interviewee to give standard answers. Kendall and Kendall (2005) outlined different kinds of interviews commonly used which include face to face interviews and telephone interviews. Face to face interviews were used to get more precise answers by taking note of body language and reactions. The Managing director of Delta Corporation Kadoma Branch, human resource manager, purchases manager and production manager were involved in a shared conversation which was conducted to find out how the management make use of the existing system and how efficient is the system in supporting business processes. All managers were interviewed and each manager was given a time slot for the interview. The interview covered many areas which included how the production department make enquiries to the purchases department to purchase packaging materials, how the sales are measured and how do they determine if the sales are favourable or not as well as how often reports are generated.

3.2.2.1 ADVANTAGES

- Interviews results in in-depth analysis of the research as it facilitates the abstraction of essential information and further clarifications can be made to help the interviewee to give answers in the expected way. The perceptions and opinions of the interviewee were easily identified as most of the questions asked were unstructured thus giving much room for further explanation.
- There was high response rate from the interviews as they attempted to answer all questions that were asked. This also helped to obtain much detail of how the current system operates.
- There was further clarification of ambiguities and incomplete answers and this facilitated the proceedings of the project study.
- The interviews carried out also covered the diagrammatic physical setting of the production system and this has also enhanced the obtaining of more information to be used for project assessment.

3.2.2.2 DISADVANTAGES

- It takes a lot of time to schedule the interviews as most of the staff members were too busy to be interviewed and this had resulted in taking more time to interview the targeted group of people.
- Unstructured interviews may be misleading as they can lead to the collection of information which is not in line with the purpose of the research study.

3.2.3 QUESTIONNAIRE

McMullan (2009) defined questionnaires as structured questions written down by the examiner and directed to the respondents so as to get essential information to solve a particular problem. There are two forms of questionnaires which are closed and open ended questionnaires. Kendall and Kendall (2005) asserts that open ended questionnaires allow the respondent to express his or her ideas, opinions and thoughts in a way he or she likes without restriction whereas closed ended questionnaires restrict the responded to either answer 'yes' or 'no'. Questionnaires were mostly directed to the employees in various departments and few were directed to the management so as to get how the management cop up with the current system. Some of the questions that were asked are attached in appendix D supplementary section of the documentation. The validity of the research was also enhanced by detailing down the questionnaires and this facilitated various employees to give various responses. The system performance and reliability was also noticed and identified by assembling factual information obtained from the questionnaires.

3.2.3.1 ADVANTAGES

- Questionnaires facilitated the possibility of obtaining accurate information as the respondents answer the questions anonymously without fear.
- Questionnaires are not time consuming as they do not need immediate response. The respondents have much time to answer the questions and they are able to do this even in the comfort of their homes.

3.2.3.2 DISADVANTAGES

- The respondents may fail to interpret the questions and this will lead to obtaining invalid information of how the current system operates.

- There is also greater possibility of getting vague answers as the questionnaires are carried out anonymously.

3.3 ANALYSIS OF THE EXISTING SYSTEM

The three data collection methodologies used to gather data reviewed that the currently used Investment and Accounting Management System is conducted manually. There are many activities that are conducted within the organization when the marketing department markets the company's products.

The marketing supervisor assesses the quantity of goods to be to be dispatched by each vehicle. The security guard records the mileage of each vehicle on departure and also after delivery as well as the fuel consumed. The sales clerks records daily sales and at the end of each month the accounts clerks record other expenses incurred such as salaries and wages, electricity and rent. Other petty expenses such as stationery are also recorded by accounting clerks for accounting purposes.

The accountant prepares a suspense account to correct errors identified in the accounting books. These errors may have accrued from failure by the accounts clerks to adhere to the accounting principles of double entry. The accountant also prepares Control Accounts to quickly detect errors and deter fraud. Cash flow statements are also prepared in order to take note of the activities that generated cash and the activities that used much of the generated cash.

At the end of each accounting period, the accountants measure the performance of the organisation by interpretation of accounts. They will figure out the ratios that have unfavourable results and identify the possible causes of these adverse conditions. The accountants also measure the budgeted sales with the actual sales and figure out the possible causes in case of adverse results. They also prepare financial statements such as

trial balances, Trading, Profit and Loss Accounts and Balance Sheets. The Chief Accountant will hand the reports in summary to the operation manager. The operations manager will use the reports from the ratios, budgets and financial statements to control the business processes.

3.3.1 SYSTEM ACTIVITIES

3.3.1.1 INPUTS
- Petty Expenses
- Direct and Indirect expenses
- Sales
- Budget details

3.3.1.2 PROCESSES
- Record sales and expenses
- Prepare Budgets
- Prepare financial statements
- Compile periodic reports

3.3.1.3 OUTPUTS
- Budget variance
- Total cash generated
- Profit/ Loss

3. 5 DATA ANALYSIS
Kendra (2008) defined data analysis as a process of evaluating the data by inspecting each element of the delivered data through the practice of investigation and logical thinking. Conclusions drawn on how the proposed system will perform will be modeled from assembled and examined data generated from numerous sources. The existing system can also be modeled using the context and data flow diagrams.

3.5.1 CONTEXT DIAGRAM OF THE CURRENT SYSTEM

A contexts diagram is a design that highlights the boundaries and the interfaces of a given project at hand or to be undertaken (Shelly and Rosenblatt, 2010). The contexts diagram shows the completeness of the system by displaying the relationship that exists between the system and its external factors. It shows the system inputs from external factors as well as the system output to external factors. Shelly and Rosenblatt (2010) states that the Contexts diagrams is defined as the explicit design that elucidates the borders and interfaces of the given scheme (project) to be undertaken or at hand. It is the chief level outlook of the system displaying the completeness of the system and its inputs and outputs from or to exterior factors.

Fig 3.1 Context Diagram

3.5.2 DATA FLOW DIAGRAM OF THE CURRENT SYSTEM

Butt (2010) defined a data flow diagram as the design of the system characterized by a logical sequence of functions highlighting the inputs and how they are processed to produce outputs. The data flow diagram is a presentation that shows how the inputs from various system stakeholders flow through the system highlighting the activities in sequential form and where the data is stored.

Key for the Contexts diagram and the Dataflow diagrams

Entity

Process

Data

Data store
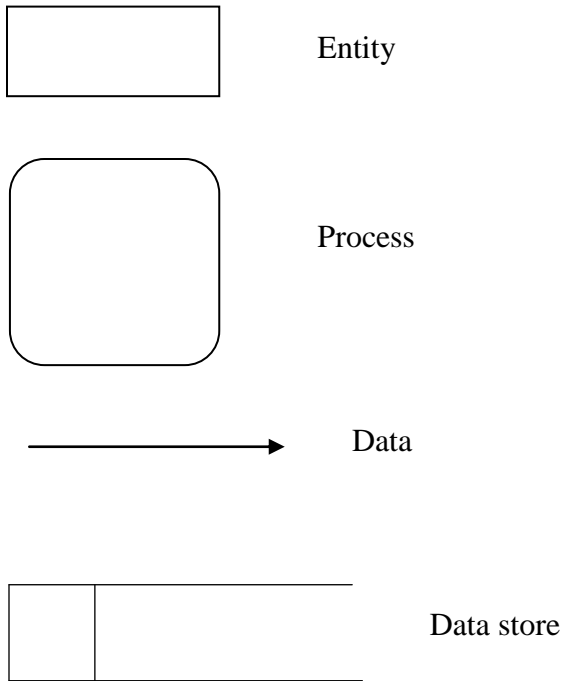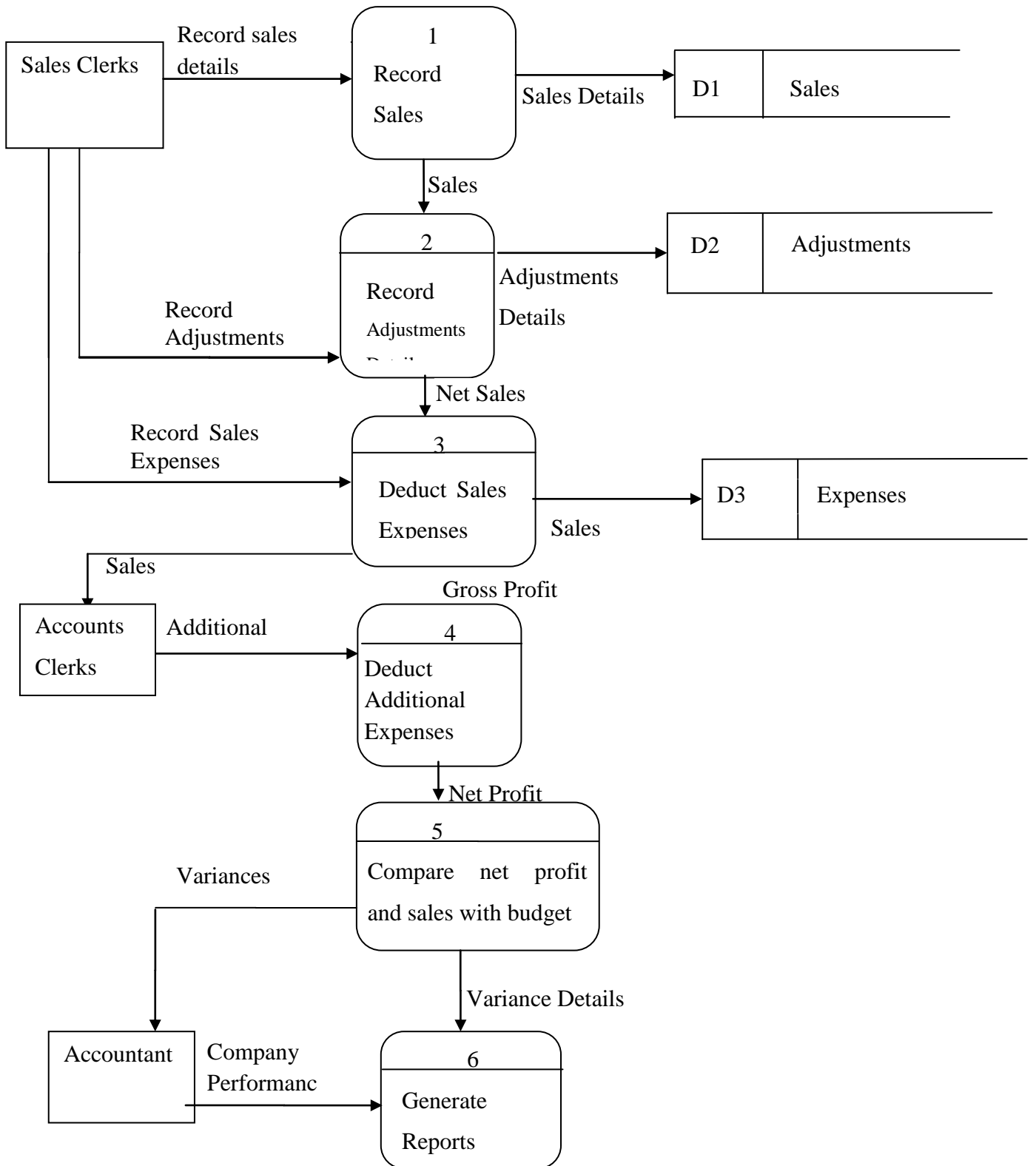
Fig 3.2: Data Flow Diagram

3.6 WEAKNESSES OF THE CURRENT SYSTEM

The three data collection methodologies used to collect the information of how the current system operates has shown the problems that arise as a result of employing the current system. The major weakness of the current manual system is lack of security. The current Investment and Accounting Management system is manual and does not provide security to the data as all the information is recorded on papers so anyone can stumble upon the papers and misuse them in any way he or she likes. There is also no data backup facility so if the records caught fire all the information will be lost.

The data collection methodologies have proved that the current manual system takes a lot of time to produce the output. Many of the procedures involved within the system require physical movement of the staff members from one department to another. Reports are usually generated at the end of each financial year and it takes a lot of time making calculations to produce these reports.

The manual system does not offer user input validation so the users can load the system with invalid input that will lead to inaccurate report generation. The manual system does not show any warnings and system alerts to inform the organization about any adverse sales trend. The current system is labour intensive in interpreting accounts using ratios as it involves complex calculations that results in mathematical errors.
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3.7 EVALUATION OF ALTERNATIVES

Alternative evaluation is a process that helps to weigh the appropriate method to use to come up with the new system by considering the method which brings minimum costs on developing it and also the one that saves financial resources. Outsourcing, in house building and system improvement are the three alternatives that an organization in need of acquiring a new system can use. Each of these three alternatives has its advantages and disadvantages and it is wise to choose the alternative with the advantages which outweigh its disadvantages.

3.7.1 OUTSOURCING

Butt (2010) defined outsourcing as a way of acquiring a new system by contracting the development of that system to another party. Many organizations opted for this method because it lessens costs in the sense that the larger part of the work is stressed to the external suppliers rather than taking all the risks internally. It is of utmost importance to outsource the software from external suppliers provided that the documentation of the system is required, the economic conditions are stable, the major problem which need to be corrected is associated with the delays that are brought by using the existing system and when no additional features will be required to be added to the system. Table **3.1** shows the costs that the organization will incur as a result of outsourcing the product. Costs that are incurred by the company as a result of outsourcing the product include the cost of training all the staff that will be involved in the running of the system as it is not developed internally, costs of purchasing computers that will suite the software, maintenance costs of making sure that the product software is efficient in processing the inputs as well as costs of hiring the project team to create a good setting environment and install the product software.

3.7.1.1 ADVANTAGES

- The organisation's employees will not be interrupted by the development of the new system and they will remain concentrated to their core business.
- High quality software products may be acquired if the organisation approached reputable suppliers

3.7.1.2 DISADVANTAGES

- It takes a lot of time to train the users on how to use the system because the system will be made by external developers and the system users will only get access to the system after its completion.
- External developers may delay to provide the software in the agreed period because they may have contracts with many customers so they may be concentrating on many projects.

3.7.2 IMPROVEMENT

Shelly and Rosenblatt (2010) defined improvement as the state of being better than before. It can also be upgrading to a better version. Delta Corporation can either opt to upgrade the existing manual system in certain sections that are mostly used, which is a difficult thing to do and very costly or they may opt to computerize the system in a certain department. Delta Corporation will incur more expenses if they choose to upgrade the existing manual system. Some of the expenses they will face include purchasing new computers to replace the old ones so as to suit for interoperability, purchasing wiring cable that will be used to create a network of computers and also costs of purchasing wireless routers to be allocated to each department so as to facilitate the effectiveness of the network. Most old information systems are characterized by outdated system architecture and they are not flexible thus making it difficult and more costly to change the system processes.

3.7.2.1 ADVANTAGES

- It may sometimes be less costly to improve the existing system especial if only a small section of the system needs small changes.
- Upgrading saves time in the sense that there is no need to train the staff which are not affected by the changes; only those affected by the upgrade will need a bit of some training and in other situations no training at all.

3.7.2.2 DISADVANTAGES

- Usually improvement of the existing system is done by the organisation's employees and this will not bring new ideas of better ways to improve business processes.
- If the organisation lacks skilled employees there will be lack of manageability.

3.7.3 DEVELOPMENT

In-house Development is whereby the organization assigns its workers to develop the proposed system as well as implementing it considering the fact that the system will fulfill the exact business needs if developed by internal developers (McMullan, 2009).

The system developed by internal developers will have greater chances of exactly fitting in the business and improve business processes since the developers will be well equipped with the knowledge of how the system should operate. Table 3.1 shows the costs that will be incurred if the company chooses to develop the software internally.

3.7.3.1 ADVANTAGES

- In-house development will give Delta Corporation total control over the system.
- In-house development promotes the development of the software that will suit accurately to the requirements of the company.

3.7.3.2 DISADVANTAGES

- In-house development is time consuming as compared to outsourcing in the sense that the employees may have to stop executing their day to day duties while concentrating on the system.

Table 3.1 Alternative Evaluation

Alternatives	Estimated Costs
Outsourcing	$22 500
In house development	$16 000
Improvement	$17 500

Table 3.1 revealed that it is cheaper for Delta Corporation to consider In-house development as compared to outsourcing and improvement although the method does have its demerits. Delta Corporation considers in-house development since the company posses the skilled employees who can develop the required software with the features that promotes efficient execution of business process.

3.8 REQUIREMENTS ANALYSIS

Requirements analysis is a process of which is articulated to launch total obligations on the system by identifying the users' requests on the proposed system (Shelly and Rosenblatt, 2010). The users' needs are clearly identified and analysed by taking a

careful evaluation of the needs that the proposed software system has to fulfill. The system users and the system designers should agree on the system requirements before the start of the development process. The requirements are further divided into two categories which are functional and non-functional requirements.

3.8.1 FUNCTIONAL REQUIREMENTS

Shelly and Rosenblatt (2010) defined functional requirements as the users' system demands focused on the components of the system such as system inputs, the system behavior as well as the output of the system. It can also be referred to as the act of identifying the functions that the new proposed system should support, identifying different inputs as well as identifying the data that must be managed by the system.

3.8.1.1 USE CASE DIAGRAM OF THE PROPOSED SYSTEM

The use case diagrams highlight the activities of the system from a user's point of view. It also presents the interaction that exists between different roles and different functions of the system.

It is referred to as the upper level view of the system, valuable exclusively when presenting to different stakeholders. Use case comprises of 4 object which are the actor, use case as well as the system and association. **Fig 3.3** shows a use case diagram for the proposed system.

Fig3.3 Use case diagram for the proposed system

Key

Actor   Use case   Association
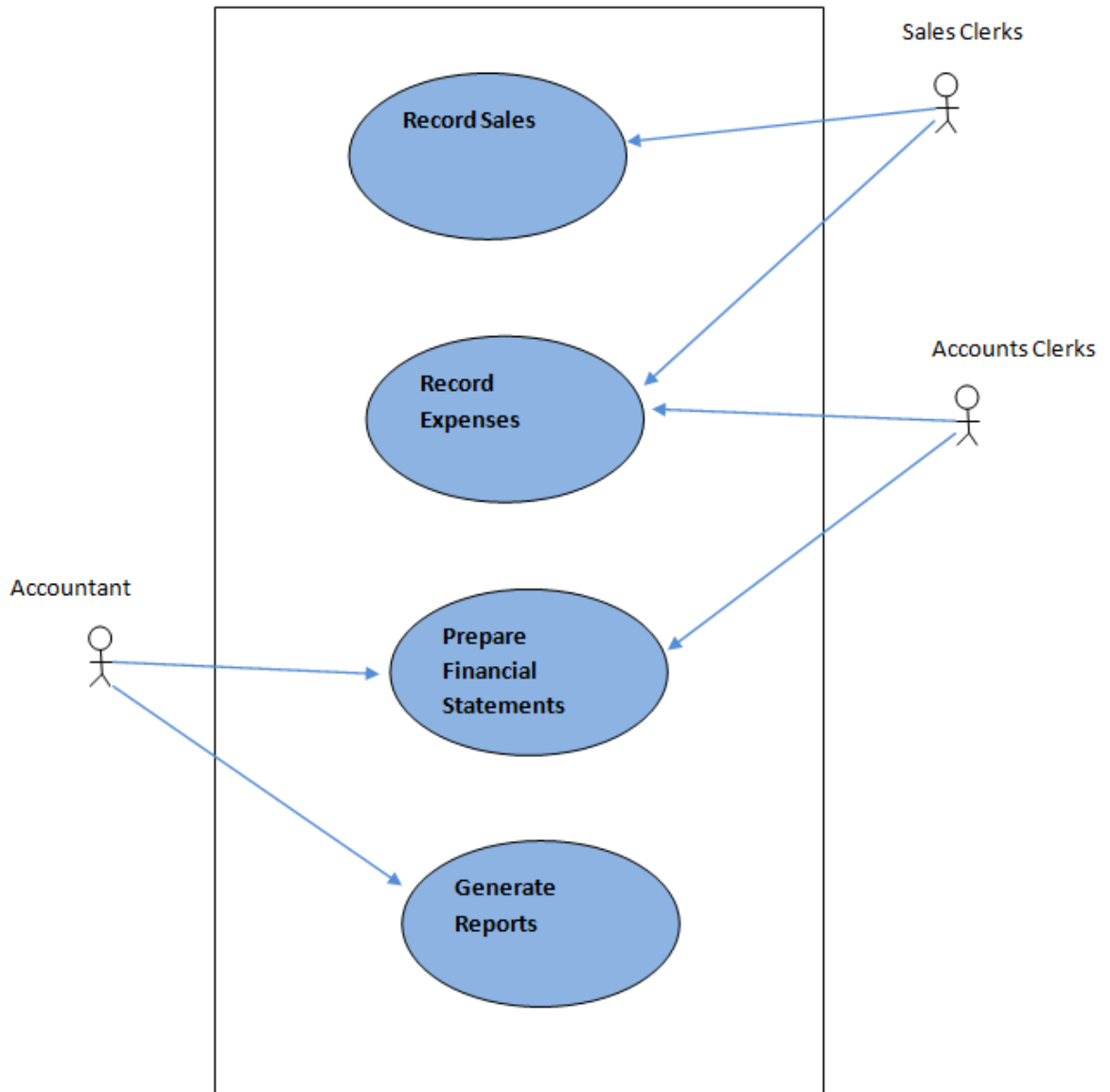
3.8.2 NON FUNCTIONAL REQUIREMENTS

Shelly and Rosenblatt (2010) defined non-functional requirements as those requirements that support the system's functional requirements. The main focus of non-functional requirements is based on the system usability. The software should not be complicated to use and learn meaning that the software should be incorporated with a good Graphical User Interface. The system should be fast in performance thus it should not take much time to input data into the system and to get the output. The software should be reliable thus it should be free from technical faults and error tolerance. The software should be easy to maintain and upgrade as well as providing security measures through the use of usernames and passwords. Different privileges should be granted to users by the system through the use of different access levels

3.9 CONCLUSION

This chapter has revealed how the current Investment and Accounting Management System operates and the problems that Delta Corporation encountered due to the use of this old manual system as well as the proposed solution to curb all the problems of the current system. The three data collection methodologies used have backed the conclusions drawn in analyzing the current system. Other forms of evaluation have been used in order to come out with the most favourable alternative that will be beneficial to the organization. Delta Corporation has considered in-house system development as it fulfills its business requirements. Considering the conclusions drawn from the requirements analysis, it is ideal to go to the next stage which is the design stage.

CHAPTER 4: DESIGN PHASE

4.1 INTRODUCTION

The functional and non-functional requirements of the proposed system have been laid down and it is of utmost importance to use these requirements in designing the system by using them as inputs to system development. The functional requirements are used to design the processes that the system should execute and the boundaries of the system. The non functional requirements are used to design the system interface that should be easy to use with good looking appearance. The design phase is going to focus on the interface design, the architectural design as well as the database design of the proposed system.

4.2 SYSTEM DESIGN

System design is a process which fulfills the requirements of a business by assembling the system's design (Kendall and Kendall, 2005). This process involves defining different system modules, the elements of the system as well as the system interfaces with the aim of satisfying specified system requirements. Kendra (2008) outlined that the major factor of designing the system emerge from the need to come up with a complete system specification by carefully choosing a single alternative design from various designs by working from various requirements specifications that constitutes a set of documents with details of the features to be provided by the system. Various attributes are intended to be offered by the proposed system which includes user friendliness, reliability, efficiency as well as maintainability. The system should provide a friendly, easy to use interface and minimize users' consultation on using the system. The system should be consistence and error free as well as producing the required outputs. The system shall offer efficiency execution of processes and also be easy to identify and fix any faults within the system.

4.2.1 CONTEXT DIAGRAM OF THE PROPOSED SYSTEM

A contexts diagram is a design that highlights the boundaries and the interfaces of a given project at hand or to be undertaken (Shelly and Rosenblatt, 2010). The contexts diagram shows the completeness of the system by displaying the relationship that exists between the system and its external factors. It shows the system inputs from external factors as

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Fig 3.1 Context Diagram

4.2.2 DATA FLOWs DIAGRAM OF THE PROPOSED SYSTEM

Butt (2010) defined a data flow diagram as the design of the system characterized by a logical sequence of functions highlighting the inputs and how they are processed to produce outputs. The data flow diagram is a presentation that shows how the inputs from various system stakeholders flow through the system highlighting the activities in sequential form and where the data is stored.

Key for the Contexts diagram and the Dataflow diagrams

Entity

Data
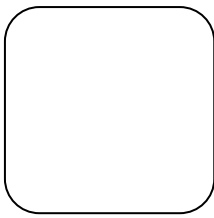
Process

Data store
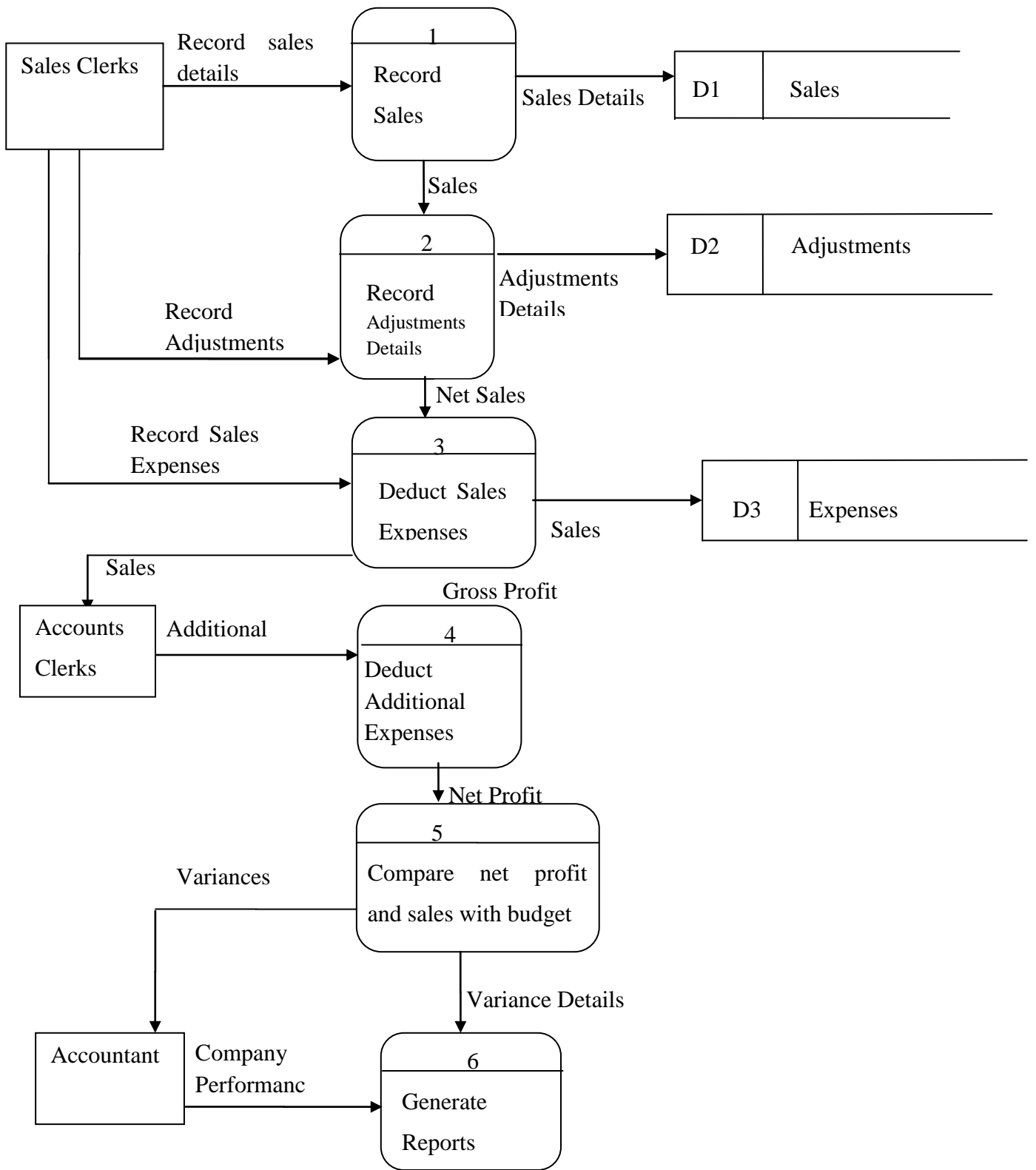
Fig 3.2: Data Flow Diagram

4.3 ARCHITECTURAL DESIGN

Zacker (2010) outlined that architectural design refers to the system's hardware components, the configuration of the softwares as well as the networks that enable interoperability between the system modules. Kendall 'and Kendall (2005) also defined architectural design as the hardware and system's prearrangement design which shows the format of the newly proposed system. Architectural design also assesses the proposed system's prearrangement confining to the proficiency of the required hardware in relation to snip cost that are associated to the hardware. The architectural design considers the proposed system functionalities by embracing the coordination that will exist between the networking cables that will be used to link the networks, the database that will store the system's data as well as the client machines that will be used to input and output data to and from the system.

4.3.1 CLIENT SERVER APPROACH

Client-server model is defined as the network system's disseminated coordination structure amongst system clients, providers, service requestors among others (Jawadekar, 2004). Dennis (2001) further outlined that the connection to the server is established via a network. The central network is also referred to as the computing theory constructing functionality because it facilitates access to database as well as mail altercation. Simple Mail Transfer Protocol (SMTP), Domain Name System (DNS) and Hypertext Transfer Protocol (HTTP) are some of the protocols that are constructed nearby the server model. Zacker (2010) outlined that client computers throw requests of the processes or the data that is needed from the server because the server is the one that stores the data, controls most of the processes and pass the outputs from various processes to the clients. The internet links the servers and the clients.
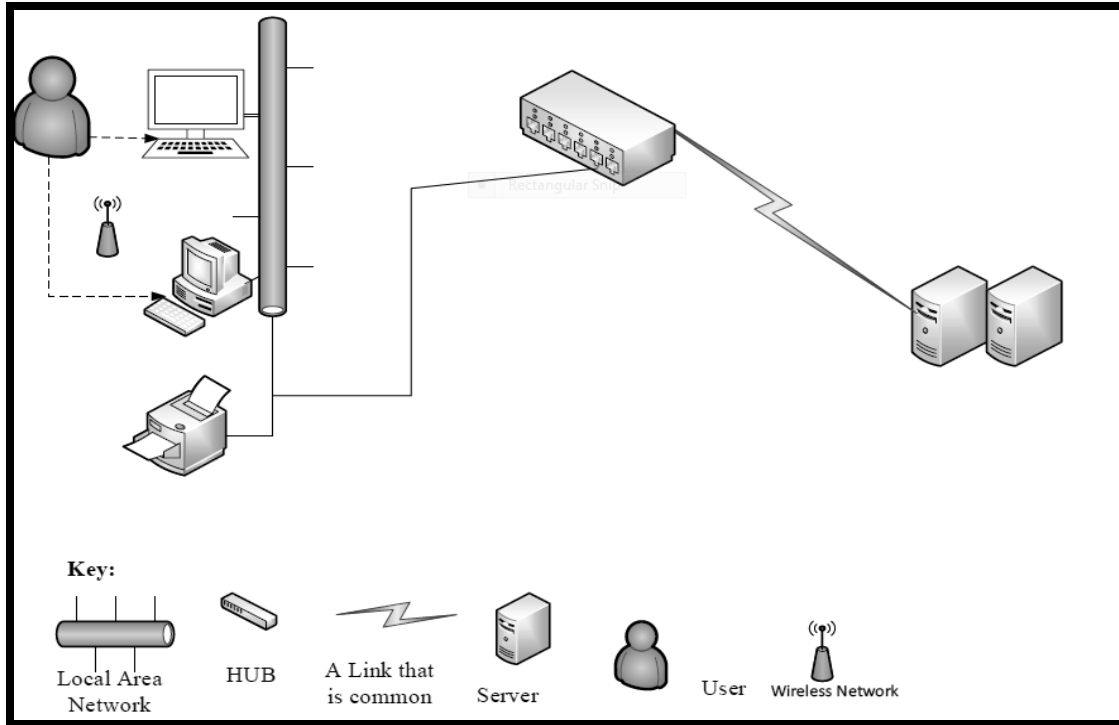
Fig 4.3 Client Server approach

4.3.1.1 ADVANTAGES

- Data can be easily distributed through the use of SQL database.
- Updating and making alterations to the database is easy.
- The client server approach facilitates communication between clients and servers as well as data commonality.

4.3.1.2 DISADVANTAGES

- System overload can cause congestion.

4.4 PHYSICAL DESIGN

Kendra (2008) defined physical design as a process of transforming the logic concepts into technical design. Physical design involves coming up with the depiction of the physical database of the system by assembling data and altering it throughout the stage of logical designing. Shelly and Rosenblatt (2010) outlined that the physical design is represented by the system's inputs, the system processes as well as the outputs of the

system and highlights the relationship that exists between the system software and hardware by making connections to the server. A router is included in the physical design of the system. Larry et al (2010) stipulates that the major role of a router is to control transmission traffic and also link networks together. Zacker (2010) reiterated that a server is responsible for storing all the data, monitoring and controlling system processes as well as processing the outputs to be presented to the user.
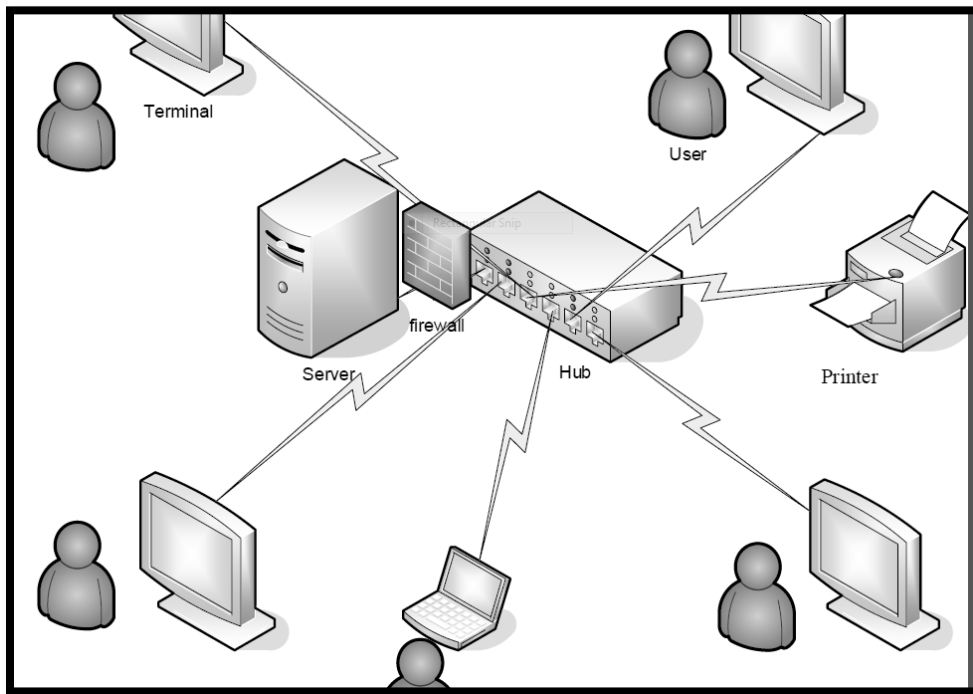
Fig 4.4 The physical design

4.5 DATABASE DESIGN

Cwalina and Abrams (2005) defined database design as an act that involves analyzing the data to be dealt with, designing and examining it as well as arranging it so that it can suit automated business processes. Cwalina and Abrams (2005) also castigated that database design uses prototypes to facilitate coordination among the system users and the system developers. Database tables need to be normalized so as to avoid redundant database tables.

4.5.1 DATABASE ARCHITECTURAL DESIGNS

Database architectural is a procedure which involves organizing database information and data into modules which are referred to as schemas (Cwalina and Abrams, 2005). The conceptual level, the internal level and the external level are the database architectures three levels and they are also collectively known as the ANSI-SPARC. The major purpose of these three level architecture is to facilitate an independent customised users' view of the database, that is, they outline how the database is physically represented.

4.5.1.1 EXTERNAL LEVELS

The ways in which the database is interpreted by the users is signified by the external level. Each user has a different view of the database so different views are obtained as the database is interpreted differently. The external level highlights how a specific user matches a specific part of the database. User access the database depending on the department they belong to and also depending on the privileges they have according to access levels. For instance staff members have a limited access of the database as compared to the management. The database administrator has full access to the database than any other system users. The sales staff is able to enter daily sales into the system as well as accessing reports of daily sales made. The Accountant is privileged to the investment section where he or she can enter project data so as to determine if it is feasible to carry on the project.

4.5.1.2 CONCEPTUAL LEVEL

The different ways the community interprets the database is exemplified by the conceptual level.

The conceptual level identifies and examines the data that is kept in the database and also identify and examine the associated relationships that exists between the data. The associated relationships that exist on the entities and their attributes are also embodied by the conceptual level. It also embodies how the different departments coordinate with each other, the requests made to the purchases department from the marketing department as well as the allocation of resources to each department. The validation procedures and the schemas that contain authorization are also encompassed by the conceptual level.

Authorization to the database for users to input and access data is placed through the use of usernames and passwords. Access control is also facilitated with the use of different access levels and massages would be thrown in case of wrong usernames and passwords.

4.5.1.3 INTERNAL LEVEL

The database's corporal depiction is denoted by the internal level. This level designates how the database will keep the data by considering file organization and different specified data structures. Further stresses is also emphasized on data encryption and compression procedures, allocating space for data, record placement which is a procedure of collecting records into files, indexes as well as classifying how the database beholds the records. Tables that are found at the internal level include tables of messages and stocks.
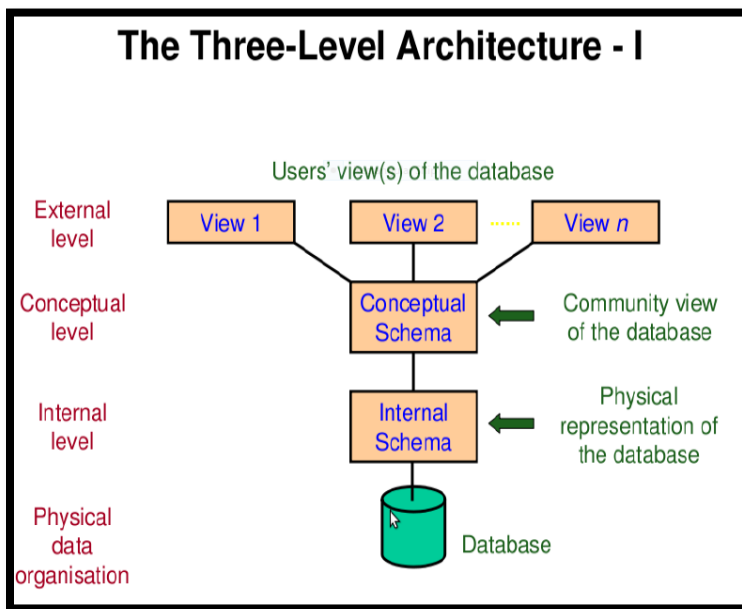
 Fig4.5: Database Design

4.5.2 LOGICAL DESIGN

Dennis (2008) outlined that the logical design of the proposed system reflects the relationship that exists between entities. Entities have sub elements called attributes. All entities have attributes as well as relationships with each other. Attributes help the

designer to differentiate entities and also identify them. Entities are also identified by a unique identifier called a primary key.

4.5.2.1 TABLES FOR PROPOSED SYSTEM

The data structure most basic part is considered to be tables. These tables contain fixed set of attributes and sets of rows also known as tuples.

4.5.2.1.1 USERS DETAILS

Table 4.1 Login Table

FIELDS NAMEs	I DATA TYPEs	DESCRIPTIONS
<u>Id</u>	Interger NOT NULL(10)	Primary'keystrokes
Named	Varchar(55)	User's names
Surnamed	Varchar(55)	User's surnames
Usernames	Varchar(55)	Use of ecumbers
Passwords	Varchar(30)	unique for each user
Access	int(2)	Determine privileges
Departmental	Varchar(55)	location

Cash Sales

All case sales are recorded in the table called cash.

Table 4.2: Cash

FIELDS NAMEs	I DATA TYPEs	DESCRIPTIONS
<u>idle</u>	Int NOT NULL(10)	Primary's key
Description	Varchar (50)	Name of product/customer
Amount	Double(10)	Value of goods sold
Date	date(15)	Date of sale

Assets

Company assets details are recorded in the assets journal.

Table 4.3 Assets

FIELDS NAMED	I DATA TYPED	DESCRIPTIONS
idle	Int NOT NULL(13)	Primary keys
Description	Varchar (50)	Name of asset
Value	Double(10)	Purchases value of asset
Dated	Date	Date

Stock

The stock table contains details of stock bought for the purpose of resale.

Table 4.41Stock

FIELDS NAMES	I DATA TYPE	DESCRIPTIONS
Idle	Int NOT NULL(11)	Primary key
Description	Varchar(35)	Name of product
Quantity	Varchar(100)	Product quantity
Value	Varchar(100)	Product value
Date	date(15)	Date of transaction

Employee

The employee table contains personal details of all employees.

Table 4.5 Employee

FIELDS NAMES	I DATA TYPED	DESCRIPTIONS
idle	Int NOT NULL(14)	Primary's keys
Ecnumber	Varchar(20)	Unique for each user
Name	Varchar(45)	Employee name

Sex	Varchar(10)	gender
Date_of_birth	Date	Date of birth
Contact	Int(11)	Contact phone number
Address	Varchar(45)	Residential Address
Department	Varchar(45)	department
position	Varchar(45)	designation

4.5.2.2 ENHANCED ENTITY RELATIONSHIP DIAGRAM

Gupta (2005) stated that an Enhanced Entity Relationship Diagram (ERR) shows different data structures that exist in the system and how the data flows within.
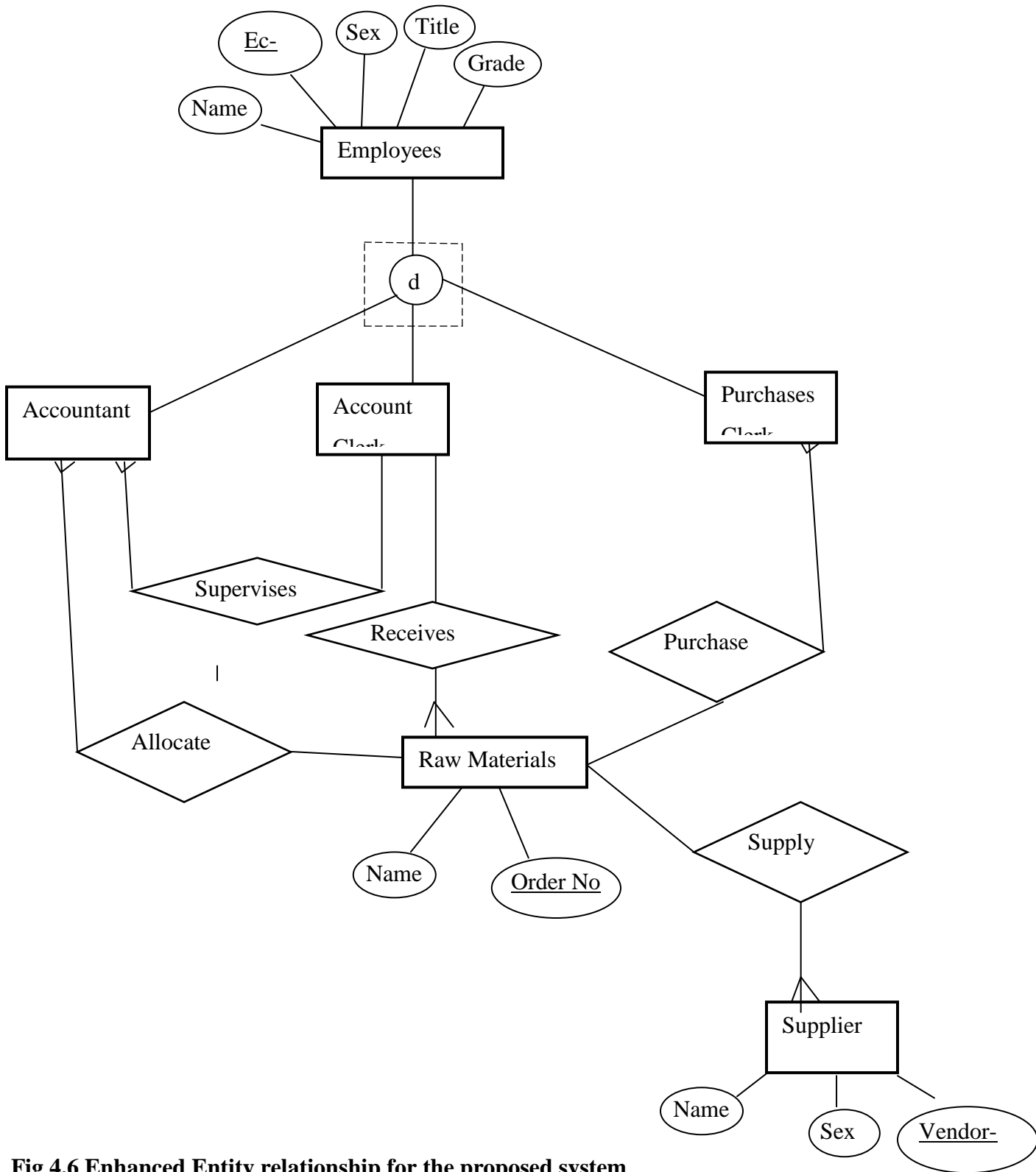
Fig 4.6 Enhanced Entity relationship for the proposed system

Key

ENTITY
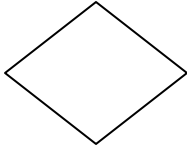
RELATION
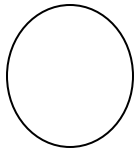
ATTRIBUTE

4.6: PROGRAM DESIGN

The design phase encompasses the generation of blocks of codes that integrates the forms designed during interface design and the source code to come up with a system that can execute tasks as required (Kendall, 2002). Authorization and authentication aspects of the system are specified on the program design section. Authentication is a process which confirms whether the supplied login credential combination match those in the database (Whitten et al, 2003). Access is denied to use the system if the user enters incorrect username and password.

4.6.1 PACKAGE DIAGRAM

Methal (2010) outlines that a package diagram can be derived from a class diagram which shows the system elements and their interdependencies.
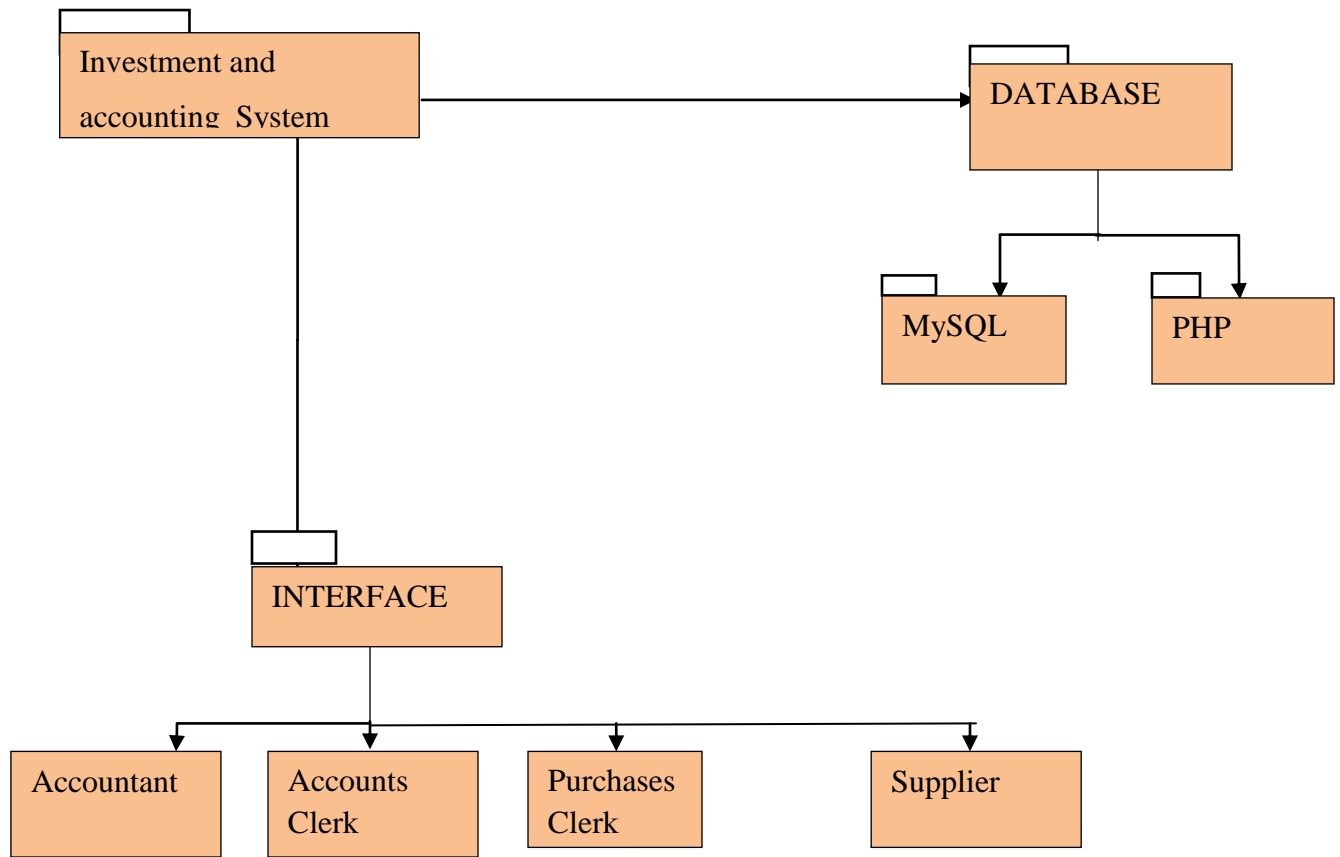
Fig 4.7 Package Diagram

4.6.2 CLASS DIAGRAM

Dennis (2008) defined a class diagram as a diagram that describes the proposed system features but not exploring various processes to be offered by the system. Kendall (2002) outlines that class diagrams show the relationships that exists between entities and classes.

Employee

Ec Number

Sex

Name

Designation

Grade

Login ()

Register()

Designation   (Disjoint, complete)

Accountant

Login ()

Verifies ()

Allocates()

Accounts Clerk

Login ()

Purchase()

Approves ()

Purchases Clerk

Login ()

Receives ()

Allocates

Purchase

Receives

Stock

Name

Order No

Supplier

Vendor Number

Name

Sex

Login ()

Supply ()

Supply
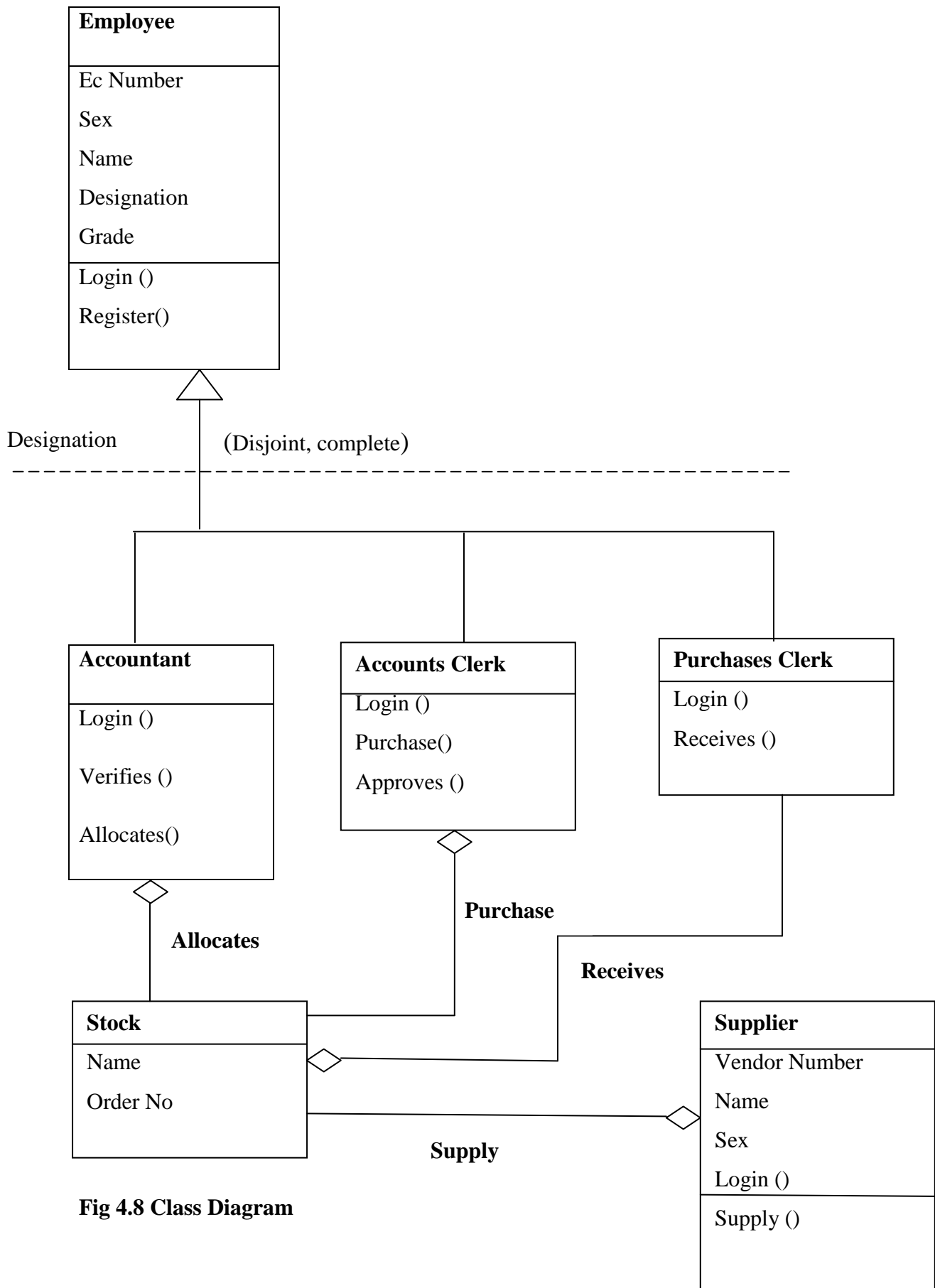
Fig 4.8 Class Diagram

4.7 INTERFACE DESIGNS

Interface design is the procedure of crafting the interfaces of the proposed system by considering various factors which includes the adaptability of the design, the organizational and user chores as well as the transparency and the ease of use of the interface.

4.7.1 MENU DESIGN

Lowery (2002) castigated that menu designing is a procedure which examines and evaluate how the proposed system will capture the data and embodies the description of the system inputs and outputs. The interface to be crafted need to be a graphical user interface in order to provide the system users with easy ways of using the system.

The home page will contain the main menu which consists of login, products, about us and contact us.

HOME	LOGIN	PRODUCTS	ABOUT US	CONTACT US

Fig 4.9 Menu Design

4.7.1.1 MAIN MENU

Each user is welcomed by the main menu after the user successfully log in. The administrator's main menu consists of Account Home, Users, Search, Logout.

ACCOUNT HOME	USERS	SEARCH	LOGOUT

Fig 4.10 Main Menu

4.7.1.2 SUB MENUS

Submenus provide the user with more options to execute system processes. The links for carrying basic database operations such as inserting, updating and deleting records are usually located on sub menus.

4.7.2 INPUT DESIGN

Somerville (2007) defines input design as the procedure of transforming a user oriented depiction of the inputs to a digital-based business system into a programmer-oriented requirement. The following should be included in the input design; documentation of the field length; Data entry point should allow a specific data format so as to reduce capturing of irrelevant data; the format of the data on the entry point should match the format of the data that can be held by the fields on the database table (Lowery, 2012).

4.6.1.2LOGIN PROCESS CHARTS
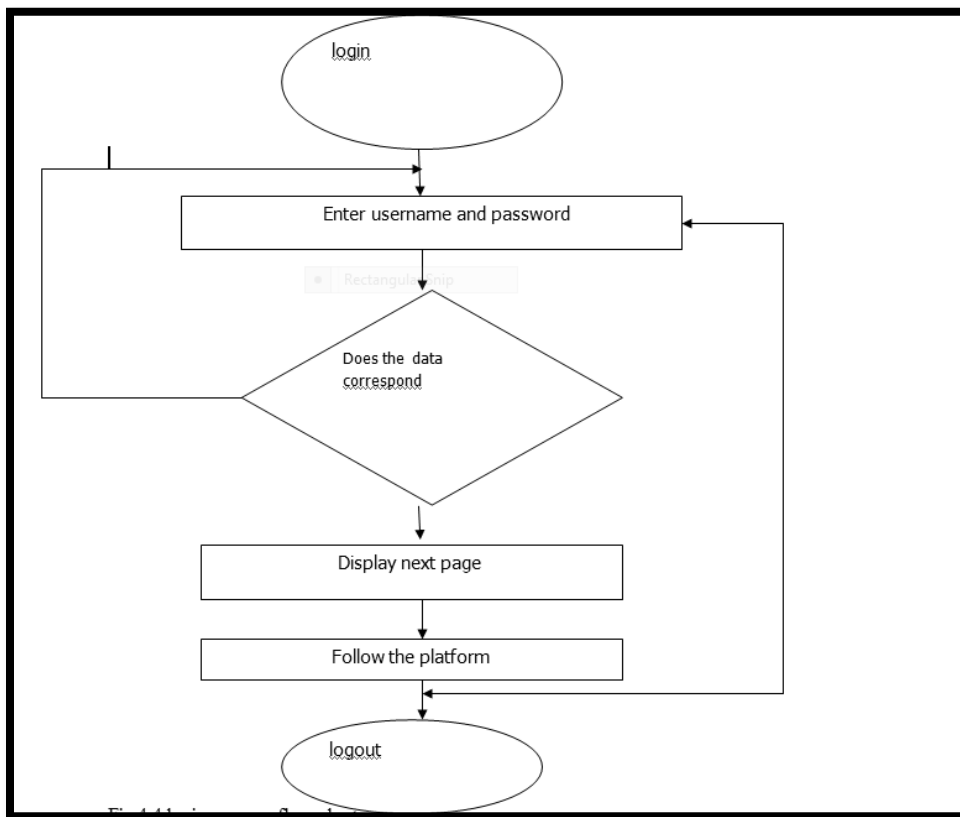
Fig 4.110Login Chart

4.6.1.3USERS LOGIN FORM

The user should provide correct log in credentials to access the secret pages on the system. If wrong login credentials are provided, an error message will pop up. This login section provides the security to the system by avoiding unauthorized access to the system.
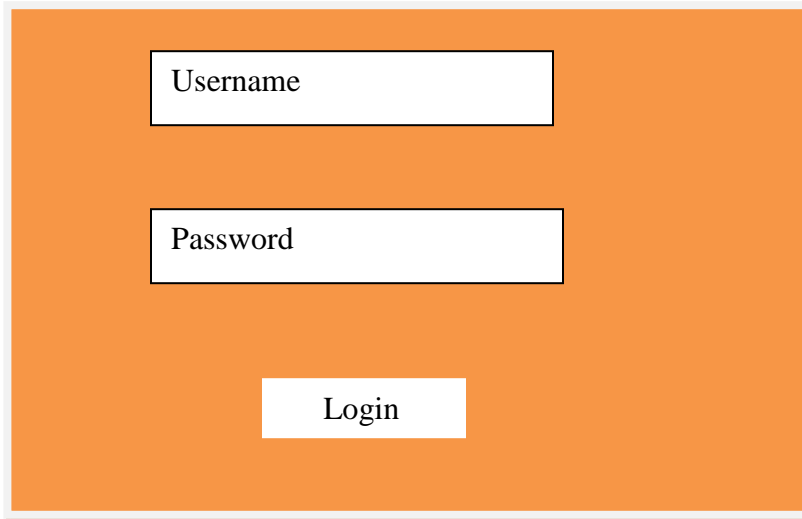
Fig 4.12: Users Login

The cash sales form provides the sales clerk with the platform to record all cash sales.
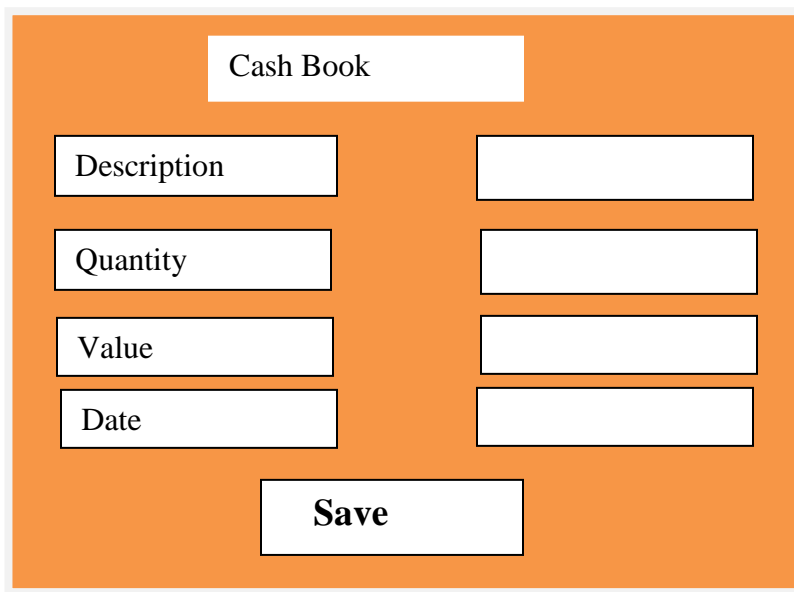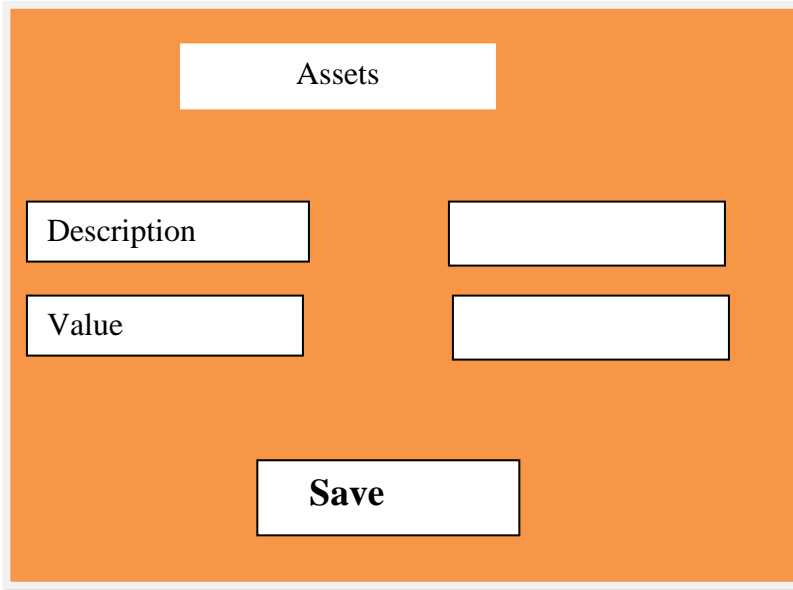
Fig 4.13 Cash Saless

4.6.1.5 ASSETS

The assets form provides the accounts clerk with the platform to record all company assets.
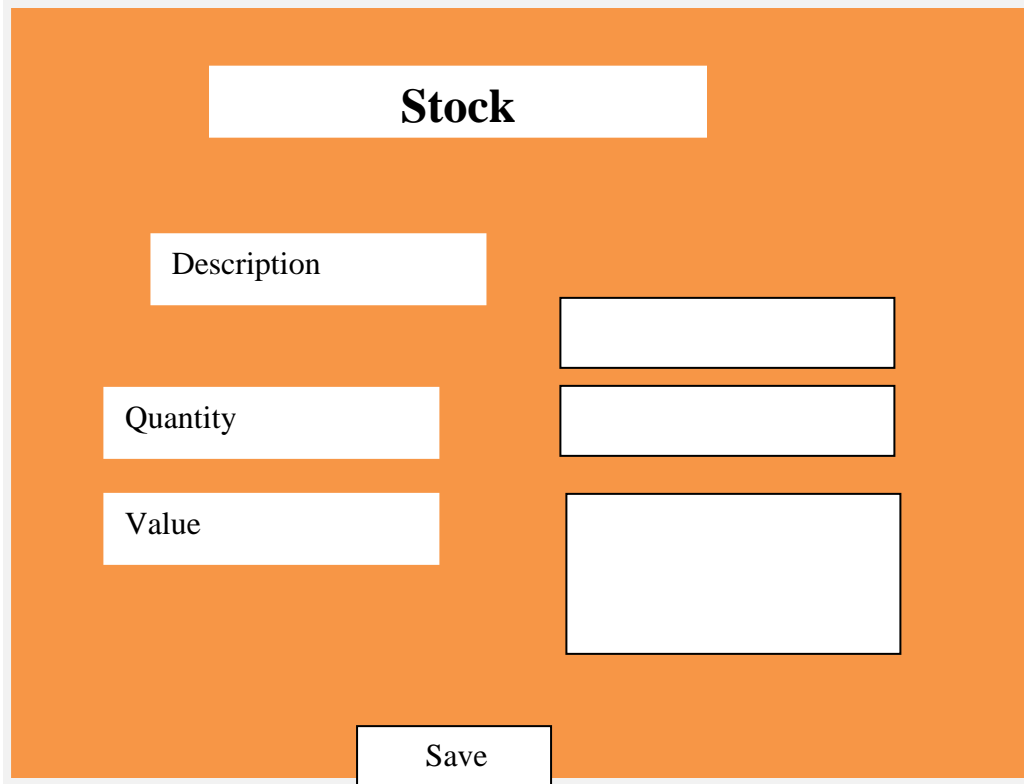
Fig 4.14 Assets

4.6.1.6 Stock

The stock form provides the accounts clerk with the platform to record all the stock bought for resale.

Fig 4.15 stock

4.6.1.7 REQUESTS FOR STOCK

The raw material request form provides the sales department the platform to request for stock from the purchases department. They specify the quantity needed.

Fig 4.16 Requests form

4.6.1.8 MASSAGES FORM

The messages form provides a chat platform which allows communication by sending private messages.

Fig 4.17 Employee Feedback Form

4.6.1.9 SEARCH SALES REPORT BY DATE

The sales report is generated after the user searches for a particular date.

| Date | | Fin |

Fig 4.18 Search sales report form

4.6.2 OUTPUT DESIGN

The major role of output designs is to deliver the outcomes of the request made from the system by the system users (Shelly and Rosenblatt, 2010). The system's usefulness is evaluated by considering the outputs of the system and these output generation is the major reason for developing a system. Lowery (2002) stated that the system should produce valid and accurate output and release relevant output at the right time.

4.6.2.1 INCORRECT LOGIN DETAIL

If the user enters wrong login credentials, an error message pops up.

Fig 4.19 Incorrect login

If the users successfully enter data into the database, a confirmation message will pop up.

Fig 4.20: Successful Record entry

4.6.1.13 EMPLOYEES FEEDBACK

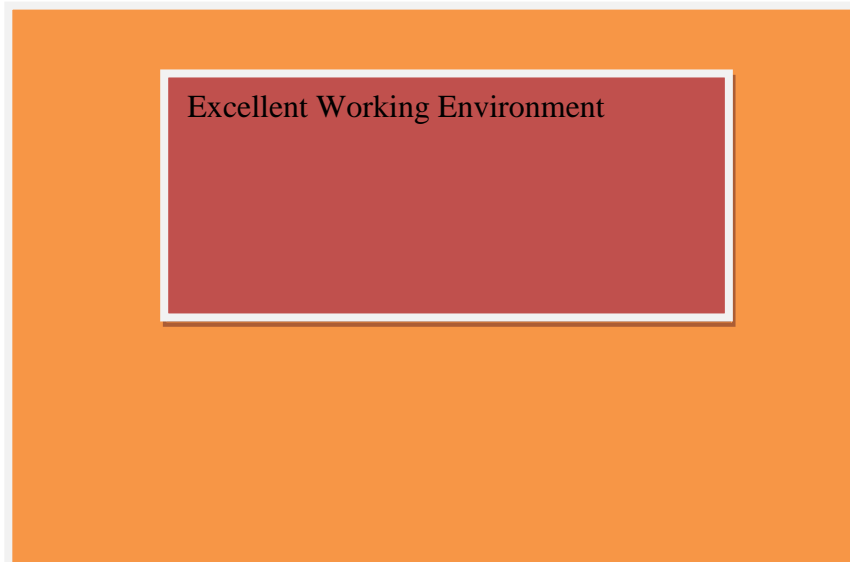**The users will receive private messages through the system.**

Fig 4.21: Feedback

If the sale manager send a request for stock a success confirmation message pops up.
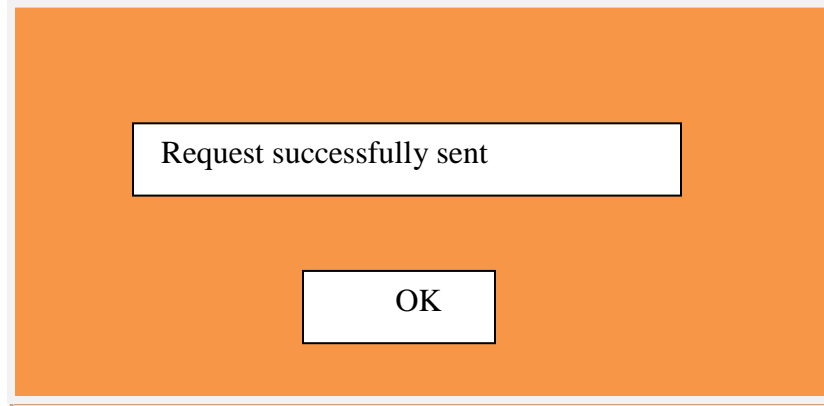
Fig 4.22 Request Sent

4.8 PSEUDO CODES

Login

Check for database connection

If there is connection

    Enter login credentials

     If correct

        Access a secret page

     Else

        Access is denied

Adding a new user

Enter encumber and login details

    If encumber already exist in the users table database

        User already created

  Elseif password exists

        Choose another password

  Else

        User successfully created

Record Cash Sales

Enter sales details

    If successful

        Record saved

  Else

      Error massage

Record Assets

Enter asset details

    If wrong input format

        Error-input valid details

Else

    Record saved

Report Generation

Enter search phrase

    If match found

        Display details

    Else

        No report

4.9 SECURITY DESIGN

Dumber (2013) defined security design as a process of employing methods and techniques to both software and hardware tools with the aim of minimizing vulnerabilities and risks associated with the implementation of a new system.

4.9.1 PHYSICAL SECURITY

Physical security portrays efforts to establish safety that are intended to deny unapproved access to offices, data and assets, and to shield work force and property from harm or mischief like theft, vandalism, natural disasters or terrorist attacks (Dumber, 2013).Some measures that can be employed to aid physical security include utilization of numerous

layers of reliant frameworks which incorporate CCTV observation, security monitors, defensive obstructions, locks, secured access control conventions and protocols, and numerous different methods.

4.9.2 NETWORK SECURITY

This refers to the protection of a computer network infrastructure and all of its traffic and resources by an organisation (Kendall, 2013). Network security includes the approval of access to information in a system, which is controlled by the system administrator. Some measures aid to the security of a network includes the use of antivirus software. The most well-known and straightforward method for securing a network resource is by appointing it a distinct name and a relating password. In network security, a network can be best defensive when secured in layers in order to sift out threats by way of encryption, authentication and malware detection.

4.9.3 OPERATIONAL SECURITY

Gregory (2014) defines operational security as a process of identifying and protecting classified and crucial information that can be interpreted as useful or beneficial to an adversary in business. It focuses on securing the processes and business operations of an organisation from being breached via a network. This is important as it limits competitive advantage on the part of the organisations that is developing a new system. Some ways to assure operational security can be through the use of email encryption during communication to counter spoofing and electronic eavesdropping.

4.10 CONCLUSION

This chapter has shown the database schemas that are going to be used on the proposed system and has served as a guide on how the proposed system is going to be assembled. The relationship of the proposed system with its external factors has been shown in the form of a context diagram and the system processes have been highlighted in the Data Flow Diagram. The major part of the data structure was shown by constructing the tables and building relations between these tables. It is ideal to go to the next stage where the system design is to be converted into a real system and then tested for functionality.

CHAPTER 5: IMPLEMENTATION PHASE

5.1 INTRODUCTION

The implementation phase is the phase which involves delivering the proposed system to the users after the system has been completed. This process is carried out after the system has been thorough tested for bugs, tested for validation and verified, installed on the hardware environment on which it will operate as well as the users had been trained on how to use the system. This phase tests the system if the intended objectives of building the system have been met as well as verifying if the system is error free. The solutions are formulated to curb different types of errors that can arise when using the system with the aim of ensuring that the functional requirements of the system are met. Security measures are implemented on the system to prevent unauthorized access to the system and make sure the users only access the section of the system intended for them.

5.2 CODING

According to Butt (1994) he suggested that coding is a technique of designing a program that can be executed to come up with a functional system. The Investment and Accounting Management System was designed using the Adobe Dreamweaver CS6 and the database is also designed using MySql. The coding phase is also defined as the physical creation of the system using programming languages such as JAVA, PHP and Visual Basics (Schwalbe, 2006). Coding involves debugging of the newly proposed system and running the unit testing.

5.3 TESTING

Tran (1999) outlined that system testing is a process whereby the organisation's management committee is given access to test the system whether it meets the intended objectives or not. System testing involves the following: testing each unit of the system; testing each module of the system; testing the system as a whole as well as acceptance testing (Rahardjo, 2006). The system is tested by considering the validation and verification aspects of the system and these aspects helps the management to carry deep analysis of the system to verify if the functions of the intended system are met. Errors are

checked on the system and the system developers will deduce solutions that will curb all the identified errors. Fig 5.1 shows the testing stages of the system.
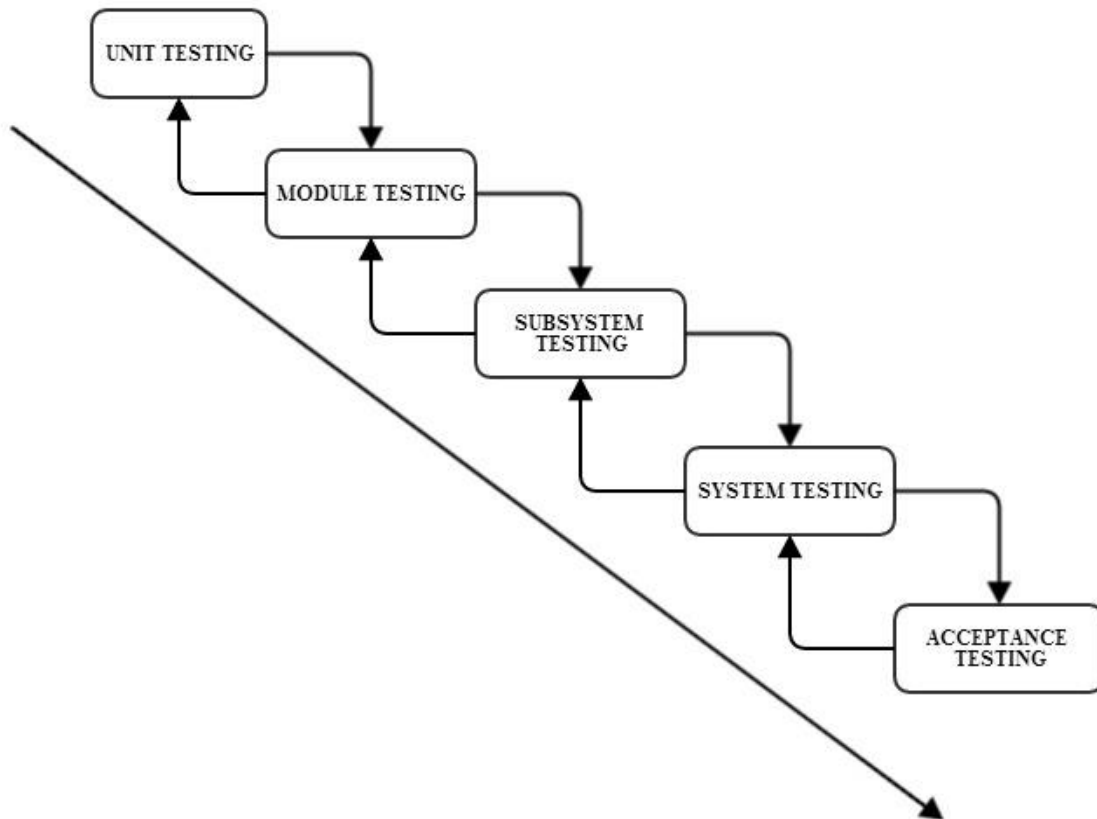

Figure 5.1: Testing stages
Source: Perry (1983)

5.3.1 UNIT TESTING

Unit testing is a process of identifying errors on the sytem by checking on a specific system section (Bently, 2011). Unit testing may involve the system designer running tests to see if the section that connects the server and the database can debug. The aim of system testing is to verify if the functionality to be provided by a small system section is met. Unit testing involves gathering errors that may result in system failure as well as

consolidating the functionality of the system with the user requirements (Rahardjo, 2006).

5.3.2 MODULE TESTING

Module testing is a process of testing the system by combining two or more units that are related to each other and test them together to see if they can execute their tasks together (Jawadekar, 2004). The developer integrates the units to be tested in a logical manner and identifies any errors that may arise as a result of combining the system units. The developer may integrate the Accounting section with the marketing and purchases section to verify if th sections are able to work together using a shared table. The system designer will keep on adding units to those tested until all units are tested.

5.3.4 SYSTEM TESTING

Kivento (2006) defined system testing as the integration of all system modules to come up with a complete system and test the system as a whole. The performance of the whole system is identified and any errors that may have arisen by integrating system modules are addressed. System testing also aims to find out if the organization is more effective when using the new system or not. The performance of the new system is compared to that of the old system. The system is tested by inputting the data into the system and find out how the system will produce and present the output. Black box and white box testing are the two methods used to test the whole system.

5.3.4.1 BLACK BOX TESTING

Mockler (1911) defined black box testing as retrieving the system's output by inputting the data into the system. Tannenbaum (2010) further clarifies that black box test is used to test the functionality of the whole system. Black box involves the input function that retrieves an output of the software package (Mockler, 2011). Tannenbaum (2010) states that the functionality of the whole system is done with the black-box test. This testing is also applicable in a situation whereby calculations may be required in the system. This

section of the black box depicts the functionality of the whole system. This phase also enables the project to be user friendly and meeting user requirements.

5.3.4.2 WHITE BOX TESTING

According to Butt (2004) white box is an aspect derived from the source code rather than the functionality of the system. This means that the system's specifications are not considered but what matters is the execution of the code. Mostly the developer generates errors using the white box and gives solutions relating to the code execution (Mockler, 2011).

5.3.5 ACCEPTANCE TESTING

This testing was used as the final stage to check if the organisation will accept the system before they could put it into use. Information which was obtained from the users of the system that is the editors, supervisors and the rest of the staff was used. The system proved to be very efficient although some errors were detected which were subsequently corrected immediately. The organization pronounced that the performance of the system was profoundly above standard. Rankl et al (2008) states that acceptance test is mainly done to see the reaction of the users towards the attainment of the objectives of the organisation. Williams (1999) came up with two ways of testing for acceptance and these two ways includes alpha and beta testing and these two are best described below.

5.3.5.1 ALPHA TESTING

Rosenblatt (2011) postulate that this type of test involves the delivery of the system to the organisation to use and errors are tested .If errors are found the developer brings necessary solutions to solve the problems. On this section the system passed because it was delivered to the directors and the users of the system.

5.3.5.2 BETA TESTING

Rosenblatt (2011) outlined that beta testing is a process of using real facts presented by the administrator and the directors as well as the subordinates. Some of the functionality
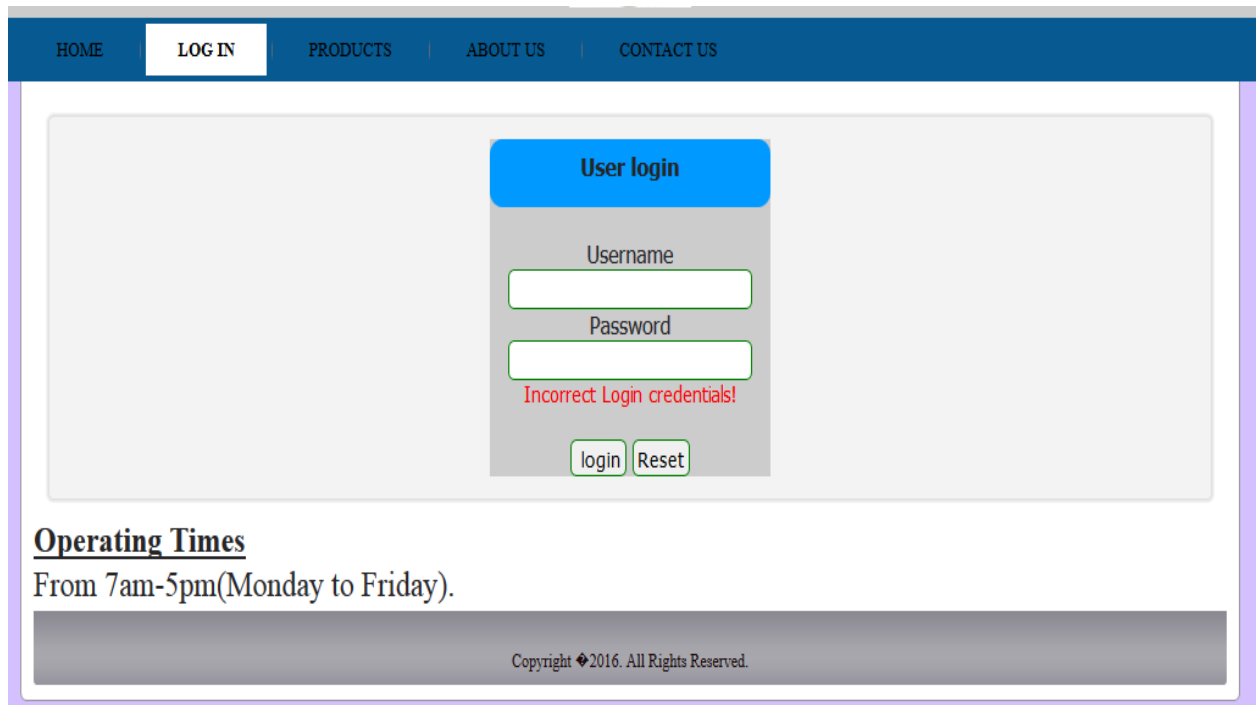
may be left out and the system may fail to meet the intended goals but as the developer did the beta test the system delivered well (Brien, 1996).

5.3.6 TESTING STRATEGIES

The various testing strategies were implemented to ensure that the correct system functionality could be met. Errors such as syntax errors and database connection errors were noted and fixed. For example negative EC numbers could be accepted on the login forms which were not authentic.

5.3.6.1 VALIDATION

Jawadekar (2004) indicates that validation is the art of checking the system performance, strengths and weaknesses as well as evaluating the objectives of the system. This means that the final software package is checked to see if the intended goals are met. It can also be the comparison of data entered and the output. On this phase the system is checked if it is accepting valid inputs. For example text or numeric values should be used and in case of errors an error message should pop up (Brien, 1996).
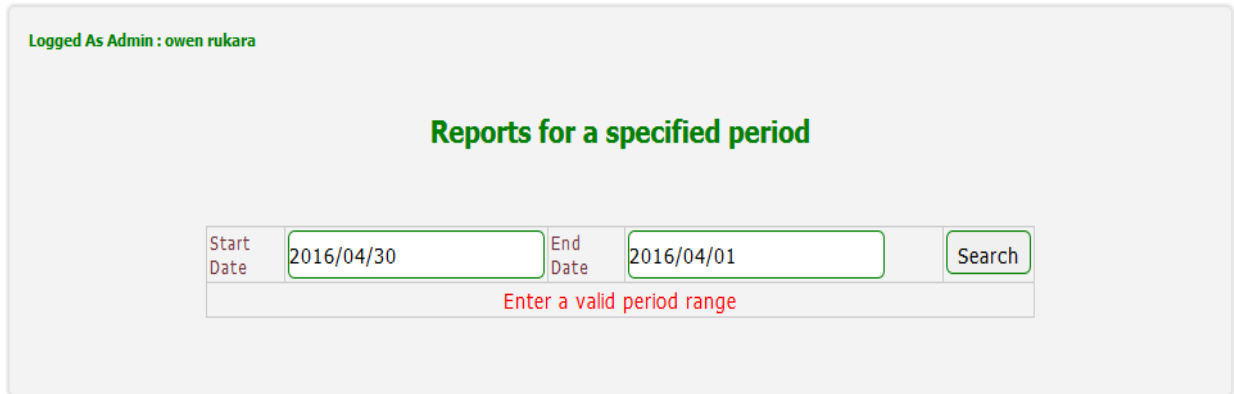
Figure 5.2: Login Validation

Figure 5.1 shows the user login form. System users log into the system using the same login platform but they access different system sections basing on the access levels imposed to them. If a user enters wrong log in credentials, the system will pop an error massage.
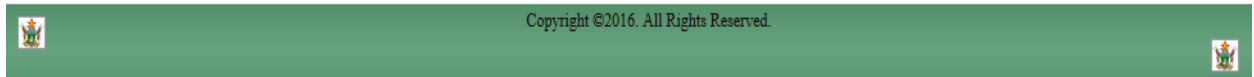

Figure 5.3: Search Validation

The search form provides the user the platform to search records for a specific period. The user enters the start date and the end date. If the user enters an invalid period range an error message pops up prompting the user to enter the correct dates. For instance if the start date is greater than the end date, an error message will pop up. An error message will also pop up when the user enters the future dates-the system will only produce an output if the dates entered have passed and the start date is less than the end date

Figure 5.4: Send Message Validation

The messages form provides the production manager, the purchases manager, marketing manager and the accountant the platform to chat by sending private messages. The message form requires the user to select the recipient of the message as well as a text area to enter the message to be sent. If the user does not select the recipient or does not fill the message text area appropriate error messages will pop up prompting the user to select the recipient and also write a message.

Fig 5.5: Budget Validation

The production budget form provides the user with the platform to set the production budget for the upcoming months. The production budget is expressed in litres. A minimum production budget of 120 000 litres and a maximum of 360 000 litres per month is allowed. An error message will pop up if the user enters any amount which is less than 120 000 or greater than 360 000 litres per month.

5.3.6.2 VERIFICATION

According to Dennis (1997) verification is a test of the user functionality on the system in comparison with the given objectives. This means that the developer confirm whether the running system has the correct functionality as intended by the end users. Rankl et al (2008) says that the verification stage requires the developer to confirm whether the system can meet certain operations as intended by the organisation.

Fig 5.6: Raw Materials Budgets

The raw material budget platform fulfils the objective of setting raw material usage budgets. The raw material budget form provides the user with the platform to enter the maximum amount of raw materials needed to carry out the production process for the whole month. The raw materials budget will be compared with the actual raw materials used to verify whether the variance is favourable or not.

Fig 5.7: Production Budget

The production budget platform fulfils the objective of setting raw material usage budgets. The production budget form provides the user with the platform to enter the

minimum production quantity for the whole month. The production budget will be compared with the actual quantity produced to verify whether the variance is favourable or not.

Fig 5.8: Production Schedule

The daily production or sales schedule sheet shows the production and sales target for that day, available raw materials and available human resources for production. The platform compares the production target and available resources to verify if the resources available are sufficient enough for the production session.

Fig 5.9: Search form

The search form fulfils the objective of generating daily and monthly reports. The search form provides the user with the platform to enter the dates for which the report is needed. The reports will be presented as shown in **Figure 5.10**.

Fig 5.10: Reports

The reports platform shows the date of production, the target production and the actual quantity produced as well as the variance. An adverse variance will be presented in red color.

Fig 5.11: Chat Form

The chat platform is a platform that is used by the production manager, production supervisor, purchases manager and accountant to communicate with each other. The production supervisor can only communicate with the production manager and the purchases manager communicates with the production manager and suppliers.

5.3.6.3 SYSTEM OBJECTIVES VS SOLUTION

Objectives are desired end results or targets that the system seeks to achieve (Jewell, 2004).The proposed system objectives were met as displayed on the following figures.

5.3.6.3.1 OBJECTIVE 1

To develop a computerized system that will offer the platform for setting and adjusting benchmarks to be used to compare production outputs.

Solution (a)

Any credit sales made will update control accounts

TOTAL DEBTORS

Date	Amount	
20 October 2016	$ 15	Edit Delete

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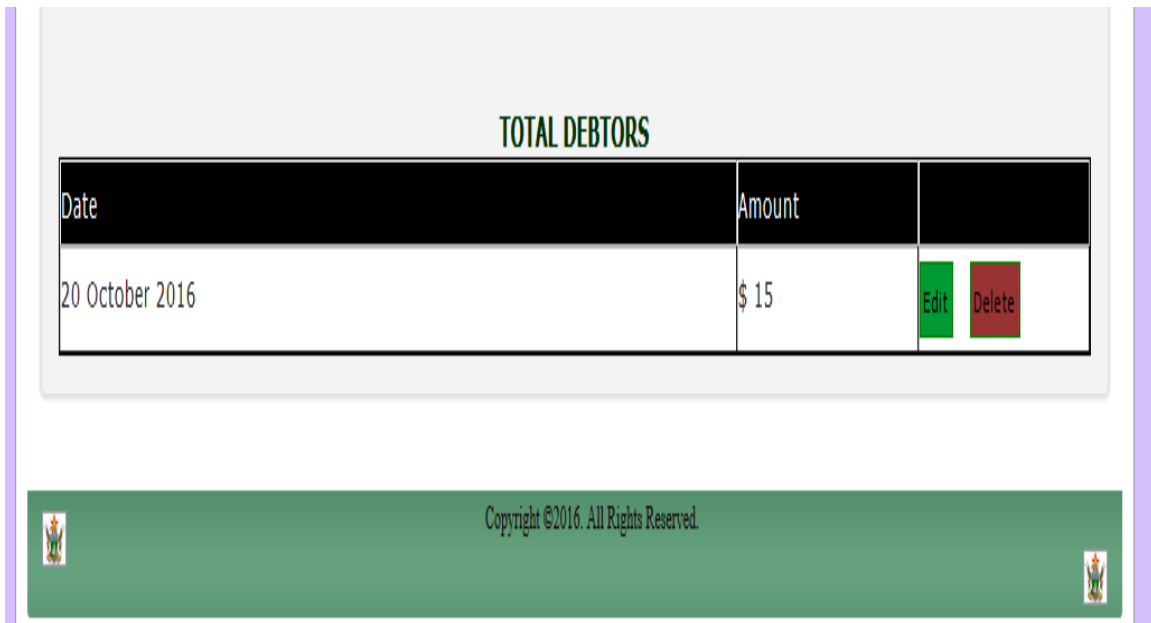
 Fig 5.12: Screen shot for objective 1

5.3.6.3.2 OBJECTIVE 2

To develop a computerized system that will provide information for on-going control of business activities and formalization of management plans by preparing budgets.

Solution (b)

Cash budget, raw material budget and sales budgets will be prepared

Logged As Manager: owen rukara

Raw Material Budget

Month	Select.... ▾
Year	2016 ▾
Quantity (Tonnes)	100
	Save

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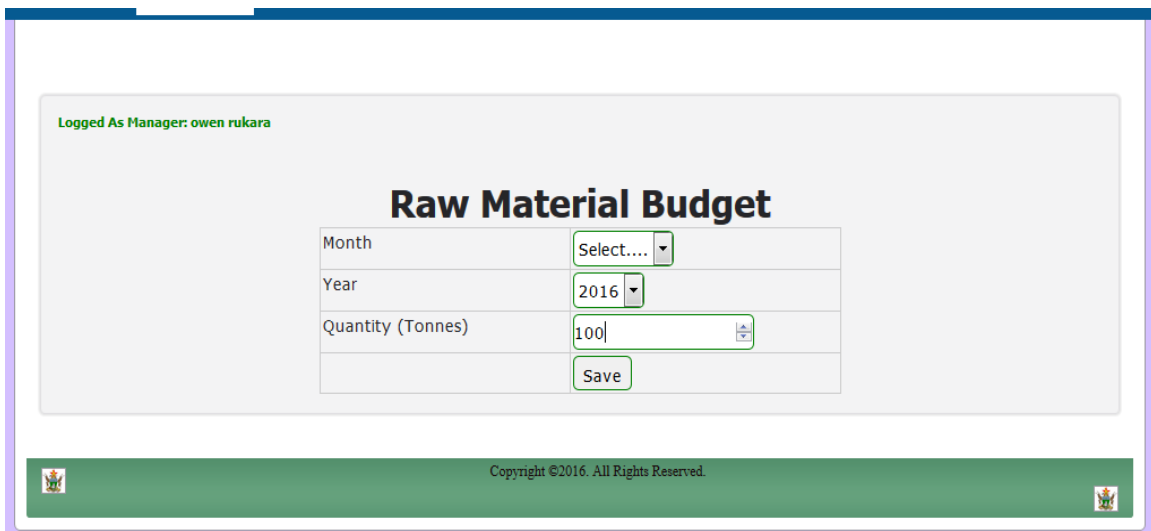
 Fig 5.13: Screen shot for objective 2

5.3.6.3.3 OBJECTIVE 3

To develop a system that has a section for interpretation of accounts by using ratios. This will help in analyzing past events, planning for the future and to acquire loans as the Bankers and Finance Houses may want to access the credit worthiness of the business.

Solution (c)

The system will calculate ratios.

Logged As Supervisor: C Bvuma

Stockturn $\quad \dfrac{702}{64} = 10.97$ times

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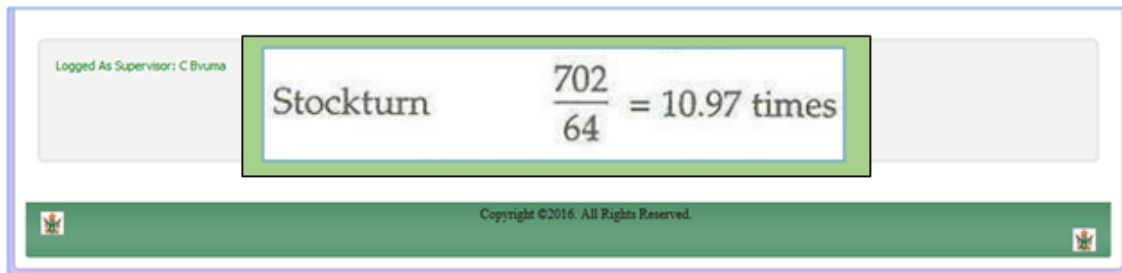
Fig 5.14: Screen shot for objective 3

5.3.6.3.4 OBJECTIVE 4

To develop an automated system that will automatically prepare financial statements and quickly reveal the financial position of the organization by simply clicking a button.

Solution (d)

The system will prepare trial balance and balance sheets.

Fig 5.15: Screen shot for objective 4

5.3.6.3.5 OBJECTIVE 5

To develop a system that will show the level of investment by using investment techniques such as payback period, accounting rate of return and net present value.

Solution (e)

Testing whether the system can calculate Net present value

Logged As Supervisor: C Bvuma | Net Present Value

		$	10%	NPV $	14%	NPV $
Year 0	Outlay	(100,000)		(100,000)		(100,000)
1	Net receipts	28,000	0.909	25,452	0.877	24,556
2		28,000	0.826	23,128	0.769	21,532
3		28,000	0.751	21,028	0.675	18,900
4		28,000	0.683	19,124	0.592	16,576
5		28,000	0.621	17,388	0.519	14,532
Net present values				$ 5,120		$ (3,904)

Fig 5.17: Screen shot for objective 5

5.4 INSTALLATION

Vermillion (2004) postulate that an installation is a launch of the software packages for use in the organisation. The new system is put in place of the old system and it is integrated with other software packages. The software package is installed on the appropriate machines of the organisation. Before phasing out the old system the organisation may choose to use the systems concurrently to compare the effectiveness and the functionality of the systems. When this is done the developer undergo certain

Fig 5.19: Screen shot for objective 7

activities such as training of workers, file conversion, system changeover and pilot operation is carried out.

5.4.1 USER TRAINING

According to Roger (2005) training is a process of adding value to workers with skills in an organisation. The training sessions are done to familiarise the end users with the newly launched system. Both the management and the subordinates are trained to gain experience in using the new system. The developer demonstrated the different modules of

Fig 5.18: Screen shot for objective 6

the system and questions were tolerated. The trainees were free to posse questions and to give queries to all the modules of the system.

5.4.2 PHASED CONVERSION

Phased conversion was eliminated because it focuses on implementing the system modules in phases yet, the integrated nature of activities in the system are such that it would be difficult to appropriate for all project costs if all the modules are not delivered at the same time. All the modules require input from other modules. It would be difficult to appraise the system in terms of its objectives if some of the essentials in each module are not considered together. Non-concurrent implementation these modules would make it more complex and difficult to reconcile the output from both the new and old system during this conversion period.

5.4.3 DIRECT CHANGEOVER

Hughes (2001) states that direct changeover is a direct way of shifting from the old system to the new system. This method restricts the developer or the end user from comparing the functionality of the new and old system. The technique limits the users from using the old system concurrently with the new system (Whitten, 2003).
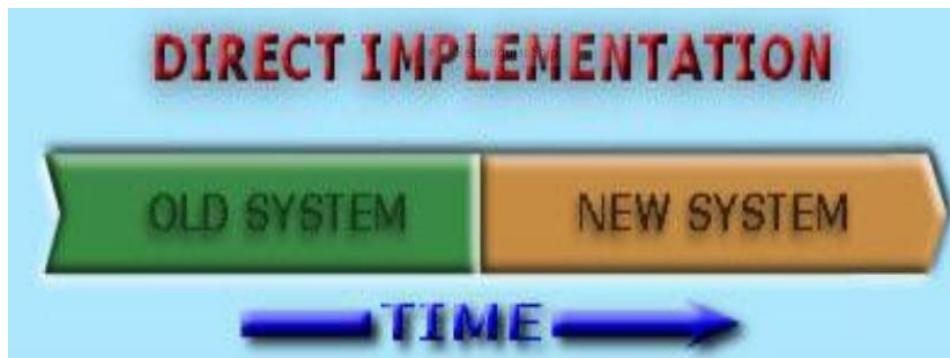

Fig 5.20 Direct changeover method
Source: Perry (1983)

5.4.4 PARALLEL RUN (RECOMMENDED CONVERSION METHOD)

Kendall (2011) parallel run is a method of switching all the operations to the new system while using also the old system to make some quality measures. The parallel run method

of conversion was chosen as the best method for switching all operations to the new system. According to Wixon (2008) running the old and new system concurrently gives assurance to the developer on how effective the new system is. The new system can adequately fulfill all user requirements.

Fig 5.21 Parallel Implementation
Source: Perry (1983)

5.5 MAINTENANCE

After implementation the system needs to be maintained to make sure that it complies with the end user requirements (Gupta, 2005). The process involves making modifications to the system so that the system continues to provide the required and needed support.

The following types of support were looked into:

5.5.1 CORRECTIVE MAINTENANCE

Otero (2003) postulate that corrective maintenance is the course of action taken by the developer to detect possible errors relating to the system through system execution. All tests performed on the system up to the time of delivery may or can never be deemed to have been completely exhaustive therefore some unidentified bugs (program code errors) which affect the normal functioning of the system may be discovered as the system is in operation. Bugs may be in the form of miscalculations, truncation or concatenation of figures when a summation of those figures was actually intended (possibly due to inappropriate data types being used for storing the data items being manipulated in the system. According to Mishra (2012) corrective maintenance involves the act of rectifying bugs that compromise the security objectives of the system.

5.5.2 ADAPTIVE MAINTENANCE

Otero (2003) states that adaptive environment under which the system operates may impose certain new requirements that call for change. In such situations, an adaptive maintenance approach may need to be taken so as to adapt and make the system compliant with those new requirements.

This adaptive maintenance approach, implemented as soon as changes occur in the environment, will in turn reduce the risk of the organization facing heavy penalties for non conformance to prescribed standards. Adaptive maintenance is a situation or condition calling for change on the system environment (Rosenblatt, 2011). This may be as a result of growth of the organisation.

5.5.3 PERFECTIVE MAINTENANCE

Perfective maintenance involves the use of more efficient techniques to implement the system functionality (Sommerville, 2004).It may actually be discovered at later stages that there are some quality issues that were compromised in the development of the new system as a result of some constraints that were faced during development e.g. time, technical expertise and financial resources to set up a very robust hardware and software platform on which the system can actually be configured. A perfective maintenance approach may need to be taken so as to incorporate these new techniques into the system. This will help the organization in maintaining a competitive edge. According to Rosenblatt (2011)   perfective maintenance involves the improvement of the software applications so that it functions at an optimum level.

5.6 RECOMMENDATIONS

From what the developer gathered throughout the Life cycle of the project, the system can be installed and begin to be used with immediate effect. The users are recommended to stick to the basics learnt during the training, and should they face any problems, they should consult the system administrator. The users should not disclose their password to any unauthorized personnel or let anyone temper around with the system.

The system users should also consult the user manual to familiarize themselves with the system. The users can simply use the system with minimal training because of the

friendly user interface but if they do not know how to exactly go about the system, then the user manual will be productive in information on how to fully utilize the system.

Delta Corporation is recommended to be consistent with all levels of maintenance because it is an integral process as far as the performance of the system is concerned. Maintenance should be included in the core activities of the organization.

The newly developed system should be appraised consistently from time to time and see whether it managed to meet all objectives and functional requirements that were specified in the project proposal and analysis phases respectively.

5.6.1 SUGGESTED IMPROVEMENTS

(i)   The system should be uploaded on the Internet. This means that the system should be web enabled

(ii)   Upgrade the Database System to Microsoft Server 2012, a more robust and scalable multi-user Database Management System.

(iii)   Improve on the user rights to also include read and write rights in addition to the access levels.

5.6.2 CONSTRAINTS AND LIMITATIONS

However, there were some shortfalls that were encountered in the development and implementation of the system. These include:

- Scarcity of time. Time was scarce to have carried out enough research therefore the system was built to quickly meet the organizational needs disregarding what the market really needs. There was need to investigate the systems that other organizations were using.

- The system is currently running on Mysql 5 database, which is not the best Relational Database Management System. Instead Microsoft Server 2012 is more appropriate for a multi-user environment.

- Resources were limited. There was no money to buy bond paper to print the documentation.

5.7 CONCLUSION

The users have finally welcomed the system because they had identified that the system meets all their requirements and also provided other functions that were beyond their expectations. No major challenges were faced by the users in using the system. All system testing strategies were applied and the all the problems found were solved immediately. The implementation phase aspects proved that the developed system is worthwhile.

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APPENDICES

APPENDIX A: **USER MANUAL**

The user manual is a high level view of the functionality of the system designed to help users cope up with the easy accessibility of the system. User's manual consists of all set of modules necessary to grant users privileges in accessing the system. This User manual will present all the functionality of the system.

GETTING STARTED

Investment and Accounting Management System is an electronic system that facilitates the efficient recording of stock, sales and assets allowing coordination of organisational activities. The system works as an intermediate between the production department, administration department, sales department and purchases department. It allows the purchases manager to prepare purchases budgets, the production manager to prepare raw material usage budgets as well as generating financial reports.

http://www.delta.co.zw is the web address of Delta Corporation. Upon clicking the URL address, you are then redirected to the home page.

Fig A1: Delta Corporation Home Page

The homepage comprises of four platforms the HOME, NEWS, ABOUT US and CONTACT US as well. Each menu item serves different functionality.

THE LOGIN

The login platform grant access only to those with privileges, for instance the administrator, accountant, production manager and purchasing manager. Access is limited to those without the privileges. Access is granted through authenticating users by providing passwords and usernames.

Fig A2: Login Form

Upon clicking the correct credentials, staff members and the admin are given access into the system with full access of all services given to the admin and staff limited within given parameters. If the user enters wrong login credential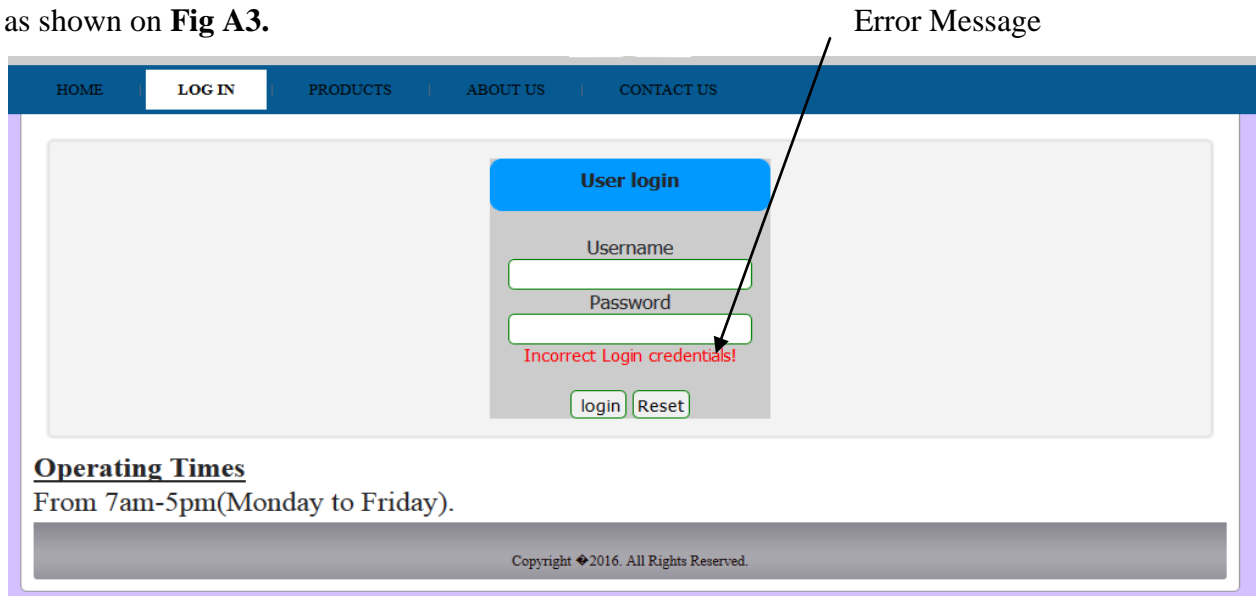s, an error message will pop up as shown on **Fig A3.**   Error Message

Fig A3: Login Form

Changing Password

Every user of the system has a platform to change the password. It is advised that the user has to change the password after two or three month in order to secure for unauthorized access to the system. To change password enter the old password in the textbox labeled "Old Password". Enter the new password in the textbox labeled "New Password" and confirm password by repeating the new password in the textbox labeled "Confirm Password".

Fig A3: Change Password Form

ADMIN MODULE

The administrator controls and monitors all services that are within the system. All services offered to various departments, the admin has full access on them. The administrator is the one who create staff members departments, each department is recognised by its own access level.
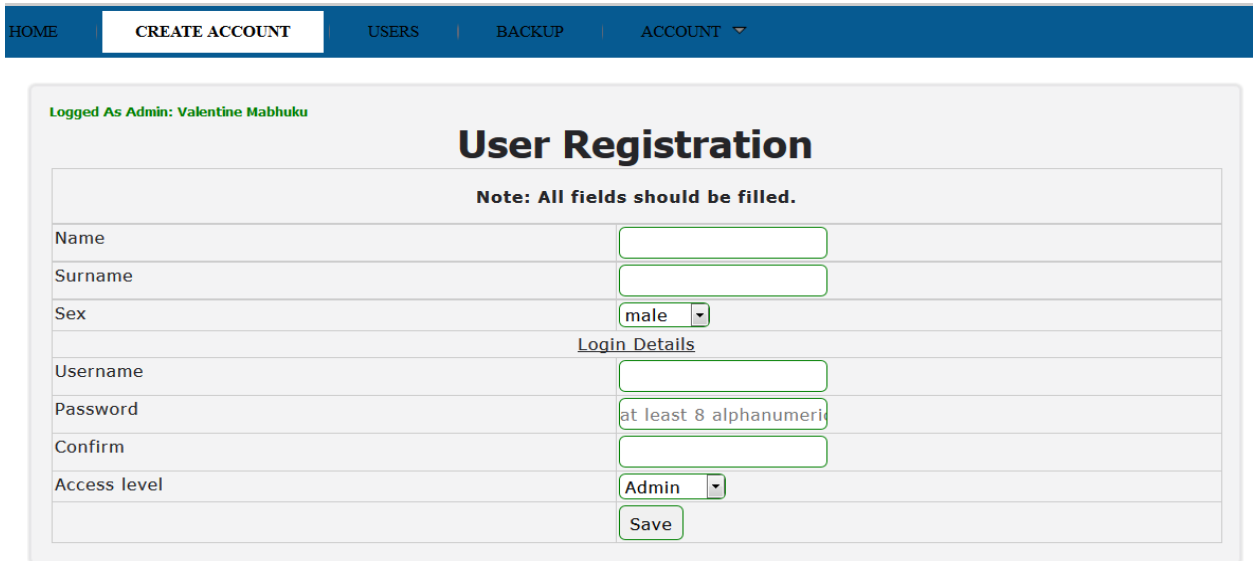
Fig A4: Admin Module

CREATING USERS

The administrator has the privilege to create and delete users. The administrator views all the system users and can access any section of the system.

Fig A5: Create User

PREPARE PRODUCTION BUDGET

The production manager is the one who is responsible for creating production budgets. Budgets can only be prepared for the current and future months only. The budget will be the quantity that is supposed to be produced in a given month. Only valid and reasonable tones will be accepted by the system.

Fig A7: Production Budget

RECORD SEARCH

All the system users have the platform to search for records but what differs is the record to be searched. The search record form gives the platform to specify the period by allowing searching using dates. Only a valid period range will yield results.
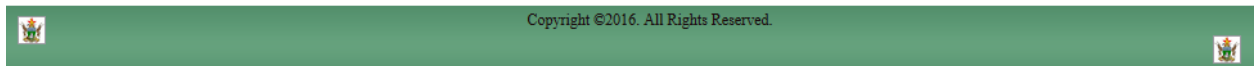
Fig A8: Search Record Form

PRODUCTION REPORTS

The production manager has the platform to access the production reports for a specific period. This platform shows quantity produced, budgeted quantity as well as the variance.

Fig A9: Production Report

Ratios

The system has a section for interpretation of accounts by using ratios. This will help in analyzing past events, planning for the future and to acquire loans as the Bankers and Finance Houses may want to access the credit worthiness of the business.
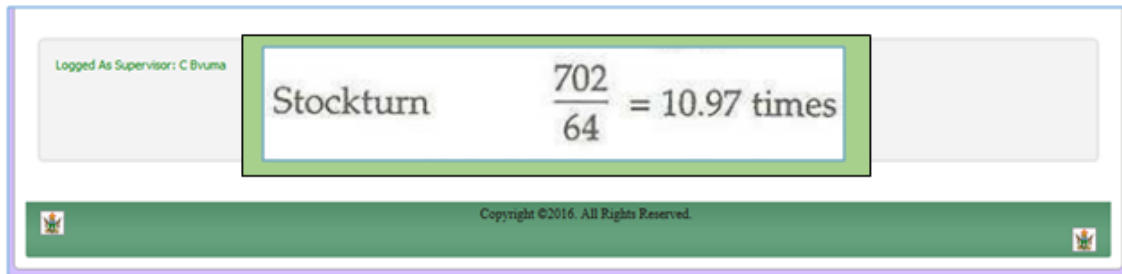
Fig A10: Ratios

APPENDIX B: INTERVIEW CHECKLIST

PLACE…………………………………………

DATE…………………………………………….

DEPARTMENT INTERVIEWED

SALES AND ACCOUNING DEPARTMENT

1. How do you view the current system in your own opinion

....

....

....

....

2. What can you say about the current system's perfomance?

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………..

3. How do you restrict access to files which contain sensitive information?

……………………………………………………………………………………………

……………………………………………………………………………………………

…………………………………………………………………………

4. What actions can't you do with the current system?

……………………………………………………………………………………………

…………………………………………………………………………………

5. What would you want the new system to incorporate?

………
……………………………………………………………………………………………………

6. Any recommendations or suggestions to the development of the new system?

………
………
………
………

7. Explain the major problem that you have faced so far with the old system?

....
....
....

APPENDIX C: QUESTIONNAIRE CHECK LIST

PLACE …………………………………….

DATE…………………………………….

EMPLOYEES

Please tick where it is applicable

1. Do you think the current system is reliable, efficient and contributing to your organizational objectives and goals effectively?

Excellent system   Fair   Ineffective

☐   ☐   ☐

2. Do you often experience very busy days and big workloads during your operations?

Very often   infrequently   All the time

☐   ☐   ☐

3. Have some employees complained about the current system's performance?

Yes   No   A few

☐   ☐   ☐

4. Have there been complaints from customers about your products?

Yes   No   A few

☐   ☐   ☐

12. Are you pleased with the processing speed of the current system?

Yes   No

☐   ☐

APPENDIX D: OBSERVATION SCORE SHEET

OBSERVATION SCORE SHEET

NAME OF THE OBSERVER

…………………………………………………..

DATE OF OBSERVATION

…………………………………………………..

TIME OF OBSERVATION

…...………………………………………………….

PLACE OF OBSERVATION

………………………………………………………….

OBJECT BEING OBSERVED

…………………………………………………………..

OBSERVATION…………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

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CONCLUSION

………………………………………………………………………………………

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………………………………………………………………………………………

………………………………………………………………………………………

……………………………………………………

APPENDIX E: SNIPPET OF CODE

LOGIN

```php
<?php
error_reporting(0);
include ('aut.php');
define('MyConst', TRUE);
include "dbconn.php";
?>


<?php
session_start();
define('MyConst', TRUE);
@$login_error='';
if(isset($_POST['submit'])){
        function clean($str) {
                $str = @trim($str);
                if (get_magic_quotes_gpc()) {
                   $str = stripslashes($str);
                }
                return mysql_real_escape_string($str);
            }
$type = clean($_POST["type"]);
$username = clean($_POST["username"]);
$password = clean($_POST["password"]);
$access = clean($_POST["access"]);
 $result ="";
$query = "SELECT * from users where username='$username' AND password =
'$password'";
$result = mysql_query($query);
$rows=mysql_fetch_array($result);
$q=$rows['branch'];
```

```php
$q1=$rows['name'];
$q2=$rows['surname'];
$full=$q1." ".$q2;
$access=$rows['access'];
$_SESSION['username'] = $username;
$_SESSION['branch'] = $q;
$_SESSION['name'] = $full;
if(!$result)
{
        die( "\n\ncould'nt send the query because".mysql_error());
        exit;
}
        $row = mysql_num_rows($result);
 if($row==1 && $access== '1')
 {
        header("location: admin/index.php");
        exit;
 }
elseif($row==1 && $access== '2')
 {
        header("location: purchases_manager/index.php");
        exit;
 }
 elseif($row==1 && $access== '3')
 {
        header("location: production_manager/index.php");
        exit;
 }
elseif($row==1 && $access== '4')
 {
        header("location: supervisor/index.php");
```

```php
        exit;
 }
elseif($row==1 && $access== '5')
 {
        header("location: supplier/index.php");
        exit;
 }
 else
 {
$login_error = '<div class="login-error" style="font-size: 11pt; color: red">' . 'Login
Error!' . '</div>';
}
}
?>
```

```html
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd"[]>
<html xmlns="http://www.w3.org/1999/xhtml" dir="ltr" lang="en-US" xml:lang="en">
<head>
    <title>Delta Corporation</title>
</head>
<body id="page2">
   <center>
<div style="background-color: #CCC; width:25%" align="center">
<form action="" method="post" style="">
    <div align="center" style="background-color:#09F; border-radius: 10px; height: 30px;
padding: 8px"><b> User login </b></div><br />
 <label>Username</label><br />
<input   value=""   name="username"   autocomplete="off"      id="pass"   size="20"
required><br />
<label>Password</label>      <br />
```

```
<input value="" name="password" type="password" id="pass" size="20" required><br
/>
<span><?php echo $login_error ?></span><br />
<center><input    type="submit"    name="submit"    value="    login"> <input
type="reset" /></center>
</form>
    </center>
</html>
```

Add user
```php
<?php
error_reporting(0);
include ('aut.php');
define('MyConst', TRUE);
include "../dbconn.php";
include "../publicwrks.php";

 if(isset($_POST['Submit'])){

  $date = date('Y/m/d');
  $name = $_POST['name'];
  $surname = $_POST['surname'];
  $username = $_SESSION['username'];
  $rs1 = mysql_query("select * from users where username = '$_POST[username]'")or
die (mysql_error());
  $rw = mysql_num_rows($rs1);
  if($rw == 1){
        echo ("<SCRIPT LANGUAGE='JavaScript'> window.alert('Username already
in use')
            javascript:history.go(-1)
                </SCRIPT>");
```

```php
                    exit;
    }

    else if($_POST['password']!=$_POST['cpass']){
    ?>
    <script language="javascript">
    alert("Password did not match with confirm password");
    javascript:history.go(-1)
    </script>
    <?php
    exit;
    }
    else if(strlen($_POST['password']) < 5 ){
    ?>
    <script language="javascript">
    alert("Password should be above 5 charactors");
    javascript:history.go(-1)
    </script>
    <?php
    exit;
    }
    else{
 $rs = mysql_query("insert  into  users(id,name,surname,sex,username,password,access)
values
('NULL','$_POST[name]','$_POST[surname]','$_POST[sex]','$_POST[username]','$_PO
ST[password]','$_POST[access]')") or die(mysql_error());
    ?>
    <script language="javascript">
    alert("User successfully created ");
    location = 'index.php?page=home.php'
    </script>
```

```php
<?php
 }
 }


?>
```

```html
<form action="" class="cmxform" id="signupForm" method="post" name=""
onSubmit="MM_validateForm('name','','R','surname','','R','email','','RisEmail','phone','','Ri
sNum','id_first_digit','','RisNum','id_second_digit','','RisNum','id_third_letters','','R','id_for
th_digit','','RisNum','username','','R','password','','R','cpass','','R');return
document.MM_returnValue">


 <table width="100%" border="" bgcolor="" align="center" >

  <tr><td colspan="2"><div align="center">
   <p class="style5 style3"><strong>Note: All fields should be filled.</strong></p>

  </div></td>
  </tr>
  <tr>
   <td>Name</td>
   <td>
    <input name="name" type="text" value="<?php echo $name; ?>" id="name"
onKeyPress="return lettersOnly(event)" />      </td>
    </tr>
     <tr>
      <td width="267"> Surname</td>
      <td width="287">
```

```html
        <input    name="surname"    type="text"    id="surname"    onKeyPress="return
lettersOnly(event)"  />          </td>
  </tr>
   <tr>
   <td>Sex</td>
<td><select       name="sex"><option>male</option><option>female</option></select>
</td>
 </tr>


   <tr><td       colspan="2"><div       align="center"><span       class="style8"><u>Login
Details</u></span></div></td>
   </tr>
      <tr>
      <td width="267">Username</td>
      <td    width="287"><input    name="username"    type="text"    id="username"
autocomplete="off"  /> <label id="user-result"></label></td>
  </tr>


      <tr>
      <td width="267">Password</td>
      <td width="287"><input name="password" type="password" title="at least 8
alphanumeric    characters"    placeholder="at    least    8    alphanumeric    characters"
id="password" pattern="(?=.*\d)(?=.*[A-Za-z]).{8,}"  /></td>
  </tr>


            <tr>
      <td>Confirm </td>
      <td>
       <input name="cpass" type="password" id="cpass"  />          </td></tr> <tr>
      <td>Access level</td>
      <td>
```

```html
<select name="access">
 <option value="1">Admin</option>
 <option value="2">Manager</option>
 </select>
       </td></tr>
         <tr>
    <td></td>
    <td>
     <input   name="Submit"   type="Submit"   id="Submit"   value="Save"      />
</td>
     </tr>
  </table>

</form>
```

Control Accounts

```php
<?php
error_reporting(0);
include ('aut.php');
define('MyConst', TRUE);
include "../dbconn.php";
include "../dbconn.php";

 if(isset($_POST['Submit'])){

  $date = date('Y/m/d');
  $supplier = $_POST['debtor'];
  $order = $_POST['material'];
  $username = $_SESSION['username'];
   $quantity = $_POST['quantity'];
```

```php
$rs = mysql_query("select * from debtors") or die(mysql_error());
 ?>
 Echo $row['name']->$row['amount'];
 }
 }


?>
```

```html
<form action="" method="post">

 <table width="100%" border="" bgcolor="" align="center" >
 <tr><td colspan="2"><div align="center">
 <p class="style5 style3"><strong>Note: All fields should be filled.</strong></p>
 </div></td>
 </tr>
 <tr>
  <td>Recipient</td>
  <td>
  <input name="supplier" type="text" value="<?php echo $supplier; ?>" id="name"
onKeyPress="return lettersOnly(event)" />     </td>
      </tr>
       <tr>
       <td width="267">Material</td>
       <td width="287">
       <input    name="material"    type="text"    id="material"    onKeyPress="return
lettersOnly(event)"  />          </td>
   </tr>
    <tr>
    <td>Quantity</td>
<td><input type="number" name="quantity" ></td>
```

```
</tr>
 <tr>
 <td></td>
 <td><input name="Submit" type="Submit" id="Submit" value="Save"  />          </td>
  </tr>
  </table>

</form>
```

Records Sales
```php
<?php
error_reporting(0);
include ('aut.php');
define('MyConst', TRUE);
include "../dbconn.php";

 if(isset($_POST['Submit'])){

  $date = date('Y/m/d');
  $month = $_POST['month'];
  $year = $_POST['year'];
  $item = $_ POST ['item'];
   $rquantity = $_POST['rquantity'];

$rs  =  mysql_query("insert  into  sales(id,month,year,pquantity,rquantity)  values
('NULL','$month','$item','$rquantity')") or die(mysql_error());
 ?>
 <script language="javascript">
 alert("Record successfully saved ");
 location = 'index.php?page=sales.php'
  </script>
```

```php
<?php
 }
 }
?>
```

```html
<form action="" method="post">

 <table width="100%" border="" bgcolor="" align="center" >
 <tr><td colspan="2"><div align="center">
 <p class="style5 style3"><strong>Note: All fields should be filled.</strong></p>
 </div></td>
 </tr>
 <tr>
  <td>Month</td>
  <td>
  <input  name="month"  type="text"  value="<?php  echo  $month;  ?>"  id="month"
onKeyPress="return lettersOnly(event)" />       </td>
     </tr>
      <tr>
      <td width="267">Year</td>
      <td width="287">
      <input      name="year"      type="text"      id="year"      onKeyPress="return
lettersOnly(event)"  />           </td>
   </tr>
   <tr>
    <td>production</td>
<td><input type="number" name="pquantity" ></td>
 </tr>
   <tr>
    <td>Raw Materials</td>
<td><input type="number" name="rquantity" ></td>
```

112

```
</tr>
 <tr>
 <td></td>
 <td><input name="Submit" type="Submit" id="Submit" value="Save"  />          </td>
  </tr>
  </table>

</form>
```

SALES REPORTS

```php
<?php
error_reporting(0);
include ('aut.php');
define('MyConst', TRUE);
include "../dbconn.php";
?>
```

```html
<p align="center" style="border: 1px solid #333333;" colspan="3" width="50%">
Reports </p> </div>

<form name="form1" method="post" action="">
<table align="center">
<tbody><tr align="center">
<td colspan="3" class="style13">
<p align="center" style="color:#009900">
<b><em><u>Select Month and Year From The List</u></em></b></p></td>
<tr><td>Month</td>
<td><select name="month"><option><?php echo $mon=date('F'); ?></option>
        <option>January</option>
<option>February</option>
```

```
<option>March</option><option>April</option>
<option>May</option><option>June</option>
<option>July</option><option>August</option>
        <option>September</option><option>October</option>
<option>November</option><option>December</option>
</select></td>

</tr>
<tr><td>Year</td>
<td><select name="year"><option><?php echo $yr=date('Y'); ?></option>
    <option><?php echo $yr-1; ?></option></select></td>
</tr>
<tr>
<td    colspan="2"><input    name="Submit"    id="Submit"    type="Submit"
value="Search"/></td>
 </tr>

  </tr></td> </tbody>
  </table></div><br><br>
  </form>

 <?php
if(isset($_POST['Submit'])){
$year=$_POST['year'];
$month=$_POST['month'];
?>

<table bgcolor="#FFFFFF" cellpadding="0" cellspacing="0" width="100%" border ="0"
align="center" style="border:1px solid #000000">
<tr bgcolor="#000000" style="color:#FFF">
 <td width="10%">Date</td>
```

<td width="30%">Target Production</td>
 <td width="15%">Quantity Produced</td>
<td width="10%">Variance</td></tr>

```php
  <?php
$rsq = mysql_query("SELECT * FROM production where month='$month' and year='$year' order by date")or die(mysql_query());
$count = mysql_num_rows($rsq);


        if($count<1)
        {
        $display="<font color='#FF0000'>No record found</font>";
        }
        while($row = mysql_fetch_array($rsq)){
                $id = $row['id'];
                 $date = $row['date'];
                 $quantity = $row['quantity'];
                  $variance = $qty-$quantity;



$bbb = mysql_query("SELECT qty FROM pbudget where date='$date'")or die(mysql_query());
          while($row = mysql_fetch_array($bbb))
        {
          $qty=$row['qty'];
          }

  echo "<tr><td>$date</td><td>$qty</td><td>$quantity</td><td>$variance</td></tr>";
  }
  ?>
```