WEB BASED FINANCIAL AUDIT SYSTEM FOR A MULTI - CAMPUS INSTITUTION

CASE STUDY: BUSITEMA UNIVERSITY

A Post Graduate Dissertation

Presented to

the Faculty of Science

in partial fulfillment of the requirements for

the award of the degree

Masters of Science in Information Systems

Uganda Martyrs University

ADONG GRACE

2014-M132-20003

October-2016

DEDICATION

This piece of work is dedicated to my beloved daughter Precious and husband David who have given me the reason to persist with this research. To my beloved parents who raised me up and for having always reminded me to have faith in God. To my friends for having supported me during the entire course. To my supervisor Mr. Emmanuel Mugejjera who has been guiding me throughout this research. Last but not least to the Almighty God for having given me the wisdom, courage and resources to complete this course.

ACKNOWLEDGEMENT

I would like to acknowledge and appreciate the support that I got from different people throughout this course. First and foremost to my supervisor Mr. Emmanuel Mugejjera for the intellectual support and guidance that he provided during this research and the entire course.

I thank the friends who helped to guide me throughout the implementation of this project. Among these include Bonny Musinguzi, Christine Nakku, Maria Asumpta Nassolo, Harriet Sibitenda and the entire class for having always corrected me where I seemed to go wrong.

This project wouldn't be a success if it wasn't for the input of the respondents who participated in a participatory design. In a special way I would like to appreciate Mr. Fred Makubo and Mr. Wilson Bwayo the internal Auditors, Busitema University for their tireless effort and for always finding time off their busy schedule to work with me.

Last but not least, to all the people that I may not have mentioned by name but played a big role in making this project a success. Without your contribution and sacrifice of time I would not have reached this level.

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LIST OF ABBREVIATIONS

AAA:	American Accounting Association
AICPA:	American Institute of Certified Public Accountants
BU:	Busitema University
EDP:	Electronic Data Processing
ICT:	Information and Communication Technology
IT:	Information Technology
IS:	Information System
ISACA:	Information Systems Audit and Control Association
ISSAIs:	The International Standards of Supreme Audit Institutions
SAI:	Supreme Audit Institutions
INTOSAI:	International Organization of Supreme Audit Institutions
WBFAS:	Web Based Financial Audit System

ABSTRACT

On a routine basis, institutions measure and quantify the performance effectiveness of their business activities. In the same manner, internal audit needs to demonstrate its own effectiveness using a performance measurement system tied to the expectations of its key stakeholders. Only by circling back to the needs of its key stakeholders and regularly tracking its performance against the expectations of the board, senior management and operating management, an internal audit function can satisfy for increased scrutiny and more demanding expectation.

Generally, institutions should establish a working framework to fulfill requirements from compliance and risk management as well as governance practices to realize financial management. A compliance audit is an assessment of an auditee's activities to determine whether they comply with the relevant regulatory requirements. Without adequate audit mechanisms, financial systems and transactions remain vulnerable to undetected misuse. Users could make financial transactions without following the proper policies, regulations as per the financial manual of the organization, could modify or delete protected financial information without these actions being traceable.

The objective of this research is to develop an interactive secure web based financial audit system that enhances assessment of an auditee's financial transactions effectively and efficiently. The financial transactions that the system handles are purchases and payments of goods and services.

To achieve the objectives of this project, data was collected using paper prototyping as a technique for requirements gathering and elicitation. This approach helped identify fault early in the systems design process. The requirements collected were thematically analyzed and used to design the web based financial audit system.

The system developed seeks to provide new opportunities in compliance auditing, furthering more opportunities that will make auditing easier and more cost effective. In addition, there is an increase in financial transactions being cleared by the internal auditors, quick submission of audit reports to management and enhanced timely retrieval of audit information.

CHAPTER ONE: GENERAL INTRODUCTION

This chapter discusses the introduction, the background of the study, the statement of the problem, the objectives, scope and significance of the project. The domain for this research project is Information Systems (IS) with a sub domain of a decision support system.

1.0 Introduction

Information Systems (IS) today provide information support to the operations, management and decision making functions of organizations. The domain of this project is in Information systems with emphasis centered on web based financial audit system. A web based financial audit system presented in this project aims to relieve staff of the tedious and time consuming experience that usually the auditing processes entail. Furthermore, it's able to minimize on cost, turnaround time taken during the audit process, generation of audit reports and reduce errors that may occur during audit process.

Public sector enterprises are generally concerned with the delivery of service or beneficial outcome to the public at large with a social interest rather than commercial motive of profit maximization. However, in the process of achieving desired objectives, they have to face all kinds of risks which may be internal or external. The success, therefore, is depending on how far a public enterprise is able to foresee and mange risks. Amongst the several control tools of risk management, internal audit is primarily used as an effective tool to manage operational, financial, legal and regulatory risks. Further, internal audit also facilitates in formulating strategic policies to achieve enterprise goals, (Vijayakumar *et al*, 2012).

Professional standards and guidelines are essential for the credibility, quality and professionalism of public-sector auditing. The International Standards of Supreme Audit Institutions (ISSAIs) developed by the International Organisation of Supreme Audit Institutions (INTOSAI) aim to promote independent and effective auditing and support the members of INTOSAI in the development of their own professional approach in accordance with their mandates and with national laws and regulations.

On a routine basis, institutions measure and quantify the performance effectiveness of their business activities. In the same manner, internal audit needs to demonstrate its own effectiveness using a performance measurement system tied to the expectations of its key stakeholders. Only by circling back to the needs of its key stakeholders and regularly tracking its performance against the expectations of the board, senior management and operating management, an internal audit function can satisfy for increased scrutiny and more demanding expectation, (Feizizadeh, 2012).

Thus, the compliance to regulations includes often security mechanisms, which need to be monitored to prevent the exposure of risk factors. Generally, companies should establish a working framework to fulfill requirements from compliance and risk management as well as governance practices to realize financial management, (Martens, *et al,* 2011).

1.1 Background

Auditing is increasing becoming an important tool to ensure that internal controls are followed in an organization. While some employees imagine auditing as unnecessary inconvenience, when organizations establish working frameworks to fulfil requirements for compliance and risk management, auditing can save employees from risks. Internationally, regulators now strictly enforce compliance with auditing standards, impose penalties for misconduct, and require audit firms to demonstrate the effectiveness of their control systems for ensuring audit quality (Dowling, 2014).

The Government of Uganda initiated the implementation of the Integrated Financial Management System (IFMS) in the FY 2003/04. The IFMS aimed at the promotion of efficiency, effectiveness, accountability, transparency and comprehensive financial reporting. The functionality of the IFMS varies between ministries, agencies, departments, and local governments. To attain the Vision 2040 and improve service delivery to the citizens, the Government is tasked to ensure: availability of resources to implement the planned programmes; increased efficiency in the allocation and use of resources; elimination of corruption and wasteful spending; intensified accountability and strengthening public sector institutions and systems. The Government has been implementing Public Finance Management (PFM) reforms since the early 1990s to establish and enforce internal control systems, enhance capacities and strengthen oversight institutions to ensure value for money in service delivery and accountable use of public resources.

There has been some improvement in financial management as financial reporting had improved in terms of timeliness and accuracy. In addition, the percentage of institutions (Ministries, Departments, Agencies and Local Governments) with un-qualified audit opinions, increased slightly from 47% to 50% over the review period. However, the quality of financial statements remains poor given the persistent high number of qualified audit opinions among institutions connected to the IFMS. Inappropriate distribution of roles was reported as affecting the implementation of IFMS operations. For example the limited access by Internal Auditors and heads of departments limited effective application of the IFMS, (Ministry of Finance, Planning and Economic Development, Uganda, 2015)

Corporate scandals and failures such as Enron, WorldCom, etc. were highly catastrophic and had a terrible effect on stakeholders. The pressure of globalisation and the intense competition have lead to organisations encouraging good corporate governance. Organisations have to promote transparency and accountability of financial information. As Gramling et al. (J Account Lit23:194–244, 2004) argued there are four important mechanisms of corporate governance include boards of directors, audit committees (among others) and internal and external audit functions. The audit committee is one of the elements responsible for overseeing the interests of shareholders and supervising financial statements. The audit committee should be efficient and provide maximum transparency. This organ of a company needs other groups, such as the internal audit function, to complete their effectiveness, (Garcı´a et al. 2010).

Governments face the problem of auditing and reviewing large volumes of tax returns and filings of various types. The large volume often means that humans are unable to process all the documents in a cost -effective manner. Alternatively, even if humans could process all the volume, often budgetary constraints limit the number and quality of persons that could be employed. As a result, the need for systems aimed at processing similar documents submitted to the government is likely to be very high (Huang a et al, 2010).

Auditing systems continue to advance in design and technology and are evolving towards decentralization, distribution, online posting, continuous (or at least daily) closing of the books, and paperless auditing. Auditors need information provided by clients and the cooperation of management to carry out an audit. In other words, auditors need their clients to participate in the audit process (Herda *et al*. 2014).

In Busitema University, the internal auditors are based at Busitema campus which is the main campus and they have to move to the other campus to carry out financial audits. The internal auditors verify the records like requisitions made by the end users, Local purchase orders, contracts, delivery notes, receipts, goods received notes and inspection of the physical goods purchased and services delivered. This information is captured in an excel sheet that is not interactive and web based resulting to delays in submissions of audit reports, clearance of purchases, payments of suppliers, tracking fraud and clearance of audit queries.

The study was carried out in Busitema University that is a multi- campus model with operational campuses that are geographically distributed at Busitema, Nagongera, Mbale, Arapai and Namasagali. This model experiences challenges when it comes to auditing. This necessitates an efficient and effective web based financial audit system.

1.2 Problem Statement

Carrying out auditing in a distributed institution has become a challenge due to non adherence to the laws, regulations, policy on purchase of goods and services by the staff, limited access to the accounting system by the Internal Auditor, unbudgeted purchases by staff, exaggerated costs of goods and services purchased, discrepancy in Local Purchase Order (LPO) and what is delivered, micro purchases due to split procurements.

Busitema University has five operational campuses that are geographically distributed. The University faces a challenge of limited man power, huge amount of data from the distributed campuses and yet the internal auditors are supposed to Audit procurement of goods and services to ensure value for money, capture information on limited number of days and this leads to work being done in a hurry, hence errors leading to audit queries which in reality would not have occurred.

Therefore, there is need to carry out an investigation on the current auditing processes in order to develop a web based compliance audit system for financial transactions for a multi campus institution where staff (who are the auditees) will comply with the laws, regulations, policy on purchase of goods and services, submit their required financial information remotely to the internal auditor using a computerized system to enable timely, effective and efficient auditing.

1.3 Objectives

This section specifies the main objectives and the specific objectives.

1.3.1 Main Objectives

To develop a web based system that enhances assessment of an auditee's financial transactions effectively and efficiently.

1.3.2 Specific Objective

1. To study the current internal audit processes used in institutions with distributed campuses so as to get user requirements for the proposed system.
2. To design a web based financial audit systems to capture and process financial transactions of the auditees.
3. To implement the designed web based financial audit systems.
4. To test and validate the developed web based financial audit systems.

1.4 Scope

The scope of this report is divided into geographical and functionality scope.

1.4.1 Functional scope.

The project is limited to development of a web based financial audit systems for financial transactions that enables staff from different campuses of Busitema University to access the system remotely and send their financial transactions to the internal audit unit at the main campus (Busitema Campus). The financial transactions handled by the system are limited to purchases of goods and services. This is possible through using computers that are in the Intranet and are accessing the network of Busitema University.

1.4.2 Geographical scope

Busitema University is a multi campus model with the main campus located at Busitema, along Jinja- Tororo highway, 25kms from Tororo town, while the Nagongera campus is located along Nagongera- Busolwe road, about 21kms from Tororo Municipality. Arapai campus is located along Moroto road, about 10kms from Soroti Town, and Namasagali campus is located along Namasagali road, about 27kms from Kamuli Town, Mbale campus located in Mbale town, Mbale Regional Referrral Hopsital, Pallisa campus in Pallisa District. Other campuse (yet to be operational) is Kaliro campus located at Kaliro NTC premises.

1.5 Significance

With a web based financial audit system, Busitema University will achieve the following;

- It promotes transparency by providing reliable reports as to whether funds have been administered, management exercised and citizens' rights to due process honored as required by the applicable authorities.
- It promotes accountability by reporting deviations from and violations of authorities, so that corrective action may be taken and those accountable may be held responsible for their actions.
- It promotes good governance both by identifying weaknesses and deviations from laws and regulations.
- Huge amounts of financial data will be captured remotely by the staff hence reducing the load of the internal auditors hence enabling efficiency for compliance audit reports to be submitted on time.
- Save time since the internal auditors will not often travel to the different campuses to capture financial transactions made by staff.
- It is cost effective for the University in terms of transport cost and per diem for the audit staff to all campus just to capture financial information.
- Limited errors that would have resulted to queries when financial information is captured in a hurry. Since the system is interactive, there is staff participation, and there is a lower chance of capturing errors.
- Timely and easy retrieval of financial records by the auditors since the information is automated.

Fraud and corruption are, by their very nature, elements which counteract transparency, accountability and good stewardship. Compliance auditing therefore promotes good governance in the public sector by considering the risk of fraud in relation to compliance.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

The literature review gives an overview on internal auditing of financial records, tools used, the processes carried out in order to come up with an audit opinion. It discusses current developments in continuous auditing and how the designed interactive web based financial audit systems would benefit Busitema University.

2.1 Information System

An information system is a multilevel structure that allows the user of such a system to transform certain information input to the desired output information using appropriate models and procedures. Computer-based information processing has changed dramatically since the construction of the first computers. From its inception as an arithmetic discipline, the field has evolved to provide sophisticated means for increasing our understanding of nature. This evolution has been made possible by the availability of increasingly sophisticated hardware and software, and has been driven by the rapid growth of information from experiments, (Bajdor *et al*., 2014).

2.2 Audit

Oxford dictionary online defines audit as a 'systematic review or assessment of something'. This generic definition faces a new reality due to recent management changes focusing management systems integration in organizations. A more suitable definition is provided by management standards stating that an audit is a 'systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled, (Domingues, *et al*, 2011)

Auditing is the process in which competent and independent persons collect and evaluate proofs to set an opinion on correspondence degree among the observed things using some pre-defined criteria.

Auditing is an information-intensive activity carried out to assess the truth and fairness of the financial statements and their compliance with the required standards and legislation. Information and communications technology (ICT) plays a vital role in ensuring the accuracy, timeliness and integrity of audit reports, which in turn strengthens the credibility of the financial information being presented to a wide range of users (Omoteso et al.,2010).

Auditing has always been an important component in the corporate governance machinery in modern organizations (Sultan, 2007). It forms important elements in the process of securing corporate accountability. It also enhances stakeholder's faith in the stewardship of the organisation. Conventional statutory financial audits require auditors to express their views, ensure financial statements are prepared according to Generally Accepted Accounting Standards (GAAP) and relevant financial reporting standards; (Yaacob & Donglah, 2012).

Auditors, IT personnel and corporate managers are still learning their way around compliance with the US Sarbanes-Oxley Act of 2002. While the law technically applies only to publicly traded corporations, private businesses and even not-for-profits worry about the cascade effects of the law and figure it is better to be safe than sorry. As a result, everyone is scrambling to evaluate their internal control systems, revise old controls or implement new controls. It will take time for Sarbanes-Oxley compliance processes to become standardized and moving regulatory targets to become fixed. In the meantime, auditors are running the range of software to help them comply with Sarbanes-Oxley. Software vendors are creating new and revising old products to deal with Sarbanes-Oxley, but they are doing so in an environment where the product needs are not fully known. Auditors are simply trying to keep from drowning in the workload as they rush to meet mandated deadlines, (Bagranoff et al., 2005).

Recently, the essential tasks in the financial reporting processes are mainly performed and supported by utilizing information technology (IT). In order to ensure a reliable financial reporting, more and more companies emphasize the use and development of effective IT control in this dynamic environment, (Huang a et al, 2010).

Auditing helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control and governance processes, (Rainer, 2012).

2.3 Internal auditing

Definition of the internal auditing provided by the Institute of Internal Auditors states that "internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes", (Rupšys *et al*, 2005).

2.3.1 Internal audit relationships

There may be many customers of internal audit services (see *Figure 1*). Customers relatively may be named as internal (CEO's, audit committee, Board, etc.) or external (external auditors, vendors, suppliers, etc.), (Rupšys *et al*, 2005).

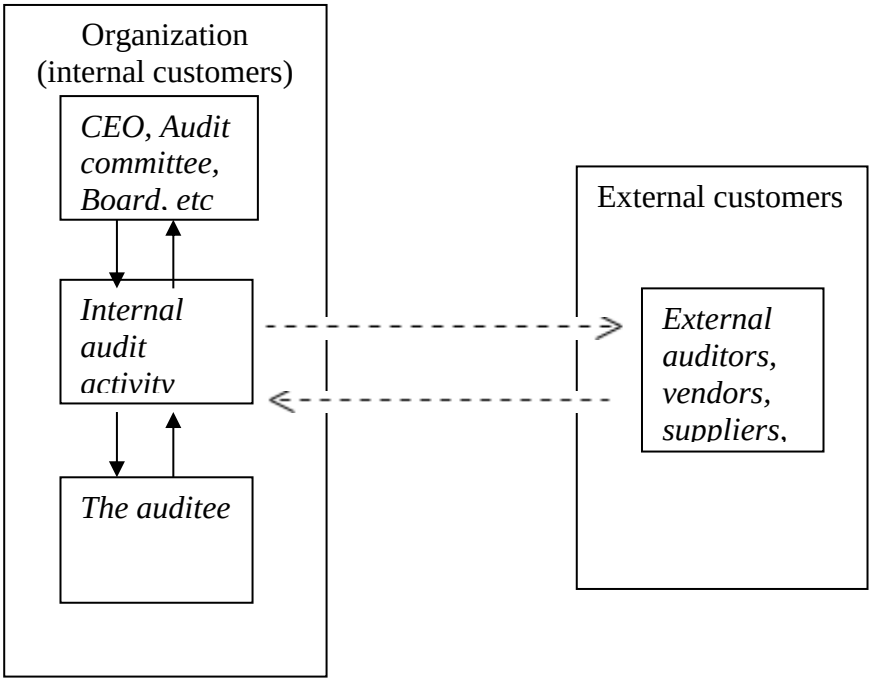

Figure 1: Customers of internal audit services

Internal auditing plays an important role in internal control system and helps the management of organization fulfill its duties by strengthening controls. The responsibilities of internal auditors exceed financial activity and involve examination of efficiency of different parts of organization with observance of the application of operational auditing. So, internal auditing is an important part of an effective management in all economical units, (Salehi and Husini, 2010).

Some types of internal audits date back thousands of years. As mentioned earlier, the Greeks, Romans, and Egyptians were conducting audits before the birth of Christ. Interestingly, the scope of these early audits was in many ways similar to that of modern internal audits; both included an examination of the correctness of accounting records and an evaluation of the correctness of activities reflected in the accounts. Emphasis was on improving management control over the activities of the organization.

In the United States of America, there was little need for internal auditing in the colonial period because there was little in the way of large industry. In fact, accounting textbooks of the period never referred to the subjects of internal auditing or internal control. In government, however, the need for an audit function was recognized. The first United States Congress in 1789 approved an act that included a provision for the appointment of a secretary of the treasury, a manager, and an auditor. The auditor's job, basically a clerical function, was to receive all public accounts, examine them, and certify the balances (Salehi et al., 2010).

The role of Internal Audit in organisations is complex. There is strong potential for confusion in the relationship between internal auditors and management. Internal auditors are expected to aid managers in doing their jobs, and at the same time to independently evaluate management's effectiveness (Cohen *et al*.2010).

The increased attention given to corporate governance is largely a response to the collapse of Enron and WorldCom and the subsequent passing of governance legislation in the form of the Sarbanes-Oxley Act in the USA in 2002 (Brown and Grant, 2005). The reason for also focusing on information technology (IT) governance is due to IT becoming ubiquitous in nature, i.e. modern IT crosses organisational activities and has become strongly aligned with business activities. Thus IT governance can be viewed as an integral part of corporate governance and therefore requires senior management's attention, (Fink, 2010).

Similarly, audit automation is said to have flattened the organisation structure of most audit firms and departments as ICT has taken over the mechanical and routine roles of most junior auditors in a more efficient and effective way. Also, audit automation could lead to a disaggregated leadership structure, decentralisation of roles and responsibilities and restructuring to cater for specialised auditors such as IT auditors. (Omoteso *et al.2010).*

The internal audit departments need to use IT-based audit tools widely to support the entire audit process from planning through to reporting, (Shin *et al*, 2013).

Internal audits are designed to evaluate the effectiveness of an operation's internal controls by first gathering information about how a unit operates, identifying points at which errors or inefficiencies are possible, and identifying system controls designed to prevent or detect such

occurrences. Then, they test the application and performance of those controls to assess how well they work. Managers ought to routinely evaluate controls in their department's operations by following the same process.

Computers and networks provide most of the information needed for auditing. In order to be effective, auditors must use the computer as an auditing tool, audit automated systems and data, understand the business purposes for the systems, and understand the environment in which the systems operate. The other important uses for computers and networks by auditors are in audit administration. By seeking new uses for computers and communications, auditors improve their ability to review systems and information and manage their activities more effectively. Automated tools allow auditors to increase individual productivity and that of the audit function, (Moorthy *et al*, 2011).

2.4 The Internal Auditor has no clear chief stakeholder

The Institute of Internal Auditors (IIA) recommends a dual reporting relationship in which the Chief internal Auditor (CIA) reports functionally to the board (or the audit committee of the board) and administratively to a senior management executive. According to the interpretation of Standard Internal auditing Profession, such a dual reporting relationship is regarded as a best practice in order to achieve the degree of independence necessary to carry out the responsibilities of the internal audit activity effectively (IIARF, 2011e, p. 16). In practice, about two-thirds of CIAs report administratively to senior management, in most cases to the Chief Executive Officer (IIARF, 2010a, p. 34). Moreover, when IA serves two masters, senior management and the board, what IA reports to the board may be filtered by management, such that only what is palatable to management is communicated, (Rainer, 2012).

A similar survey jointly undertaken by ACL Services Limited in Canada and the Institute of Internal Auditors also shows that interest in CA is increasing rapidly, with 36% of responding firms stating that they have adopted a continuous auditing approach across all of their business processes or within select areas, and with another 39% planning to do so in the near future. The latter survey concludes: “Whatever the reasons organizations may have had for neglecting continuous auditing in the past, regulatory demands, the push for real time financial reporting and the drive to automate resource draining manual audits are nudging them to adopt it now.” With the emerging of a continuous auditing and continuous monitoring methodology, an

on-going, timely review of financial data and internal control of the organization is enhanced. (Vasarhelyi et al 2010).

In accordance with Popa *et al,* (2010), the concept of *audit* means a systematic, independent and documented process to obtain audit evidences and their examination with impartiality to establish the degree in which the audit criteria are met. Internal auditing (IA) serves as an important link in the business and financial reporting processes of corporations and not-for-profit providers. Internal auditors play a key role in monitoring an organisation's risk profile and identifying areas to improve risk management. The aim of internal auditing is to improve organisational efficiency and effectiveness through constructive criticism. IA has four main components:

(1) verification of written records;

(2) analysis of policy;

(3) evaluation of the logic and completeness of procedures, internal controls and

(4) reporting recommendations for improvements to Management, (Cohen *et al*.2010).

Recent regulation both in the USA (SAS 99; AICPA, 2002; PCAOB, 2007) and internationally (ISA 240) has placed increased responsibility on auditors for the detection of financial statement fraud. The Public Company Accounting Oversight Board (PCAOB) has reminded auditors of the importance of being diligently focused on their responsibilities to detect fraud (PCAOB, 2007, 2008). However, fraud can be difficult to detect as ''some members of management may even seek to conceal outright fraud by strategically altering information they expect the auditor will obtain as evidence'' (Trotman et al. 2012).

2.5 Information Technology (IT)

IT has also affected the reporting aspect of internal auditing. In other words, it improved the quality of reporting toward the appeal of the illustration of report, decreased internal auditing mistakes, improved report presentation time and updates (Salehi et al., 2010).

ICT equipments like Computers, digital cameras, phones, scanners are used by the internal auditors to capture most of the financial information needed for auditing. For effective and efficient reporting, auditors need to use the computer as an auditing tool, use audit automated

systems and data, understand the business purposes for the systems, and understand the environment in which the systems operate.

The other important use for computers and networks by auditors are in audit administration. By seeking new uses for computers and communications, auditors improve their ability to review systems and information and manage their activities more effectively. Automated tools allow auditors to increase individual productivity and that of the audit function.

By recognizing the importance of emerging environment and requirement to perform audit task effectively, auditors must recognize the key reasons to use audit tools and software. The key reasons include:

i. On a personal level, learn a new skill.
ii. Improve organisation decision-making using improved data.
iii. Increase the efficiency of an audit.
iv. Reduce routine tasks to provide more time for creative and business analysis.
v. Provide improved transparency governance of the organization.
vi. Identify quantitative root causes for issues.
vii. Reduce fraud and abuse.
viii. Identify savings in supplier, customer, human resource, computer, and enterprise management.

2.6 Impact of Information Communications Technology (ICT) on Financial Performance

Knowledge is the fundamental driver of increased productivity and global competition and the innovations in the ICT field have provided a platform for businesses to operate on a global scale. ICT refers to technologies that are used to collect process and store, retrieve, disseminate and transmit information. This encompasses use of electronic devices or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning (Ministry of Information and Communications Technology Uganda, 2009). Presently, the extensive use of ICT is changing the way businesses operate. Hipp and Grupp (2005) refer to ICT as a very important tool for innovation in this present era. The benefits of ICT for a firm includes saving of inputs, general

cost reductions, higher flexibility and improvement in product quality. Mouelhi (2009) adds that ICT plays a major role in networking and communication as firms use these technologies to facilitate communication among employees and reduce co-ordination costs. ICT enhances the production process in organizations as monitoring technologies could be used to reduce the number of supervisors required in the process. ICT has been of prime importance in information gathering and dissemination, inventory control and quality control with ICT facilities being used for strategic management, communication and collaboration, customers' access, managerial decision making, data management and knowledge management since it helps to provide an effective means of organizational productivity and service delivery. Application of ICT in businesses causes fundamental changes that can provide powerful strategic and tactical tools for organizations if properly applied and used. This could have great impact in promoting and strengthening organizational competitiveness.

Mouelhi (2009) argues that although organization cultures and business strategies shape the use of ICT in organizations, more often the influence is stronger the other way round. ICT significantly affects strategic options and creates opportunities and issues that managers need to address in many aspects of their business. The key impacts of technology and the implications for management are as follows: ICT creates new opportunities for innovation in products and services. Services which used to be delivered in person can now be delivered over networks hence improving financial performance.

2.7 IT and internal auditing

The technology revolution in accounting and auditing began in the summer of 1954 with the first operational business computer. IT changed the way accounting data was stored, retrieved, and handled and these new systems led to radically different audit trails, (Salehi and Alipour, 2010).

The revolution became a dynamic evolution as the computer industry sustained continuous, rapid, technical innovations. In addition to the introduction of computers to the business world, other IT-related events have also had a profound effect on the auditing profession and the way audits are conducted. These events included:

1) the commercialization of computers;
2) the introduction of AUDITAPE;
3) the Equity Funding scandal;

4) the emergence of Information Systems Audit and Control Association (ISACA);
5) the systems, auditability, and control (SAC) studies by the Institute of Internal Auditors (IIA); and
6) constant emerging technologies. Information technology affected, and continues to affect auditing. (Salehi et al., 2010).

The introduction of AUDITAPE in October 1967 by Haskins and Sells at the American Accounting Association (AAA) annual meeting in Portland, Oregon, was a key event for external auditors in particular (at that time), and internal auditors (later). Practitioners were excited when they saw the potential of AUDITAPE because external auditors who were not highly technical could now run the computer and use it as an audit tool.

Very few auditors had yet acquired a high level of technical skills in 1967. AUDITAPE was the impetus that led to the development and use of audit tools, specifically GAS (Generalised Audit Software), in EDP audits. AUDITAPE also affected other aspects of auditing. Although statistical sampling preceded AUDITAPE by several years, AUDITAPE affected the use of statistical sampling as much as it affected anything. Thus, AUDITAPE was born from a need to audit through the computers (information technology) in a simple, efficient, and effective manner. Information technology's effect on access to data by external auditors (that is, difficult to examine) drove the need for better audit tools. To this day, GAS is perhaps the most valuable tool an auditor has to audit data embedded in IT. (Salehi et al., 2010).

2.8 Audit committee

An effective audit committee can be defined as follows:
Has qualified members with the authority and resources to protect stakeholder interests by ensuring reliable financial reporting, internal controls, and risk management through its diligent oversight efforts. The size and the number of meetings of audit committees are mentioned in numerous codes or recommendations on Corporate Governance, such as the Cadbury Report (1992) and the Smith Report (2003). These reports recommended a minimum of three members on the audit committee. The Blue Ribbon Committee Report (1999) recommended a minimum of three members and four meetings a year for effectiveness of audit committees. The Sarbanes–Oxley Act (2002) stipulates a minimum of three members, (Garcı´a et al. 2010).

2.9 Continuous Auditing

Groomer and Murthy (1989) and Vasarhelyi and Halper (1991) pioneered the two modern approaches toward designing the architecture of a CA system: the embedded audit modules and the control and monitoring layer, respectively. The literature on CA since then has increased considerably, ranging from the technical aspects of CA (Kogan et al. 1999, Woodroof and Searcy 2001, Rezaee et al. 2002, Murthy 2004, Murthy and Groomer 2004, etc.) to the examinations of the economic drivers of CA and their potential impact on audit practice (Alles et al. 2002 and 2004, Elliott 2002; Vasarhelyi 2002, Searcy et al. 2004). Kogan et al. (1999) propose a program of research in CA. In the discussion of the CA system architecture they identify a tradeoff in CA between auditing the enterprise system versus auditing enterprise data. A study by Alles et al. (2006) develops the architecture of a CA system for the environment of highly automated and integrated enterprise system processes, and shows that a CA system for such environments can be successfully implemented on the basis of continuous monitoring of business process control settings. A study published by the Australian Institute of Chartered Accountants (Vasarhelyi et al, 2010) summarizes the extant state of research and practice in CA. However, few empirical studies have conducted on CA in general and on analytical procedures for CA in particular due to the general lack of data. This contributes to the CA literature by providing empirical evidence to illustrate the advantages of CA in close to "real time" problem resolution, Kogan et al, (2013).

Previous research has considered the impact of different types and sources of audit evidence but not business model evidence. We recognize that an auditor's expectations, and the acquisition and use of evidence, depend on a rich understanding of how management executes its business model, Trotman et al. 2012

Technology, information system (IS) and electronic data processing (EDP) have changed the way organizations conduct their business, promoting operational efficiency and aid decision-making. In this essence, and in the case of United States (US) as being explored by the authors, various authoritative bodies, such as the American Institute of Certified Public Accountants (AICPA) and the information systems audit and control association (ISACA), have issued standards to facilitate and provide sufficient guidance to auditors.

According to AICPA's SAS No. 3, the objectives of accounting control are the same in both a manual system and an IT system. However, procedures used by an auditor may be affected. SAS No. 48, "the effects of computer processing on the examination of financial statements,"

explained and recommends auditors to evaluate the methods of computer data processing and other significant factors. (Salehi et al., 2010).

The author has explored on the widespread of corporate reporting on the internet and its implication to auditing profession. The phenomenal growth of Internet ultimately contributes to electronic, web-based Internet reporting information. The author first had revised several literature and accounting standards to understand the nature of best practice and code of conduct for web based business reporting. The author later examined internet reporting practices in Malaysia and set the limit of the study to 100's Kuala Lumpur Stock Exchange Composite Indexed (KLSECI) companies in Malaysia for year 2003 and 2004. The author found out that there was a significant increase of companies using the internet to supply information to the public. The core activities of disclosing information are mainly on general web page attributes (line of product, business function and product promotional activities), investor relations, and financial information; including audit reports. The author has suggested that although usage of internet can benefit the organisation, reliability and verification of information disclosed has to be guarded (Salehi et al., 2010).

The author has compared features of the internal audit function between organizations in the private and public sector. Several aspects has been carefully examined which includes organizational status, using internal audit as a "tour of duty" function, outsourcing of audit function, risk management, and interactions with external auditors. The study is based on a survey done in Australia and New Zealand organizations. Survey was done to indicate the length of time spent by respondents in internal audit process and it has appeared that internal audit has a higher status in the public sector rather than in private sector entities. On outsourcing, survey indicated that both sectors engaged in some outsourcing of internal audit activities particularly in information technology and system. The percentage outsourced is quite similar between these two sectors. (Salehi et al., 2010).

The authors highlighted the pressures auditors would face in the era of globalization and challenges in order to maintain trust and integrity. The authors have reviewed a wide range of articles and journals published and covered areas of audit fraud, true and fair view interpretation, auditor independence and role of internal auditors. In addition, expressed that computer fraud is easy to commit but difficult to prevent and therefore, the auditors should define their responsibility for computer fraud. The authors have defined the lack of

independence, integrity and credibility of the auditing profession on the role and responsibility to detect and prevent audit fraud. They also discussed the accounting uncertainty and changes in standards over time have affected auditors in forming a true and fair view (TFV) opinion. The concept of "true and fair view" (TFV) is well known to accountants as well as auditors. It has been the fundamental basis of audited accounts for many years. The recent audit failure cases have revealed the issue on the concept of TFV and whether this concept certify by auditors or not, needs an overhaul to strengthen the audit process. This should be supported by taking into account the judgments from stakeholders of the organization and the auditors. This can help the auditors not only to be professionals, but also to be seen as professionals. It is noted that internal auditors, rather than external auditors, will be more helpful in detecting and reporting fraud, since internal auditors work with the management, (Salehi *et al*., 2010).

The Institute of Internal Auditors (IIA), the American Institute of Certified Public Accountants (AICPA) and others have likewise identified organizational independence as crucial to the viability of the internal audit function. Auditors should be sufficiently independent from those they are required to audit that they can both conduct their work without interference, and – equally important – be seen to do so.
Coupled with objectivity, organizational independence contributes to the accuracy of the auditors' work and gives employers confidence that they can rely on the results and the report, (Cohen *et al*., 2010).

The authors aimed to understand internal audit functions, explore implication of IT and analyze advantages of internal audit in the organizational governance. The authors explored the origin and acceptable definition of internal audit by reviewing literature, comparative analyses, and reviewing latest research. The definition of internal audit has continually changed and revised decade by decade, and still we are still facing certain issues understanding of internal audit function and it position within the organization.
At present, the function of internal audit includes not only of internal control effectiveness, fraud investigations or assistance to external auditors, but also identification of organizational risks, consultations to the senior management with regard to risk management, process improvement or global operations. It is vital for all members of organization (management, accountants, audit committee) to have same and adequate understanding of what internal audit is all about. Auditors aided by IT based application; computer assisted audit tools (CAATs) increased effectiveness of internal audit in the organization. On the other hand, IT

development, for example, automation and computerization, had increased risk of discontinuing organizations activity, data loss, network breakdown and influence business monitoring and control process. The authors have reemphasized the aim of internal audit function which is to monitor, evaluate and improve risk management, controls, and governance process. Unfortunately, the author has not provided enough analysis on how different corporate governance's approaches can influence internal audit process in the organization. (Salehi et al., 2010)

As Vasharhelyi et al (2010) indicate, early adopters of CA (Continuous Auditing) will likely simply automate existing audit practices, going after the "low hanging fruit" of processes that are easily and simply automatable. Once the benefits of that are apparent, CA will grow into further areas of the audit, but this will necessitate reengineering the audit to make more processes capable of being automated. Finally, by the mature stage, much of the internal audit will be automated and conducted independent of location, with the human auditors focusing only on the audit tasks that demand the most subjectivity, such as in assessing the "tone at the top".

Kogan et al, (2013) develops a framework for continuous monitoring of business processes by internal auditors. In this framework the first layer monitors compliance with deterministic business process rules and the second layer implements analytical monitoring of business processes. In the extant auditing literature (mostly focused on external, not internal auditing), analytical procedures are utilized first in order to identify areas of potential concern for focusing detailed testing on the most relevant samples. This sequence of audit procedures is driven by the objective to reduce the amount of data that the auditor needs to obtain given the high cost of doing so. The change in the order becomes essential in continuous auditing since data today is much more easily accessible to auditors and the automation of tests of detail both enables and necessitates their application to the complete population of business transactions thus eliminating any rationale for sampling.

2.10 Audit software in use

Audit Planning with Planet

Planet (Delisio *et al.*1994) is a program that guides the auditor through a structured series of questions, assigns varying degrees of audit risk to all accounts and audit assertions about those accounts. It then draws upon an extensive library of audit procedures to construct an initial

audit plan that uses the most efficient audit procedures to provide an adequate level of comfort to mitigate all identified risks. The benefits are substantial: the auditor is efficiently guided through a comprehensive set of audit considerations, and each element of the resulting plan represents the best practice as agreed upon by experts throughout Price Waterhouse firms worldwide. In the course of extensive testing around the world, Planet has been documented as having achieved up to twenty-five percent reduction in audit hours without sacrificing effectiveness. Planet is an expert system that captures the accumulated knowledge of human experts in a narrow domain, and represents this knowledge in the form of (a) propositions to which the program assigns varying degrees of likelihood given information about the current situation, and (b) logical axioms --- usually if-then rules, that is, syllogisms --- which represent the relationships between the propositions and whose antecedents and consequents are chained together to produce complex inferences. For example, a single Planet session focuses on a single business unit in a given reporting period, for which it must assign a degree of likelihood to various propositions such as "revenues exceed expectations," "management is sensitive to market expectations," and propositions about specific accounts, such as "reported revenues are genuine", "revenues are reported in the proper period" and so on. Continuing the example, one example rule would be that if revenues fall short of expectations, but management is sensitive to the market's expectations, then there is increased risk that reported revenues are not genuine. The general audit planning problem is exceptionally well suited to an expert system approach. Planet also benefited from existing codification of audit planning theory into Price Waterhouse's Audit Guidance Series (AGS) books, although substantial refinements and extensions were made to AGS in order to achieve the fine grained judgments that Planet is capable of, (Hamscher *et al.,* 1992).

Internal Controls Evaluation with Comet

Comet is program which formally manipulates a description of a set of business activities to produce an analysis that classifies every documented activity as to its relative contribution to control objectives, as well as classifying potential points of failure as to their relative degree of coverage by controls. Comet is a breakthrough technology because it exploits the system documentation and flowcharts that auditors already produce, and uses this information to produce a precise analysis of internal controls.

Price Waterhouse EDP (Electronic Data Processing) auditors use a tool called Venus- a program that is, in effect, a subset of Comet- to produce a formal model of business processes,

the information flows and document media in those processes, and the types of internal controls in place and how those controls are executed in the context of the business process.

Comet exhaustively examines all of the potential categories of failure that can occur in the model that the auditor builds, mapping each of these potential failures onto audit assertions that they would violate and onto the documented controls that would mitigate them. In model-based reasoning, an expert system is built with a very small fixed set of judgmental rules, while most of the dynamic information about the problem is represented using a multi-purpose computational model of the situation. A key advantage of model-based reasoning is that, as in Comet, the expert system can be used in conjunction with a model that already has been built for other purposes; in the case of Comet, a business process model used for systems documentation or reengineering can be re-used for analysis of internal controls, including "what-if" analysis of the impact of changing the set of controls.

Documenting the Audit with TeamMate

TeamMate is a uniquely advanced Microsoft Windows-based product that supports the preparation of all types of audit documentation in a common framework. Unlike other "office suite" software products, TeamMate provides a rich set of functions designed specifically to support auditors in a variety of environments. TeamMate provides users with the ability to produce audit workpapers using any of a variety of tools including word processing, spreadsheets, imaging, and checklists.

Currently, TeamMate supports Novell Quattro Pro and Wordperfect as well as Microsoft Word and Excel. TeamMate also provides a common and completely uniform set of facilities across all applications for making fine grained cross references (hypertext references from, and to, a specific location in any other document), tickmarks and annotations, an enforced protocol of preparation, review, and signoff with document encryption and other security features, facilities for searching and constructing ad hoc views of the contents of the workpapers, as well as, most important, a substrate providing remote check-in and check-out that allows the set of workpapers to be fully shared via modem, local network, or diskette.

A key design goal which was achieved in TeamMate is to allow auditors to do away completely with paper, to produce the entire audit end-to-end electronically, producing hardcopy only in special circumstances such as summarizing in a report all of the internal control weaknesses found.

Also, reviewers need not examine every workpaper, but can immediately index to view those which have been marked as troublesome or that match any other criteria specified by the reviewer. Finally, teams never need to be physically present at the same site at the same time, an important advantage where the corporate facilities to be audited are geographically distributed.

However, auditors both within Price Waterhouse and among the internal audit departments of Price Waterhouse clients report that, once the initial learning curve is passed, the speed with which workpapers are produced, reviewed, and revised increases measurably, with many beneficial consequences in terms of cost, timeliness, and quality of audit work, (Hamscher *et al.*, 1992).

APEX (Audit Planning and EXecution) software.

Apex 2.6 is a highly customizable software platform for management of both internal and external audits. The solution covers the entire gamut of activities performed by an audit organization. The solution provides a centralized repository for past present and future audits, workpapers, programs, findings, auditee records and reports which can be cross referenced and indexed for maximum value. It allows for total customization of an Audit organizations process and requirements. It give you the ability to deliver on time, on budget audit reports in both online and offline environments with total synchronization of information.

APEX's Web Component is the key to collaborative work between Auditors and Audit Teams. The Web Component is a central server component that acts as the hub for audit work. Auditors can log in into the APEX server and perform audit related tasks which include management of: Audit Entities, Objective Areas, Objectives, Risks, Controls, Audit Plans, Audits, Audit Teams, and Reports.

This solution covers the entire scope of the activities of an Audit Institution, starting from Planning to generation of Work Orders, from Monitoring of the Audit Progress to creation of reports and Audit Status. Management of Work Papers of Audit in Office (Word, Excel) file formats. APEX comprises of two components: A central Web Component, and a Desktop Component that is installed on every Auditor's computer or laptop.

Main advantages:

1. Existing features can be customized to suit requirements thus reducing development effort.
2. APEX Manages the complete Audit Process, from Annual Planning to the Reporting stage.
3. Close integration with Microsoft Office software to enable offline working.
4. Each Auditor can view and print his own schedule for the entire plan period and send updates of the Audit status.
5. Functional audits under each audit entity can be planned and reported.
6. Using the Skill Matrix module, the Management can frame its Personnel Training and up-gradation policy.
7. Using the Audit Status module, the Management can view the status of Audits at any point of time.

MKinsight™ is an Audit Management Software System.

This is where the User can manage the ongoing activities of the Audit Team on a day-to-day, week-to-week, month-to-month basis. This is where Audits can be created either from the Plan, the Schedule or just as Unplanned Audits. MKinsight™ has a very comprehensive Enterprise Risk Management (ERM) capability which can be used to enter, assess and manage the Enterprise level risks an organization faces. In many cases this capability is in use within dedicated risk teams, in other cases Audit teams use it to record Enterprise level risks to aid and facilitate risk based Annual Planning, and in other cases the two disciplines work alongside one another within MKinsight™

MKinsight™ was conceived as a fully integrated Audit and Risk Management system with the risk side informing Audit at the Annual Planning stage and Audit informing Risk Owners based on actual test results.

Key Features of MKinsight™

1. Seamlessly Integrated Single Database
2. Web Enabled with Off-Line Working
3. Fully Configurable Terminology And Workflow
4. Complete Encrypted Data Security
5. Exceptional User Interface

6. Role Based Privileges
7. Unique Scoring And Trend Analysis
8. Robust Development Programme
9. Active Directory Integration
10. Secure Hosted and Self-Hosted options
11. Multi-Language
12. Enterprise Risk Management Integration
13. New MKinsight Subscription Service

However, all the above softwares do not have the capability of the auditee having access to the system remotely and posting their entries at a cost less and timeliness way that can be viewed by the internal auditor to enable effective and efficient auditing. The software that are web based are not very secure because they can be viewed from any computer in any location yet am developing a system that is interactive, secure and can only be view within the campuses of the University. This will ease the work of the internal auditor since the financial records are entered by the auditee and the internal auditors will not always have to travel to other campuses to make entries of financial records, hence enabling timely, efficient and effective reporting to management and the audit committee. This research will focus on internal audit of purchases and payments of financial transactions for a University with multi campuses that are geographically distributed.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

In this chapter the study discusses the methodology the researcher used basing on the research objectives. It describes the various research and development methodologies used in this project. Research methodology includes the data collection tools used while the development methodologies include the system development techniques used in requirements gathering.

It adopts the following structure: research Design, target Population, data collection techniques and data analysis methods that were followed in the research process.

3.1 Research Methodology

Several data collection tools were used to comprehensively gather all the requirements needed for the WBFAS. The requirements for the new WBFAS were gathered using interviews conducted with key Busitema University (BU) personnel, questionnaires were administered to all the potential WBFAS users like the Auditors, accountants, stores officers, procurement officer, document reviews were carried out on existing data collection instruments and other documents like user requests, invoices, goods received notes, Local purchase orders, receipts, reports and BU financial manual, and observation was used as a mechanism to establish the process flows at BU. All these provided comprehensive requirements and variables that were required for the WBFAS.

Creswell (2009) recommends that a general framework be adopted to provide guidance about all facets of the study, from assessing the general philosophical ideas behind the inquiry to the detailed data collection and analysis procedures. Although different types and terms abound in the literature, the author focuses on mixed methods approach.

3.1.1 Questionnaires

Questionnaires were administered to 2 internal auditors, 3staff from the planning Office, 3 Accountants, 5 stores assistants, 5 staff from procurement office from Busitema campus and 22 staff, from other campus who are the potential WBFAS users (Appendix 1). The respondents took between 1 to 4 weeks before returning the questionnaires and the response rate was 98% as almost all the questionnaires were returned.

3.1.2 Semi-Structured Interviews

The main feature of an interview is to facilitate the interviewees to share their perspectives, stories and experience regarding a particular social phenomena being observed by the interviewer. The participants, who are the practitioners in their field, will pass on their knowledge to the researcher through the conversations held during the interview process (Boeije, 2010). The interview method is most often selected as the main method for collecting empirical data of the relevant practices. The interview procedures, encompassing all procedures from;

1) designing the interview questions and developing the interview guides
2) process of interviewing itself.

Oral Interviews were held with key BU personnel as a way of filling in any gaps that were not properly captured in the questionnaires and to gather facts, opinions and speculations of the expected IS. The two key BU personnel interviewed were the internal auditor and the accountant to gather facts, opinions and speculations. The interviews were able to fill in the gaps that were not captured in the questionnaires, proving the advantage of oral interviews as an opportunity to provide room for probing to obtain the required information. The interviews also helped to seek and clarify diverse views from interviewees that were not clearly elaborated through the questionnaires.

3.1.2.1 Design and development of interview questions

A semi-structured interview, also known as the non-standardised or qualitative interview is a hybrid type of interview which lies in between a structured interviews and an in depth interviews. Therefore, it offers the merit of using a list of predetermined themes and questions as in a structured interview, while keeping enough flexibility to enable the interviewee to talk freely about any topic raised during the interview. The use of an in-depth qualitative interview is considered as the appropriate format for case study research because in-depth questions cannot be answered briefly. It is anticipated that the researcher would need to ask for examples or more explanation on the answer given in order to gain a deep understanding of the issues (Wahyuni, 2012).

Follow-up questions were developed to explore the particular themes, concepts, ideas and unexpected thoughts provided by the interviewees. The probes were used not only to keep the discussion flowing, but also to clarify some discussion points by asking for more details or examples of what had been said (Wahyuni, 2012).

3.1.3 Observation

Observation of the audit procedures was also carried out to determine how the financial transactions are received, registered, funds committed, approved, managed and paid. Three observation visits were made before the final conclusion to provide first-hand information about the procedures and events that occur in the audit process. Observation was used to help in verifying statements that were made during the interviews, to determine if procedures were operated as specified in system documents and to obtain unbiased data that greatly supplemented the oral interviews. Observation provided first-hand information about the procedures and events that occurred in auditing, and was particularly helpful in determining the various work flow processes and procedures.

3.1.4 Document Review

Useful and related sources were used in order to get the basic and necessary background about the project. Available documentation was helpful to collect appropriate data. The main focus of this literature studies was about the auditing system for auditees in a mullti-campus setting.

Existing data collection instruments and documents were reviewed and these included user requests, invoices, goods received notes, Local purchase orders, receipts, reports and BU financial manual. The document review provided a broad coverage and helped collect all the necessary information and variables required for the new system. It also provided references to all sources used in the audit process giving opportunity to discover gaps and problems with the existing system, new needs and organizational direction.

3.2 Research Designs

Research purpose and research questions are the suggested starting points to develop a research design because they provide important clues about the substance that a researcher is aiming to assess (Yin, 2012).

A research method that facilitates a deep investigation of a real-life contemporary phenomenon in its natural context is a case study (Yin, 2012). There are three ideal conditions for conducting a case study advocated by Yin in comparison to the other research methods in social sciences: experiment, survey, archival analysis and history. First, the form of asking a research question is in the form of *why* or *how*. The remaining two conditions are that no control is required over behavioural events being studied and the study focus on contemporary events. Thus, a case study should be of a contemporary event as opposed to a historical one.

Multi-method qualitative research refers to using more than one data collection techniques and applying multiple methods to analyse these data using non-numerical (qualitative) procedures to answer the research question. Here, the investigation should result in both a descriptive model as to how the world is, and prescriptive suggestions as to how the world should be. Thus, case study research should ideally be performed through a two-stage case study with the use of both qualitative and quantitative data collected from multiple sources, and predominantly qualitative analysis procedures applied in a sequential design. Multi-method approach is different from mixed method research, which uses both quantitative and qualitative data collection and analysis procedures that are applied either in a concurrent or in a sequential design (Wahyuni, 2012).

Case study research is an increasingly popular approach among qualitative researchers (Thomas, 2011). Several prominent authors have contributed to methodological developments, which has increased the popularity of case study approaches across disciplines (Creswell, 2013b; Denzin & Lincoln, 2011). If the rich meaning that naming a qualitative methodology brings to the study is not recognized, a case study might appear to be inconsistent with the traditional approaches described by principal authors (Creswell, 2013a; Yin, 2009). If case studies are not methodologically and theoretically situated, then they might appear to be a case report.

Current qualitative case study approaches are shaped by paradigm, study design, and selection of methods, and, as a result, case studies in the published literature vary. Differences between published case studies can make it difficult for researchers to define and understand case study as a methodology, (Hyett *et al*., 2014).

3.3 Study Population

The study population included staff working in the University including; staff from the internal audit unit, some top management staff, staff from stores unit, planning unit and procurement unit, and randomly selected staff from different departments and faculties. An appropriate sample selection technique was identified and used to select samples for this study.

3.4 Research Method

The quantitative and qualitative research, have different forms of research and for this study, the approach was case study research. A case study is a research strategy which focuses on a single organization, institution, event, decision, and policy.

3.4.1 Sample size

The projected number of people to gather information from was an estimate of 40 people.
Two internal auditors, 3staff from the planning Office, 3 Accountants, 5 stores assistants, 5 staff form procurement office from Busitema campus and 22 staff, from other campus.

3.4.2 Sample selection technique

This study used purposive sampling techniques. Purposive sampling is a form of non-probability sampling in which the subjects selected seem to meet the study's needs. It gives the researcher freedom to select a sample based on judgment towards a specific purpose. This method was used by the researcher to identify the key stakeholders who participated in the design of the system.

3.4.2.1 Reasons for using this sampling technique

i. In order to get the right information for this project, there was need to center on the key actors who actively and directly take part in the auditing process. These are the internal auditors, staff from planning Office, Accountants, stores assistants and staff from procurement office.

ii. The sampling technique also provided for free mindedness and willingness by the respondents who were selected to participate in the entire process.

Six participatory design sessions were conducted on different days at Busitema University.
Two internal auditors, 3staff from the planning Office, 3 Accountants, 5 stores assistants, 5 staff from procurement office from Busitema campus and 22 staff, from other campus.

3.5 Participatory Design

Participatory Design (PD) is a data collection method that enables end users to become part of a design team as well as test the usability of systems. Therefore, involving users in design facilitates the elicitation of requirements and early refinements.

3.5.1 Paper prototyping

The design phase of this project application was done with a PD by the use of paper prototyping. According to (Beaudouin-Lafon, M. and Mackay, W., 2003) in the paper

prototype tools and techniques define a prototype as a concrete representation of part or all of an interactive system. A prototype is a tangible artifact, not an abstract description that requires interpretation. Designers, as well as managers, developers, customers and end-users, can use these artifacts to envision and reflect upon the final system. They go ahead to distinguish the different type of prototypes as "on-line prototypes" which run on a computer. They include computer animations, interactive video presentations, programs written with scripting languages, and applications developed with interface builders and "off-line prototypes" do not require a computer. They include paper sketches, illustrated story-boards, cardboard mock-ups and videos. The most salient characteristics of off-line prototypes (of interactive systems) is that they are created quickly, usually in the early stages of design, and they are usually thrown away when they have served their purpose. The researcher chose to use an off line paper prototype in this project. Paper prototyping is when the systems designer involves the user to sketch on a piece of paper how they intend the final product of a system should look like. It is a technique of requirements gathering that is User Centered. According to Maria Johansson, Mattias Arvola, 2007, much of the work of designers is to develop representations of design ideas. They go ahead to affirm that Sketches contribute extensively to facilitating communication between designers and clients. If you put several sketches in a series after each other, you get a storyboard. It is a combination of sketches and scenarios in a comic-like representation. In this project however, the researcher engaged the users and performed several iterations using throw away paper prototypes until the prototype generated was of high fidelity which means the prototype was closer to a more refined system. A sample of two internal auditors, 3staff from the planning Office, 3 Accountants, 5 stores assistants, 5 staff form procurement office from Busitema campus and 22 staff, from other campus. where selected and engaged to sketch their expectations of the final product. This reflected both a high fidelity and low fidelity of the final product. Where high fidelity simply means how fine or close the final product is to the sketch and a low fidelity is the reverse.

3.5.1.1 Reasons for using this approach

i. Cost and time benefit: use of inexpensive material to create paper prototypes, minimum time and effort is required, technical skills are not required to create a paper prototype.

ii. Improved interaction between the end users and the researcher this relieves the user of being bombarded with a product that they have to learn.

iii. User focus: early involvement of the users in the early stage of the development lifecycle such as the conceptual review stage. This reduces user resistance in the future.

3.5.2 General procedures conducted when using this method

This section describes the general procedures that were harnessed when using paper prototyping as a requirements gathering and elicitation tool.

3.5.2.1 Conducting an evaluation meeting

The meeting provides a platform to debrief the stakeholders about the overall objectives of the sessions, the goals to be accomplished and the rules and guidelines on how the stakeholders were engaged when using a paper prototyping tool. The procedures that guided the researcher together with the stakeholders are summarized as:

i. The purpose of the research, its specific objectives and their role in contributing to achieving the objectives of the research.

ii. An introductory briefing on the history of paper prototyping, its relevance and use in the industry and how it relates to participatory design.

iii. Provide participants with information about paper prototyping method as a research tool. And the free mindedness expected from them emphasizing that there is no right or wrong answer and were free to explore their creative side.

iv. Evaluation of the current system and an earlier version or competitor system to identify usability problems and obtain measures of usability as an input to usability requirements, and review of necessary documentation.

v. Two groups are separately handled in developing the prototypes, which meant that, a number of requirements were elicited by the end of the session. All the members in each group collaboratively are tasked to develop the prototypes with the guide of the researcher.

vi. A briefing about the stationeries, materials used to develop paper prototypes and samples of paper prototypes are provided in order to stimulate the stakeholders design.

vii. A highlight of the benefits of the prototype in order to convince skeptics and to encourage the participants to give their full commitments.

3.5.2.2 Evaluation of paper prototypes

At this stage the goal of the researcher was to conduct an evaluation in order to get the users views and perception about the paper prototypes. This was conducted by using a table of performance measures which helped to tap the stakeholder's responses.

3.6 Data Analysis

Data analysis involves the drawing of inferences from raw data. Data analysis can involve multi-methods that are applied sequentially (Wahyuni, 2012). The desire to interpret the user's artifacts is necessary for purposes of system requirements acquisition, elicitation and implementation. This is done by selecting and going through the different paper prototypes and recommending the one with high precision. The exercise was done together with the stakeholders.

3.6.1 Data Analysis Techniques

This section explains the best fit technique that was used to analyse the data. That was extracted from the user participants

3.6.1.1 Contextual and Narrative Analysis

Some time it is not possible to code all texts during analysis. But contextual and narrative analysis was developed as an alternative to techniques such as coding. Instead of segmenting the data into discrete elements and re-sorting them into categories, these approaches to analysis seek to understand the relationships between elements in particular text, situation, or sequence of events (Kaplan & Dorsey, 1991; Maxwell &Miller, n.d). Likert scale of attitude statements are utilized in order to analyse the user's satisfaction.

3.7 System Development

3.7.1 System Development Life Cycle

The study used the System Development Life Cycle (SDLC) for the development of the system. This method involved major activities such as Planning, Analysis, Design, testing, and Implementation. Within these activities are specific activities under each and all these were fully followed in the development process.

3.8 Systems design

This phase involved the actual designing of the system using inputs from the analysis phase. This included selecting the preferred database software and building the design using the software. This provided inputs for the implementation phase of the system and included;

functional design, logical design of the database, Entity Relationship Diagram, physical design of the database, User interface designs, report templates, system architecture, network model and the program design.

3.8.1 Unified Modeling Language (UML)

It is a language for specifying, visualizing, constructing, and documenting the artifacts of software systems, as well as for business modeling and other non-software systems. The UML has a number of models which in turn form part of the models for information systems development, such as the systems requirements. UML was used to design use case diagram, component diagram, relational tables and entity relational diagram

3.9 Systems Implementation

This section explains the method applied in the implementation of the new system. A rapid prototype was built basing on the user interface designs. During the implementation, the system design was converted into the actual/live system. The interface was developed and programmed using software selected and linked to the database.

3.10 System Testing

This section describes how system testing was done, testing is a set of activities that were planned in advanced and conducted systematically. A strategy for software testing must accommodate low-level tests that are necessary to verify that a small source code segment has been correctly implemented as well as high-level tests that validate major system functions against customer requirements. This enabled the user to compare the paper prototypes design with the system.

The developed system was then tested, installation planned and users training planned on how to use it. Testing approaches used included functional, structural, system and unit-testing approaches in combination, to ensure that system program, database structure and performance requirements faults were working according to the specifications. Documentation was also an important activity that occurs throughout implementation and after proper installation and configuration, maintenance, support and management changes that would take effect.

3.11 Conclusion

This chapter described the various methodologies used, to gather comprehensive system requirement specifications for the WBFAS; it also gave an overview of the next phases, the deliverables and a detailed schedule for the WBFAS development. The next chapter is the

analysis phase where the requirements were determined, analyzed to determine the appropriate business processes and their transactions and various models were designed for the intended web based financial audit system.

CHAPTER 4: CURRENT SYSTEM ANALYSIS AND NEW SYSTEM DESIGN

4.0 Introduction

This chapter presents findings from data collected, analyses the results and represents the requirements gathered for the design of the web based financial audit system for a multi-campus institution. An evaluation of the methods used, the system architecture and models were developed in this section that provided a comprehensive description of what the new system requires.

4.1 Data Analysis Results

In order to implement a properly operational web based financial audit system for a multi-campus institution in this case Busitema University, the researcher conducted a study using a purposive sampling method as explained in chapter three. The requirements gathered were critically categorized and analyzed to provide the specifications for the new system and data obtained was categorized and analyzed.

4.1.1 Results from the employees

Table 1 below shows the respondents who were randomly selected from the different faculties (campuses), in Busitema Campus, a total of 18 (45%) respondents. Nagongera campus 6 (15%), Mbale campus 4 (10%),Arapai campus 4 (10%), Pallisa campus 4 (10%), Namasagali campus 4 (10%).

Table 1: A table showing respondents' campuses

Campus	**Frequency**	**Percentage (%)**
Busitema	18	45
Nagongera	6	15
Mbale	4	10
Arapai	4	10
Pallisa	4	10
Namasagali	4	10
Total	40	100

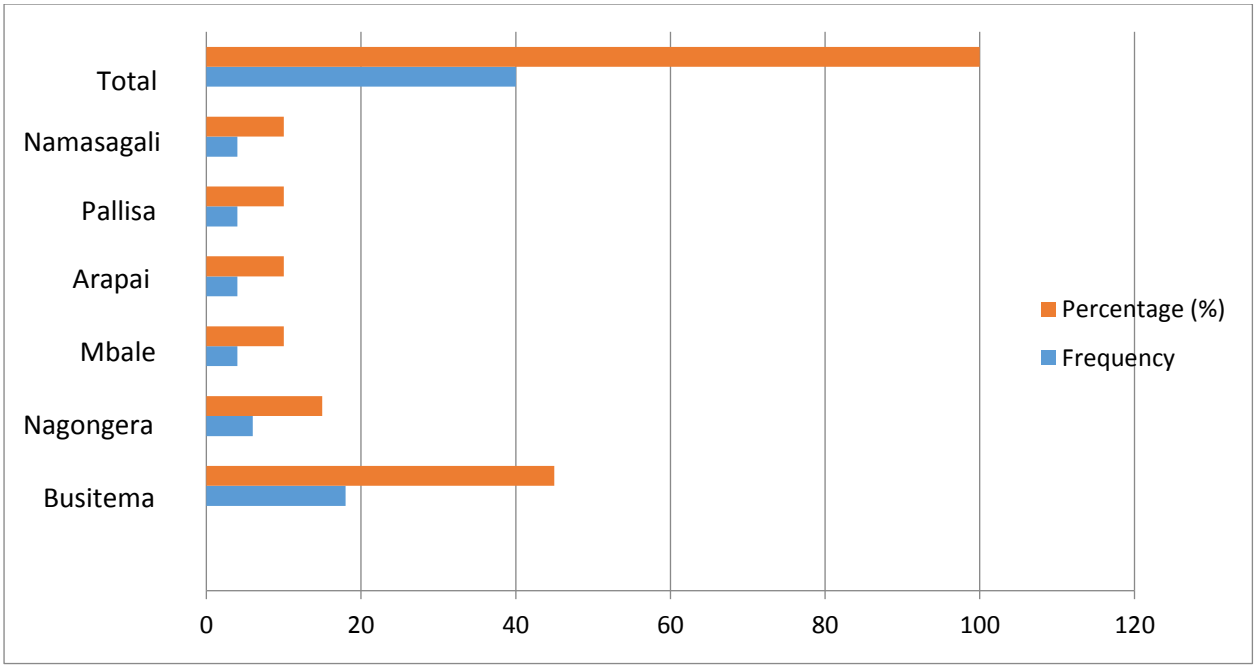

Figure 2: Represent respondents' campus

80% of the correspondents said that the system will ease their work since it will be easy for them to post their purchases transactions and get a feedback of their audit clearance.
90% of the employees knew how to use online web applications.

Table 2: A table showing the ability of users to access online web applications

Question	**Response**	**Frequency**	**Percentage (%)**
Do you know how to use online web applications?	Yes	36	90
	No	4	10
Total		40	100

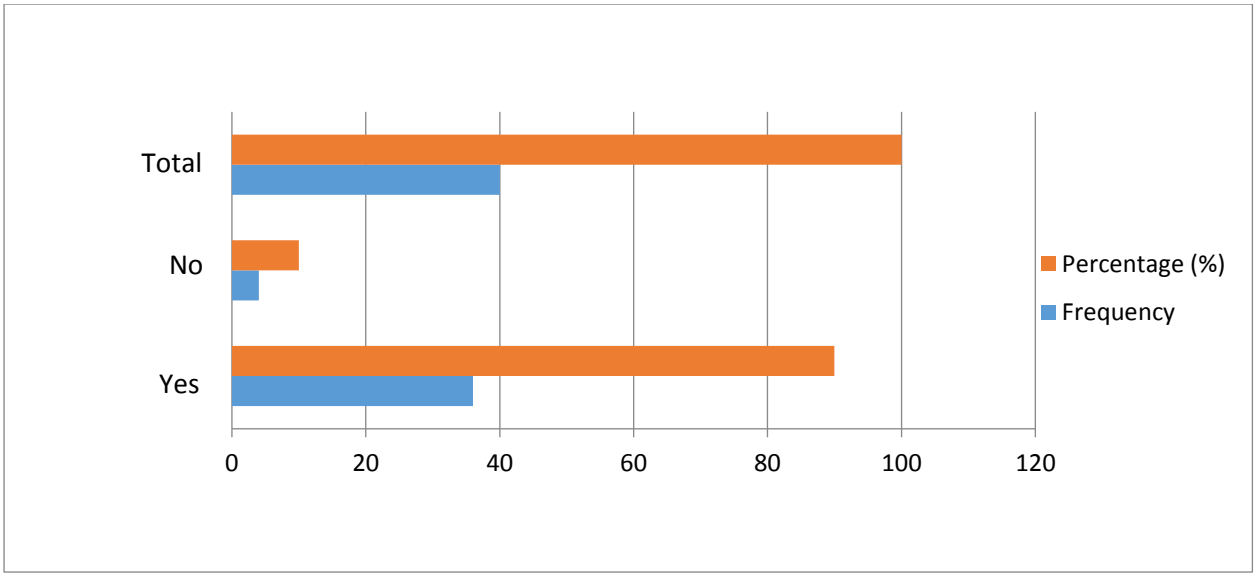

Figure 3: showing response on use of online web applications

A random sample of the respondents was conducted and table 2 below shows the majority of the respondents targeted were male who made up a representation of 26 (65%) respondents. The female respondents only made up a representation of 14 (35%).

Table 3: A table showing respondents' gender

Gender	**Frequency**	**Percentage (%)**
Male	26	65
Female	14	35
Total	40	100

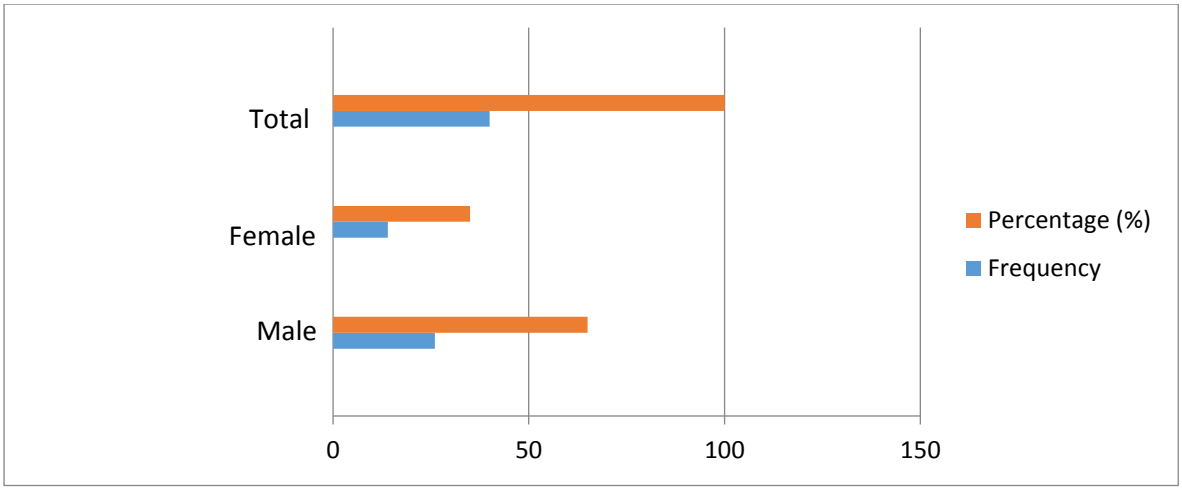

Figure 4: Respondents' gender

4.1.2 Procedure

Six participatory design sessions were conducted on different days. Two internal auditors, 3staff from the planning Office, 3 Accountants, 5 stores assistants, 5 staff form procurement office from Busitema campus and 22 staff, from other campus. The researcher acted as a facilitator for each group. Basing on the findings, the current system was reviewed and below presents on how the financial auditing currently takes place.

4.1.2.1 How auditing is done in Busitema University

This is a spotlight on how auditing of purchases and payments are currently done at the University. Users write requests of goods or services to the Accounting Officer. The requests are first sent to the finance department and the accountant checks if funds are available and if the activity was budgeted for as per the approved work plan and Budget for that financial year before commitment of finds. If the is no planned activity, the request is rejected, but if the activity was planned for in the financial year and funds are available, the request is committed and sent to financial controller to authorize payment. If a request is below 5 million shillings, the users request is sent to the cash office and a user is given cash to make a purchase. If a request is 5 million shillings and above, the users request is sent to the Procurement and Disposal Office so that the procurement process starts. The Procurement officer follows the guidelines as per the Public Procurement and Disposal of Assets Authority.

All items delivered to the University are delivered at the stores of the different campuses accompanied with a delivery note from the supplier. Internal Auditors verify the items procured, against what was requested for after verification from a technical person. If delivery is not ok, goods are rejected, if the delivery is fine, stores Office issues a Goods received note,

the Internal Auditor clears the purchase, and the Supplier is paid. If the delivery is a service, a Job card (Appendix iv) or Delivery Note (Appendix vii) is issued, and a Technical person confirms the availability of the service, before the auditor clears the procured item. The user is also cleared of that financial transaction. The internal auditor generates a report on whether there was compliance as per the rules, regulations in the Busitema University financial manual or there was fraud or misappropriation of funds.

4.1.2.2 Challenges faced by the current system

i. Cost of conducting financial auditing: because of the multi-campus model and the campuses being geographically distributed, the Internal Auditor experiences a challenge to monitor purchases and payments across different campuses.

ii. Time: the turnaround time taken during the auditing process such as travelling to the respective campuses, viewing physical items and files, capturing the information in an Microsoft excel worksheet and then make reports.

iii. Accuracy: the accuracy of the current system can be contested because, the auditors do this in a limited time since they are in a hurry to go back to their duty station. This results to audit queries for some users that would not have come up if well captured.

4.1.2.3 Strength of the proposed system

The web based financial Audit systems simplifies the auditing process for a multi-campus university thus reducing on the resources spent by auditors looking for information, easy retrieval of information, time saving for the internal auditors since information is captured by the auditee and provides a transparent way of information archiving.

4.2 Data sources

Data for the project was collected from Busitema University from the Internal Audit Unit, Finance department, University Secretary Office, Procurement Unit, Stores Unit, Planning Unit. This offices work hand in hand in the purchase and payment of foods and services for the University. Necessary documentation was provided that was of help to the researcher in accomplishing this project.

4.3 Data presentation and analysis of the findings

After gathering the feedback from the target user groups, findings indicate that there is need for an electronic auditing system accessible online to provide easy access of the user information about purchases and payments of goods and services. As revealed in chapter three,

the current system is manual, therefore, the decision of which features to include in the online web based auditing system was largely influenced by the feedback gathered from intensively engaging the stakeholders using a participatory approach. As a result, the system actors roles where identified and classified as below;

4.3.1 System requirements

4.3.1.1 Functional requirements

User Registration. Before the user accesses the system, the system administrator enters the user details into the system. This enables tracking of all the users who have access to the system, easy management and administration of users.

User Login. In order for a user to use the system, he/she needs to login to the system. During registration, a password is created. Login ensures security restrictions on the system access hence mitigating security risks.

Commitment of funds. The accountant is able to commit funds for a request that has goods or services that were budgeted for in the current financial year. In case the request contains goods and services that are not budgeted for, thee account does not approve the request.

Macro and Micro Request Submission. With this functionality, the users are able to submit both micro and macro requests. If the items are budgeted for the, the request is committed and sent to financial controller to authorize payment. If a request is below 5 million shillings, the users request is sent to the cash office and a user is given cash to make a purchase. If a request is 5 million shillings and above, the users request is sent to the Procurement and Disposal Office so that the procurement process starts. The Procurement officer follows the guidelines as per the Public Procurement and Disposal of Assets Authority.

Displaying Requests. Here the details of the user's submissions are displayed, this helps when Auditor needs to clear the request. The order of clearance is a user request is first viewed by the accountant, then the Accounting officer, if its below 5 million, its sent to the cashier for payment, if it is 5 million and above, the request is sent to procurement office, when the item is purchased or service delivered, its sent to stores, verified by the technical person and the Internal auditor.

Verify requests for goods and services and clear for payment; The Internal auditor should be able to view the items purchased, verify them against the attachments provided like receipts, delivery notes, Local purchase order, Goods received note and clear them for payment.

Verify payments: the system shall display items due for payment and those that have already been paid for

Generate reports: The internal auditor should generate a report on whether there was compliance as per the rules, regulations in the Busitema University financial manual or there was fraud or misappropriation of funds.

4.3.1.2 Nonfunctional requirements

- **Quick response time -** A user should be able to get a system response to all the necessary requests sent within reasonable time. This makes the functionality of the system faster and convenient for users**.**
- **Security-** The system should be able to take into account the actions of people attempting to maliciously use the system. It should also be able to also prevent unauthorized access to private user information and confidential data.
- **Reliability –**The users should be able to access the system at all times that is 24/7. It should be available to them to access it and use it when required.
- **Interoperability** – The system should be able to operate on all common platforms that may be used by the users. That is on the majority of the operating systems that are connected to the internet.

4.3.1.3 User requirements

Drawing from intended users' responses, the following were summarized as a user requirements needs:

- A system that can provide real time results viewable by the auditor.
- Analyze the financial transactions and provide a result of users who have complied with the regulations on purchases and payments.
- Secure system; allowing users to login, post financial transactions and the modifications made to the database must be automatically registered in the system and a record is kept of the users which made the modification, the date and the place it was made. .
- A system that can work on current windows Operating Systems platform or linux.

4.3.1.4 System requirements

The web based auditing system is open source and cross platform it can run on both the windows operating system and Linux systems with a MYSQL database platform and an apache server 2.0. The system is able to run on WAMP, MAMP and XXAMP 2.0 and above the following are the minimum hardware and software specifications that will be required;

1) VGA of higher resolution - at least 800x600 pixel resolution
2) Microsoft Internet Explorer 6.0 SP1 or later
3) Windows Installer 4.5 or a later version
4) Minimum Processor speed of 1 GHz;
5) Memory (RAM) of at least 512MB
6) Windows XP or higher, operating system.

4.4 System design

The researcher discussed how a web-based auditing system was designed from a basic paper prototype to a high-fidelity prototype. This part of the design process required us to design an interactive system that enables auditees' to securely post their financial transactions. Therefore, a participatory design approach was used, in conjunction with paper prototypes. In the next section, we describe the process and results obtained after this approach.

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy the specified requirements.

4.4.1 Procedure

Participartory Design (PD) sessions were conducted with the six different groups as discussed in chapter three, participants were briefed about the overall objectives of the sessions and the goals to be accomplished. Then they were introduced to the paper prototyping technique in which the following aspects were highlighted as presented by (Snyder, 2003).

1) An introductory briefing on the history of paper prototyping, its relevance and use in the industry and how it relates to participatory design.

2) Participants were also informed that they were learning paper prototyping. They were further told that there is no right or wrong answer and were free to explore their creative side.

3) The groups worked separately in developing the prototypes, which meant that at the end of the sessions, a number of requirements were elicited. All the members in each group collaboratively developed the prototypes.

4) The participants were briefed about the stationeries and materials used to develop paper prototypes.

This was followed by showing the participants samples of paper prototypes in order to stimulate their design.

5) The benefits and the positive aspects of paper prototyping were highlighted throughout the briefing, to convince skeptics and to encourage the participants to give their full commitments.

In the first step, the concept of user goals was explained to the participants. They were also reminded that they were the users and that they were developing a web based auditing system. Thus, as users, they know their specific needs. They were asked to think about the things that they do frequently when handling purchases and payment transaction and the things that were important. The user provided the following answers;

1) Capture users requested, check if the goods and services requested for are in the approved budget of the current financial year before commitment of funds by the accountant.
2) Approval of funds by the accounting officer after funds are committed by the accountant.
3) If funds approved are below 5 million shillings, the request is sent to the cashier for processing and payment and if request is greater or equal to 5 million, the request is sent to Procurement and disposal unit.
4) Procurement and Disposal unit sources for bidders as per the rules and regulations of PPDAA.
5) Suppliers and staff deliver items to stores. They must have a delivery note, receipt, invoice, Local purchase order (LPO). The stores officer issues a goods received note when the delivery complies with the LPO and delivery is verified by a technical person and the internal auditor.
6) The internal auditor clears a delivery for payment after the issue of a goods received note.
7) The internal auditor writes a report on whether there was compliance as per the rules, regulations in the Busitema University financial manual or there was fraud or misappropriation of funds.

They were also asked to prioritize activities although most of them validated the idea that all activities were of equal importance. The researcher then guided the groups with sample prototypes showing activities (that simulate the production a web based auditing system) in order to stimulate them to think about the system. After each session, a walkthrough was done in order to identify any issues and for the participants to justify their choices. The groups then started developing the paper prototypes with the assistance of the researcher. This is the moment where they could explore their creative side to design the system. The paper prototype

during the Participatory Design (PD) sessions helped in eliciting user goals and identifying requirements for the web based auditing system. Below are representations that resulted from the different PD sessions and the different group artifacts were compared.

4.4.2 Paper prototype

The researcher combined the ideas generated from the groups (the staff of different departments as described in section 4.0) and user interface sketches on pieces of paper were presented. The prototypes were developed basing on the user requirements. The figures bellow show the sample of agreed design with high precision whereas other sketches with lower precisions where thrown away. A comparison was made with the different prototypes, this is shown below.

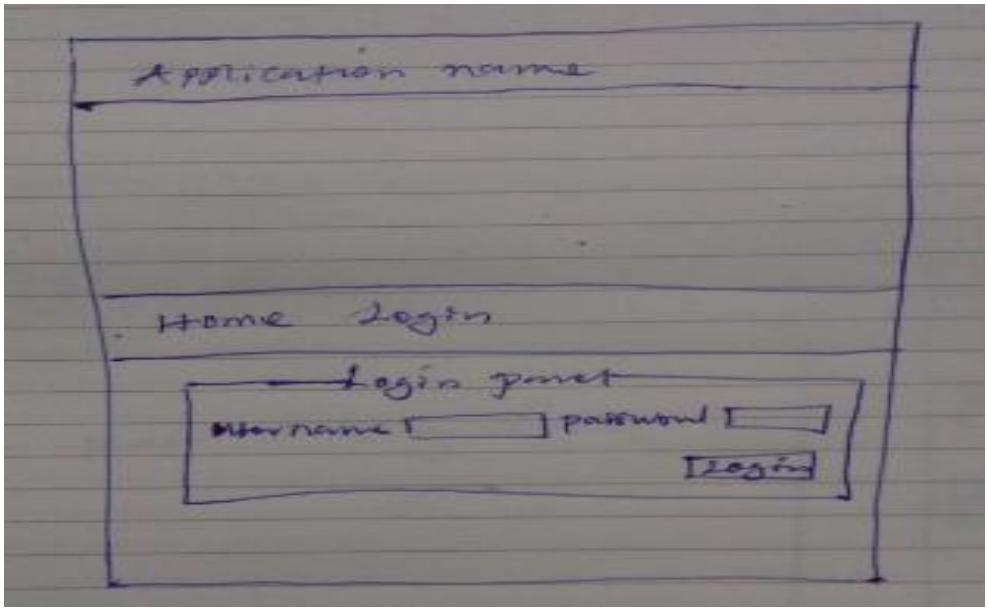

Figure 5: The login page for users drawn during the PD session

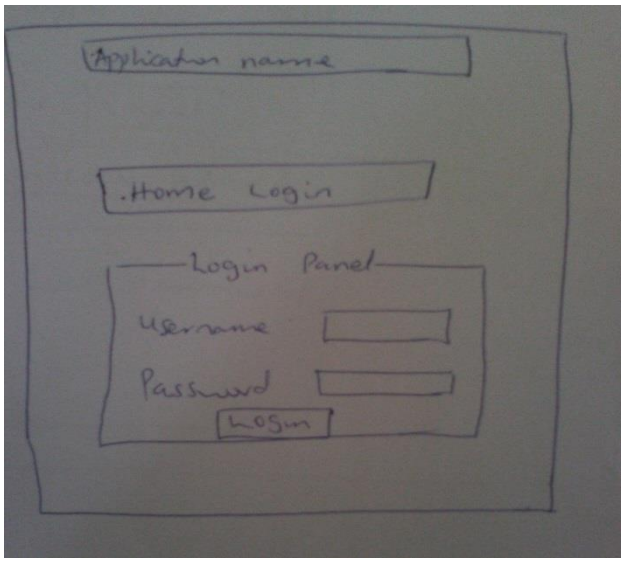

Figure 6: The login page for users drawn during the PD session

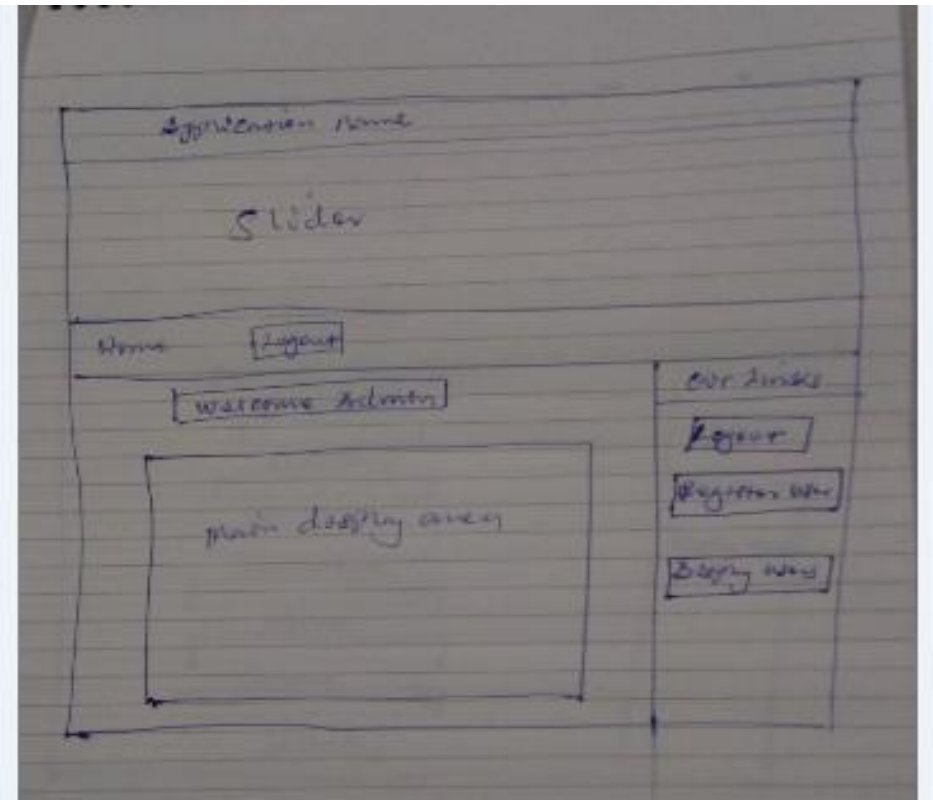

Figure 7: The Administrator login home page drawn during the PD session

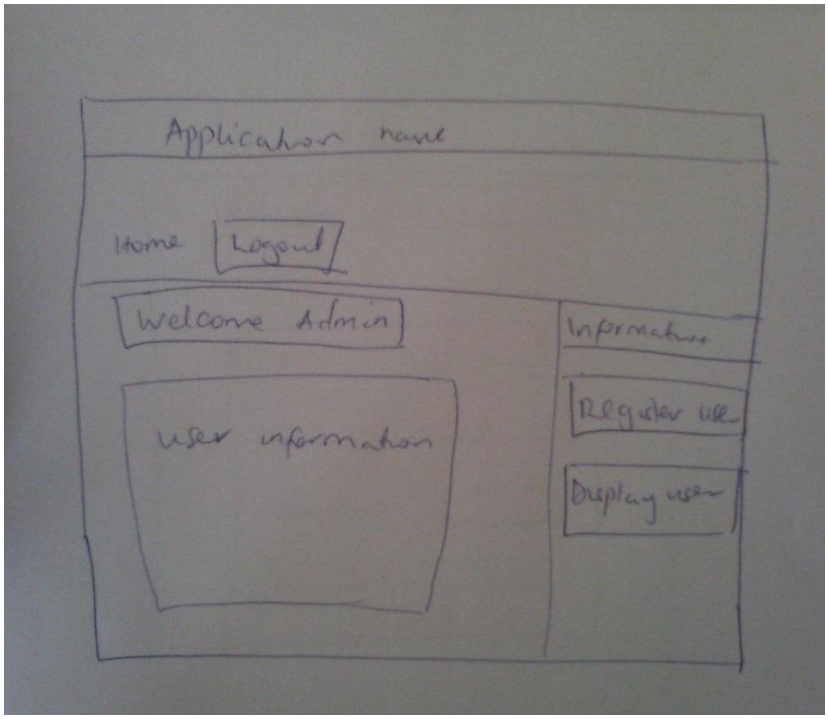

Figure 8: The Administrator login home page

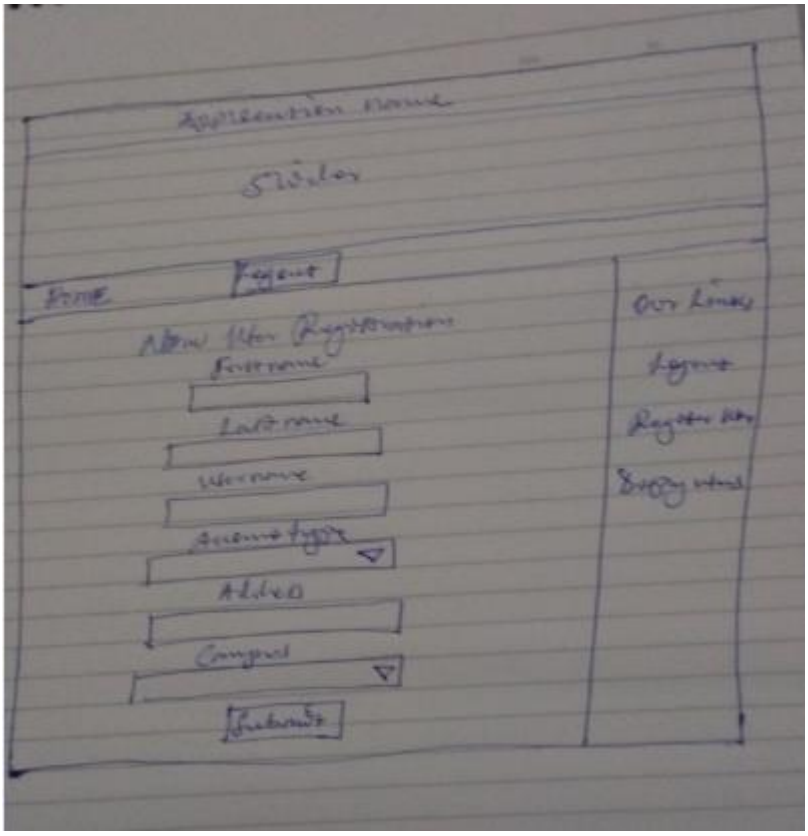

Figure 9: shows information required to be registered drawn during the PD session

4.4.3 Results of the design session

As a result, several issues were identified with the prototypes, such as: incomplete interfaces and missing links; failure to generate tasks and the reluctance from one of the participants to sketch solutions. The screen designs produced during the design activity revealed a trend towards simplicity. There was a need to strike a balance between functionality and the number of steps to accomplish an auditing system processes.

In this light, the participants raised a lot of wary of the security, authenticity and user friendliness of the system. This guided the researcher on the methods to choose to implement the system.

In the next section system models using UML are presented. The systems architecture and implementation is also performed. This is obtained from the findings provided in this section.

4.5 System models and design

This section presents the system models that were derived as a result of the functional and nonfunctional requirement. Universal Modeling Language (UML) was used as presented in the sections that follow.

4.5.1 Use Case Model

Use case diagram is a Unified Modeling language (UML) diagram with its specific purpose to represent actors and corresponding use cases. Use case diagrams specify the events of a system and their flows but use case diagram never describes how they are implemented. Use case diagrams are used during requirements analysis as a graphical means of representing the functional requirements of the system.

Use case Diagram

The diagram below shows the users of the system together with the tasks they can perform on the system.

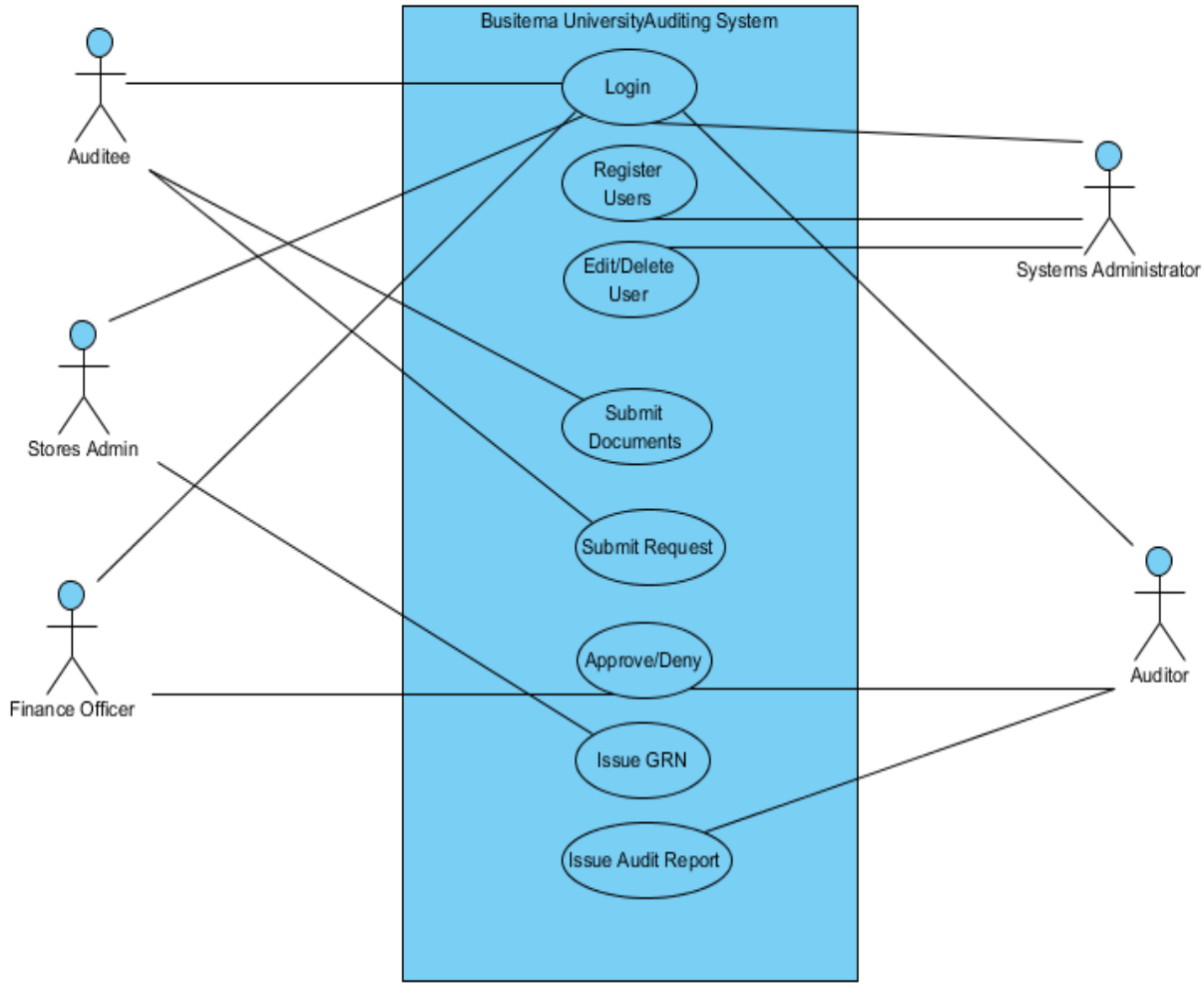

Figure 10: Use case diagram

1. Store admin, verify goods, services and financial transaction documents like invoices (Appendix ix), LPO-local purchase order (Appendix vi), user requests and when all is ok, issue Goods received Note (GRN) (Appendix viii)
2. Auditor, verify goods, services and financial transaction documents like invoices, LPO-local purchase order, user requests and when all is ok, approves the GRN (Signs on the GRN), clears the request as a compliant transaction. If not ok that is some relevant documents are missing, the user is given an audit query since fraud and misappropriation of funds has been detected by the system. The auditor produces an audit report showing the compliant transactions and noncompliant transactions.
3. Finance Officer, Commits a user request after verification that funds are available and the user budgeted for that activity as per the approved University budget and work plan (Appendix v), makes cash payments to users so that they can purchase goods, issues out a check for macro requests to the supplier.

4. Auditee, Submits a request, submits the supporting documents e.g. work plan (Appendix v), receipt (Appendix ix), Delivery note (Appendix vii) for the request.

4.5.2 Flow chart

A flow chart is another important diagram in UML to describe dynamic aspects of the system. It represents the flow of one activity to another activity. The activity can be described as an operation of the system that the control flow is drawn from one operation to another. This flow can be: sequential, branched or concurrent.

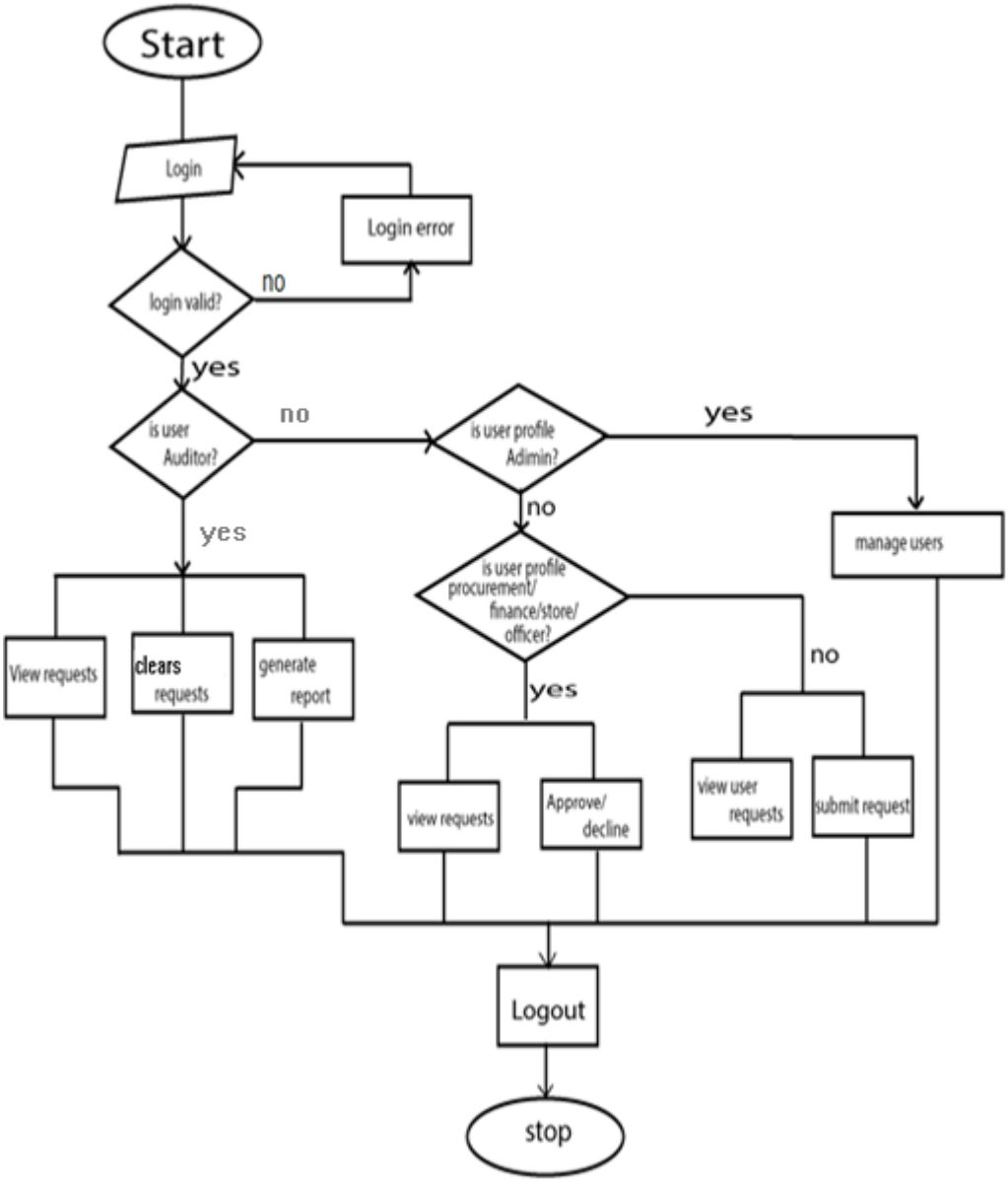

Figure 11: Flow chart representing the design of the system

4.5.3 System Component Diagram

Component diagrams are special kind of UML diagram to describe static implementation view of a system. Component diagrams consist of physical components like libraries, files, folders etc.

This diagram is used from implementation perspective. More than one component diagrams are used to represent the entire system. Forward and reverse engineering techniques are used to make executables from component diagrams.

Below is the component diagram of the system illustrating the main components of the system.

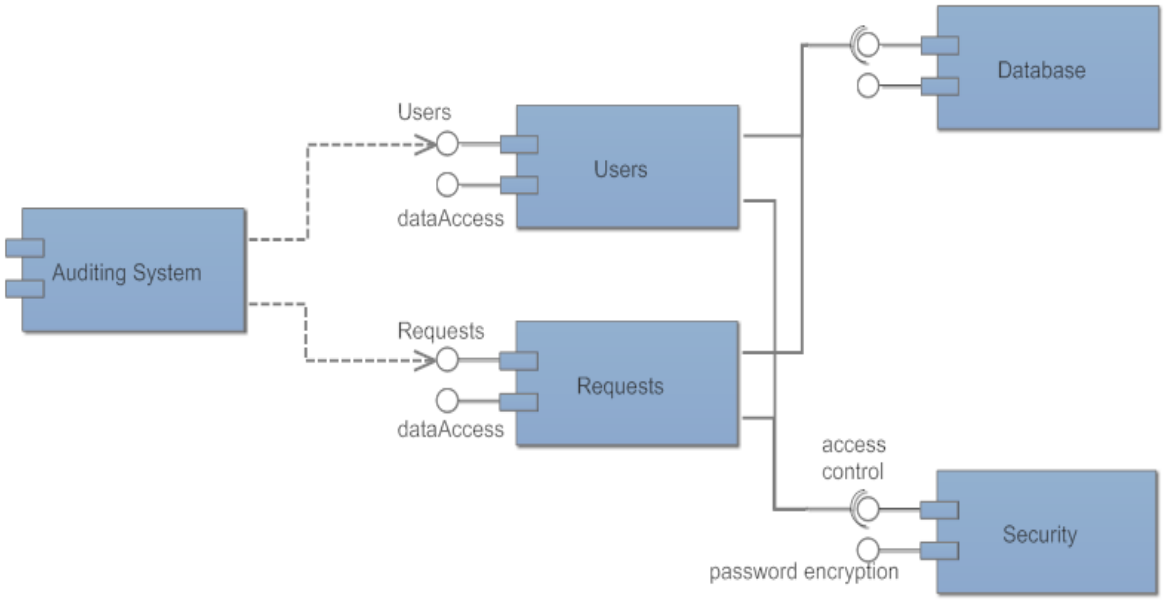

Figure 12: System component Diagram

From the above diagram, the system consists mainly of the web application, database and users accessing the system

4.5.2 Systems Architecture

The implementation runs on a three tier architecture. Three tier simply means there is enforcement of separation between the following three parts:

1. Client Tier or user interface

2. Middle Tier or business logic

3. Data Storage Tier

The first layer runs on the client side, the second layer at the middle layer (the business logic) and the third layer is the database system. The system is designed to run using web technologies which provides greater application scalability, high flexibility, high efficiency, lower maintenance, and permits reusability of components. Since each tier runs on a separate machine, it improves systems performance. The dynamic web technology used to build the system permits adding and retrieving data to and from the base tables whenever requested. The figure below shows the construction of the three tier.

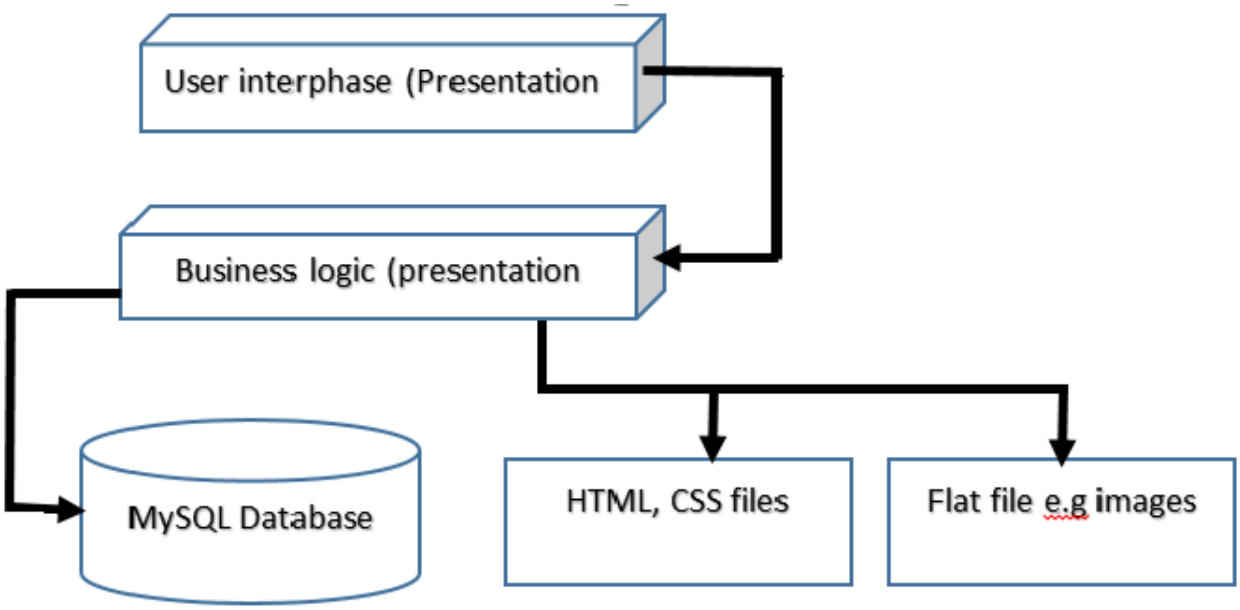

Figure 13: The client server architecture

4.6 Database design

This section describes the different database tables used to store the web based financial audit system information.

Data normalisation was carried out on the database and below are the details of the different tables that were extracted.

4.6.1 Relational tables

Table 4: Users Relational table details

Field Name	Data Type	Description	Constraints
Id	Int(10)	Primary Key	Not null , primary key
Fname	Varchar(45)		Not null
Lname	Varchar(45)		Not null

Password	Varchar(45)		Not null
Username	Varchar(45)		Not null
Account_type	Varchar(45)		Not null
Status	Varchar(45)		Not null
Address	TEXT		
Phone	Varchar(45)		Not null
Datentime	TIMESTAMP		Not null
Campus	Varchar(45)		Not null

Table 5: Micro_requests Relational table details

Field Name	Data Type	Description	Constraints
Id	Int(10)	Primary Key	Not null , primary key
Request	Varchar(45)		Not null
Details	TEXT		Not null
receipient_id	Int(10)		Not null
Finance_aproval	Int(10)		Not null
Amount	DOUBLE		Not null
Stores_aproval	Int(10)		Not null
Audit_aproval	Int(10)		
Receipt_id	Int(10)		Not null
Datentime	TIMESTAMP		Not null
Workplan_id	Int(10)		Not null
Amount_approved	DOUBLE		Not null

Table 6: Macro_requests Relational table details

Field Name	Data Type	Description	Constraints
Id	Int(10)	Primary Key	Not null , primary key
Request	Varchar(45)		Not null
Details	TEXT		Not null

receipient_id	Int(10)		Not null
Finance_aproval	Int(10)		Not null
Procure_aproval	Int(10)		Not null
Stores_aproval	Int(10)		Not null
Audit_aproval	Int(10)		
lpo_id	Int(10)		Not null
Datentime	TIMESTAMP		Not null
Wplan_id	Int(10)		Not null
Greceived_id	Int(10)		Not null
Company	TEXT		

Table 7: Attachments Relational table details

Field Name	Data Type	Description	Constraints
Id	Int(10)	Primary Key	Not null , primary key
Type	Varchar(45)		Not null
Fname	Varchar(45)		Not null
Datentime	TIMESTAMP		Not null
Uid	Int(10)		Not null

Table 8: Approvals Relational table details

Field Name	Data Type	Description	Constraints
Id	Int(10)	Primary Key	Not null , primary key
User_id	Varchar(45)		Not null
Request_type	Varchar(45)		Not null
Datentime	TIMESTAMP		Not null
Status	Varchar(45)		Not null
Aby	Int(10)		Not null

4.6.2 Entity Relationship Diagram

This is a graphical representation of entities and their relationships to each other, typically used in computing in regard to the organization of data within databases or information systems

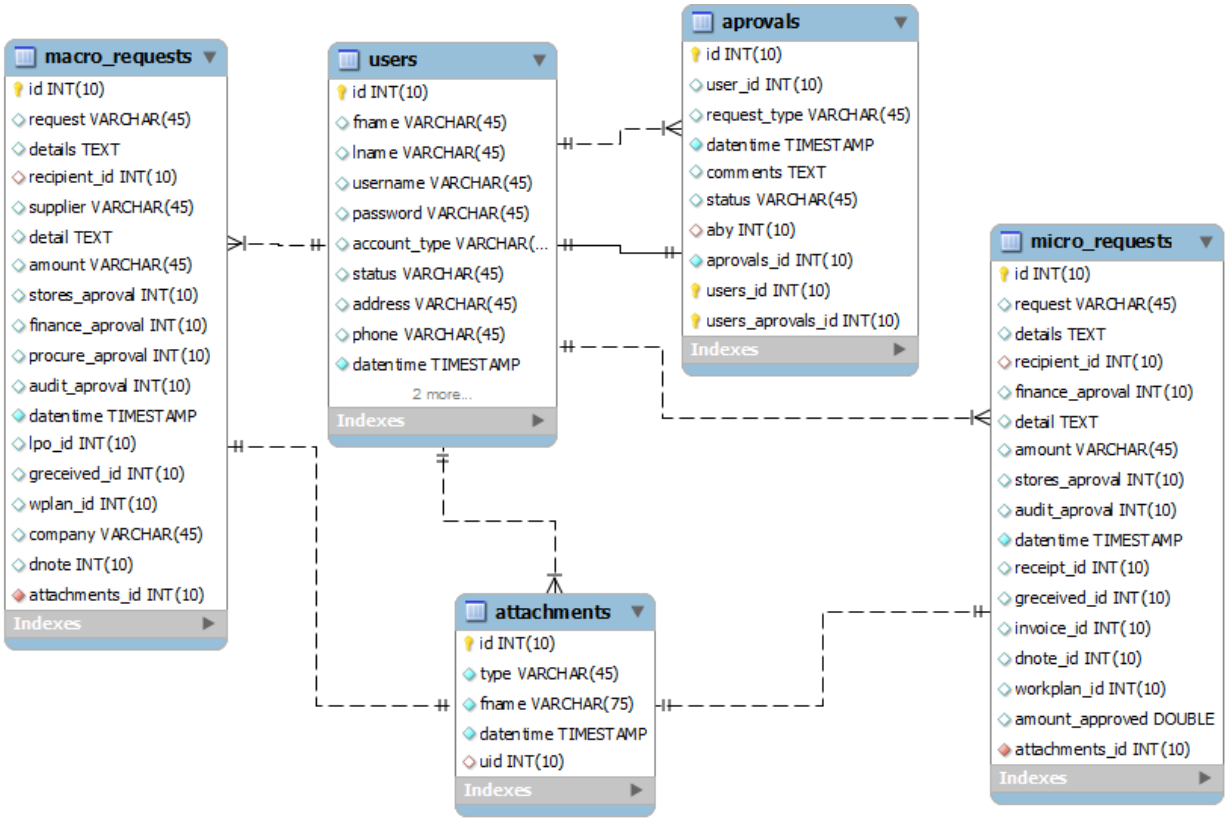

Figure 14: Entity relationship diagram

CHAPTER FIVE: SYSTEM IMPLEMENTATION AND TESTING

5.0 Introduction

This chapter entails the implementation of the designs to realize the physical database and the system. This section describes the implementation of the product in two sections. The first section explains the development tool, and the second section describes the system developed. It discusses the final results, explaining the different tools used while developing the system, the minimum hardware requirements needed for the deployment of the system and how the system operates.

5.1 Development Platforms

5.1.1 Sublime Text

This is a programming open source text editor that was used throughout the development of the system. It was used to develop and debug php, javascript and HTML code

5.1.2 Dreamweaver CS6

This is design software that is used for the design of web pages. Dreamweaver was used in project as an editor for the development of HTML pages that provides the interface for the online auditing system.

5.1.3 PHP

Hypertext Preprocessor is an open source server side programming language extensively used for web scripts. It is a popular server-side scripting language designed specifically for integration with HTML, and is used (often in conjunction with MySQL) in content Management System and other web applications. The researcher used PHP to write web pages that connects the web application to the database server.

5.1.4 MySQL

MySQL is an open source relational database management system (RDBMS) that uses Structured Query Language (SQL); It was used for adding, accessing, and processing data in a database. MySQL is noted mainly for its speed, reliability, and flexibility

5.1.5 Programming languages used

The programming languages used include php used for development of the web application developed on Wamp 2.0 server. Php is a server side scripting language hence provides for a thin client. Php is open source hence cross platform. PHP 5 has got new features such as

improved support for object-oriented programing, the PHP Data Objects (PDO) extension (which defines a lightweight and consistent interface for accessing databases.
JavaScript and HTML was used for the coming up of the web pages.

5.1.6 The application server

WAMP server 2.0 was selected for this project because it was readily available and since it implements in a windows platform which is the most commonly used by most computers. However, the system can be accessed by different operating systems such as MAC operating Systems and Linux that is, it is open source and cross platform. Another consideration was based on a fact that databases and applications developed using WAMP can always be upgraded to newer versions with minimal changes. WAMP is an integrated development environment comes packaged with MYSQL and Apache server and a PHP preprocessor. MySQL has some better qualities which makes it preferable compared to the others relational database management systems. It is multithreaded, multi-user database management system, supports all known platforms including Windows-based platforms, requires less hardware resource for storage as well as for execution, much faster, supports Unicode character storage and more than that, it has free version product.

5.2 Code design

During the implementation of the system, the code for the web application was mainly done in Sublime text using php programming language and the database was developed in mysql.
To ensure security of the web applications, users' passwords were encrypted using MD5 method that is built in php.
Different interfaces were also developed based on the user's access level in order to increase on the security of the application
In order to provide a better user experience, the interfaces were built in a way that they are very easy to use.
All users who want to access the system must provide both the username and password assigned during user registration as seen below is the code for the login activity.

```php
require('config.php');


if(isset($_POST['login']))
{
    $u = $_POST['uname'];
    $p = md5($pass);
    $_SESSION['user']=$u;
    $_SESSION['pass']=$p;
//user check
$q = "SELECT * FROM users WHERE username='$u' AND password='$p'";
$cq = mysql_query($q);
$ret = mysql_num_rows($cq);
if($ret == true)
{

    $r=mysql_fetch_array($cq);

    $uid= $r["id"];
    $_SESSION['uid']=$uid;

    $atype= $r["account_type"];

    if($atype=="normal")
    {
echo "<script>document.location='profile_nm.php'</script>";
    }
    elseif($atype=="stores")
    {
echo "<script>document.location='profile_st.php'</script>";
    }
    elseif($atype=="admin")
    {

echo "<script>document.location='profile.php'</script>";
    }
    elseif($atype=="procurement")
    {
echo "<script>document.location='profile_pr.php'</script>";
    }
```

Figure 15: code for login activity

```
            $uid=$_SESSION['uid'];

            $qr="select * from micro_requests  where recipient_id=$uid";
            $sql=mysql_query($qr);

            $num=mysql_num_rows($sql);
            if($num >=1)
            {

  echo '<tr><td align="center" colspan="7">

  </td></tr><tr>
  <td width="5" style="font-weight:bold">#</td>
  <td width="98" style="font-weight:bold">Request Name</td>
  <td width="207" style="font-weight:bold">Description</td>
  <td width="70" style="font-weight:bold">Date Submitted</td>
  <td width="40" style="font-weight:bold">Amount</td>
  <td width="40" style="font-weight:bold">Finance_Aproved</td>
  <td width="40" style="font-weight:bold">Stores Aproved</td>
  <td width="70" style="font-weight:bold">Auditor Aproved</td>
  <td width="70" style="font-weight:bold">Amount Approved</td>
  <td width="70" style="font-weight:bold">Documents</td>

  </tr>';

  $i=0;
   while($r=mysql_fetch_array($sql)) {
            $i++;
            $d=$i%2==0 ? "#ffffff" : "#40b5bf";

            if($r["finance_aproval"]=="")
            {
  $fa="No";
  $amounta=0;
            }
            else
```

Figure 16: Sample php code for displaying user's micro requests

```
if(isset($_POST['register']))
{
$fname = $_POST['fname'];
$lname = $_POST['lname'];
$uname = $_POST['uname'];
$atype= $_POST['atype'];
$address = $_POST['address'];
$contact = $_POST['contact'];
$campus = $_POST['campus'];
$pass = md5($_POST['uname']);

$query = "INSERT INTO users (
                fname, lname, username, password, account_type, status, address, phone,  campus
            ) VALUES (
                '{$fname}','{$lname}', '{$uname}','{$pass}', '{$atype}',1,'{$address}','{$contact}','{$campus}' )";

   $result = mysql_query($query);
   if($result)
   {

echo "<center><h2 style='color:red'>NEW USER HAS BEEN ADDED, THANK YOU</h2></center>";

   }
   else
   {

echo "<center><h2 style='color:red'>UNABLE TO ADD A USER, TRY AGAIN LATER</h2></center>".mysql_error();
   }


}
```

Figure 17: Code sample for adding users from the admin interface

5.3 Testing

The different components of the system were tested against the requirements and then integrated to make sure that they achieve the goal of the system

5.4 Testing of the web application

The web application was tested by creation of different users with different access levels (admin, normal user, finance officer, stores officer, procurement officer and auditor) who logged on and were able to perform the tasks based on the design document.

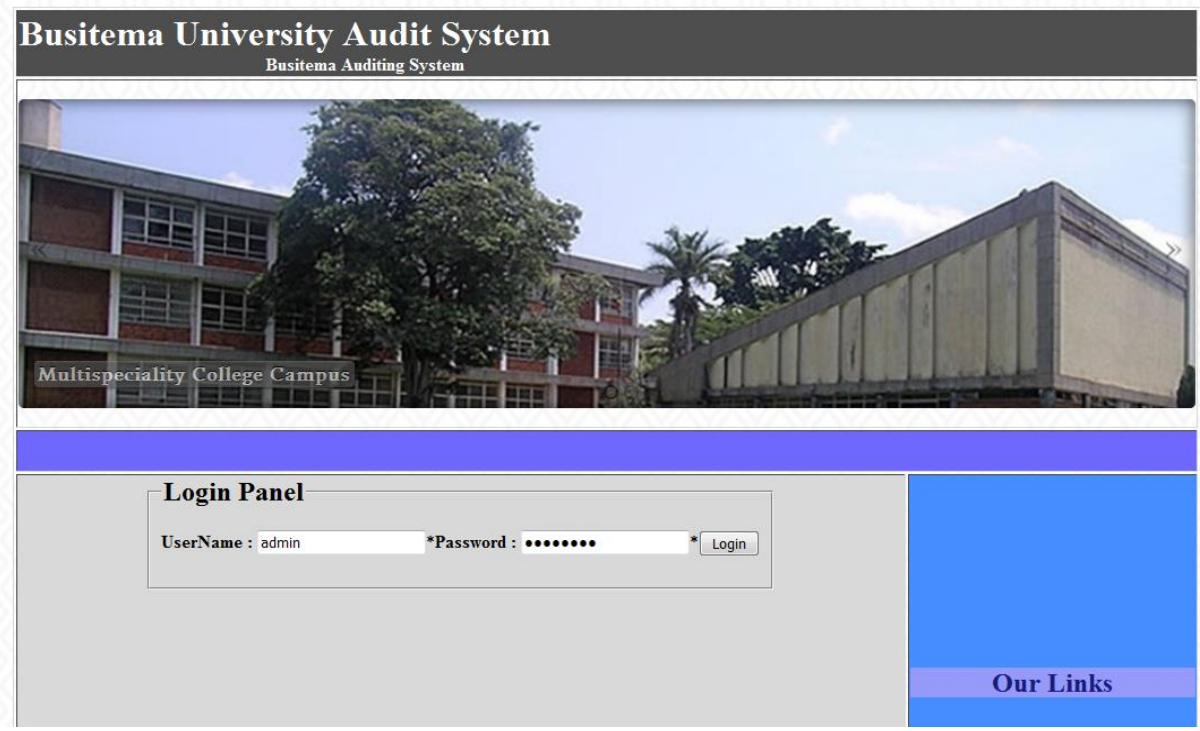

Figure 18: Screen showing the login page

Admin adds Mary to the system

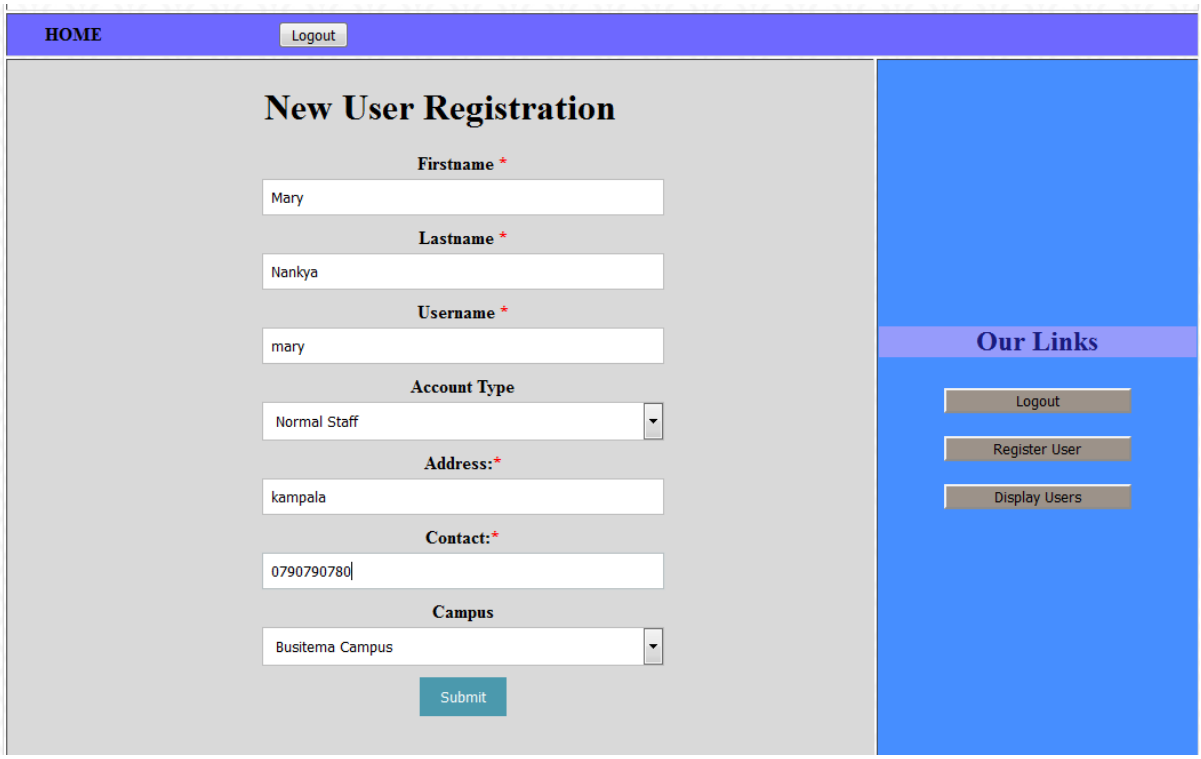

Figure 19: Screen showing admin registering a user

Mary logins in and submits a micro request

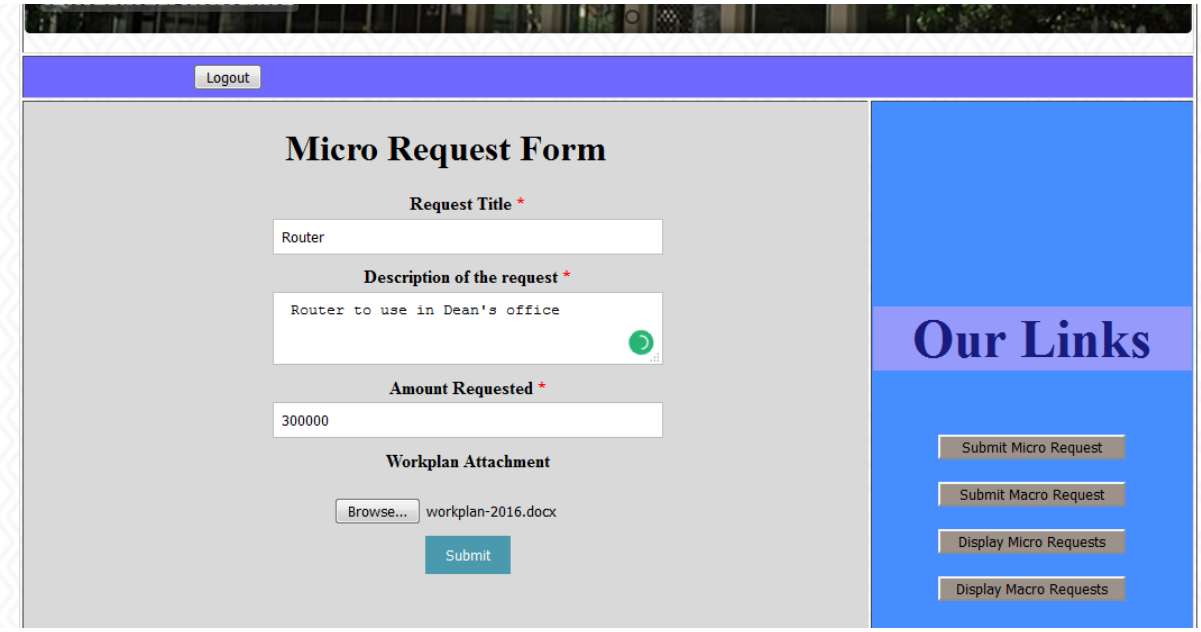

Figure 20: Screen showing user submitting a request

The Accountant views Mary's request and approves with the amount approved. If the request has goods and services that are budgeted for in the current financial year, the accountant commits funds for the purchase, else, the request is declined.

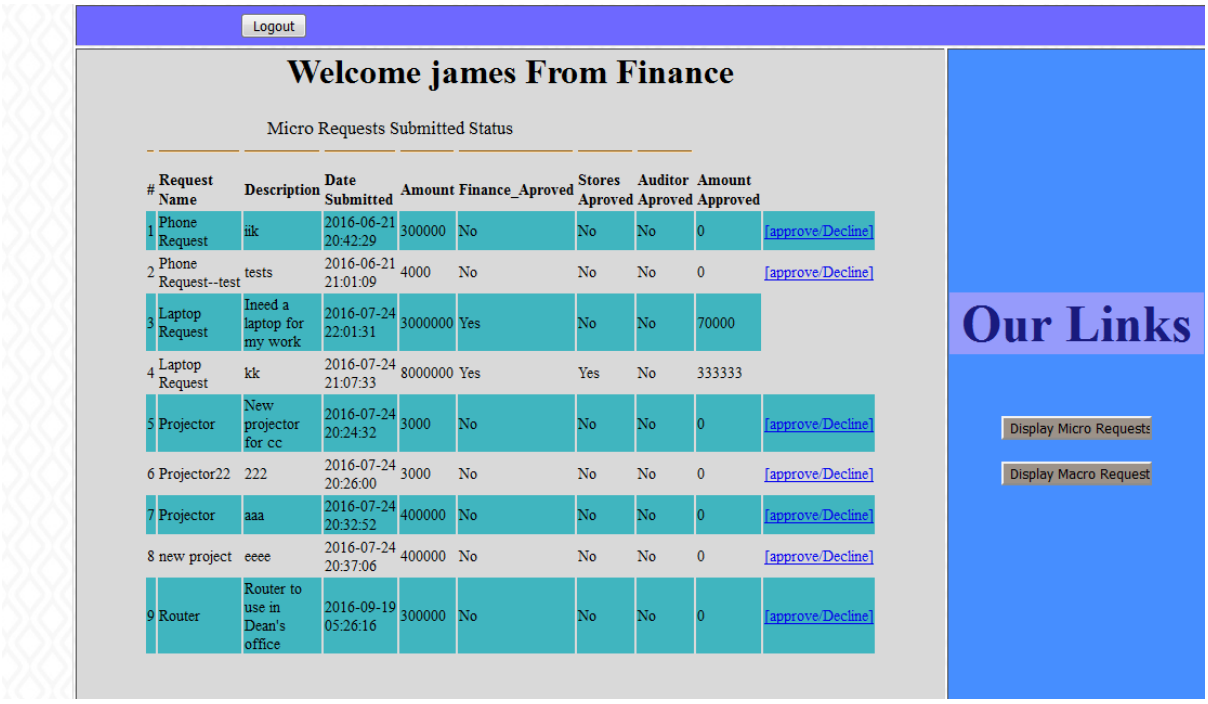

Figure 21: Screen showing accountant committing request

Mary logins into the system to check the status of her request, if the request is approved and funds are committed for the purchase.

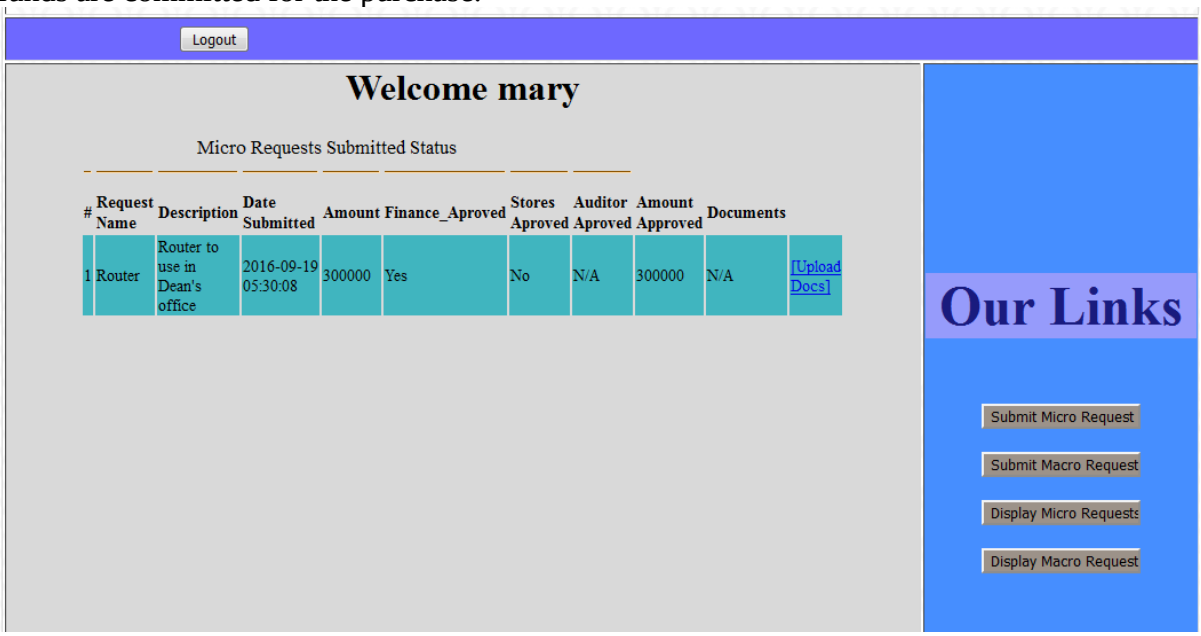

Figure 22: Screen showing user checking on the status of a request submitted for commitment of funds

Since the purchase is less than 5 (five) million shillings, Mary is given cash for the purchase of the router. Mary logins into the system after she has made a purchase of the router and submits the following documents (Receipt, delivery note, invoice) that prove that she made a purchase.

Mary organizes to meet the stores officer, who varies the items as per the request in the presence of the technical person and the internal auditor. If the delivery is ok, the stores officer issues a goods received note, the internal auditor also signs on that goods received note. Then Mary uploads all the required documents for clearance from the internal auditor.

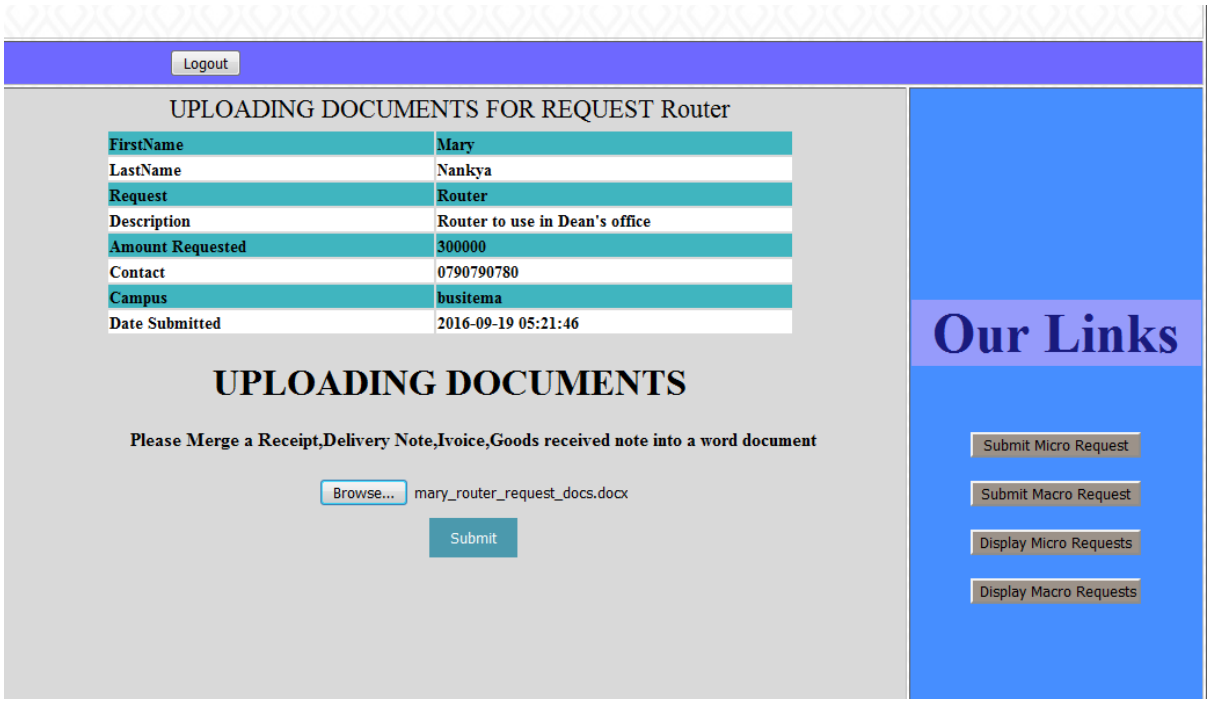

Figure 23: Screen showing user login and documents uploaded

Stores Officer views the request and verifies the documents and approves as below

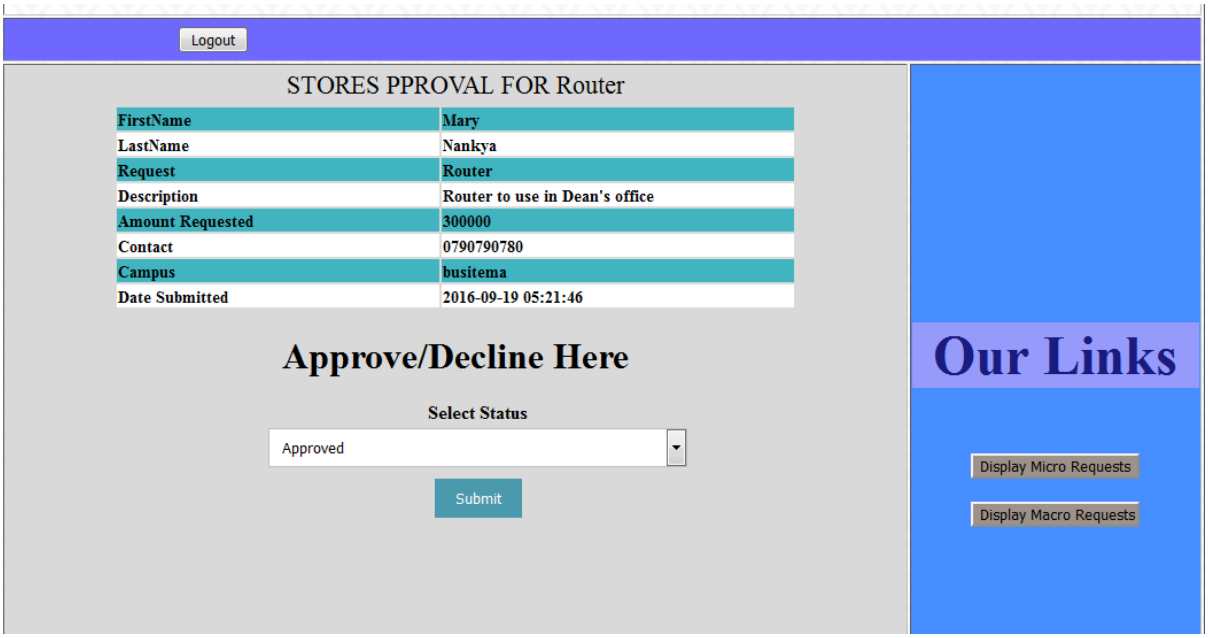

Figure 24: Screen shot of stores officer interface

Auditor after viewing a request approves/declines the request and clears the financial transaction.

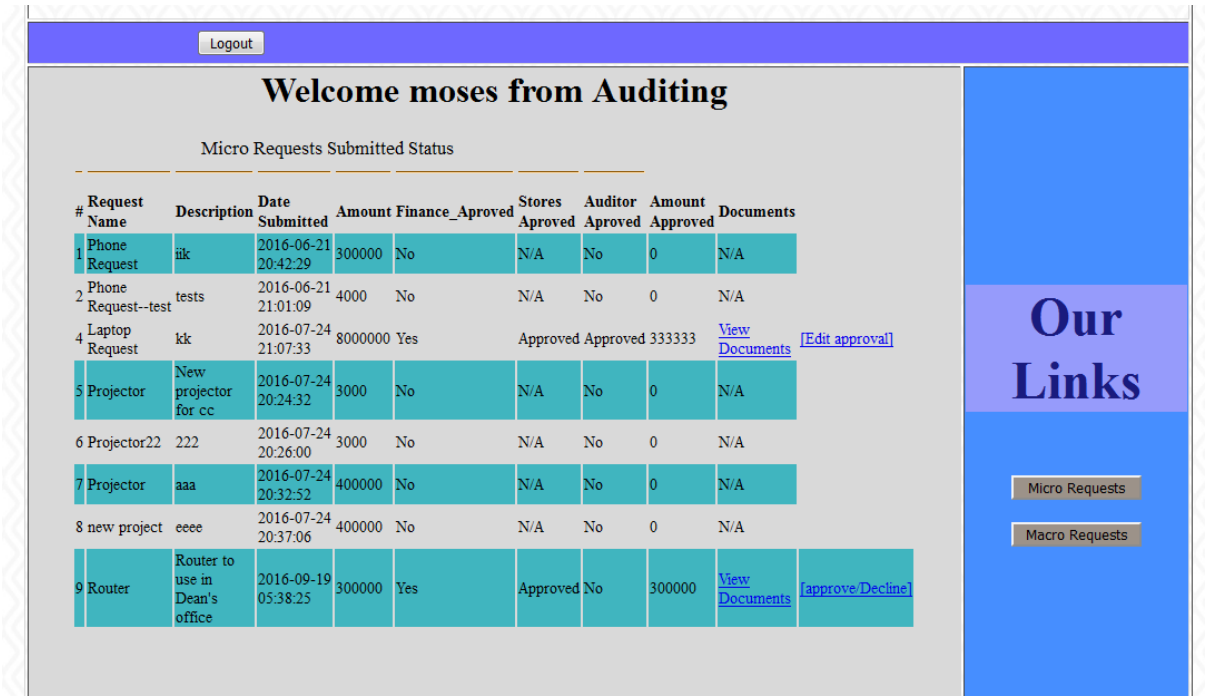

Figure 25: Screen shot of internal auditor's interface showing status of clearance of requests

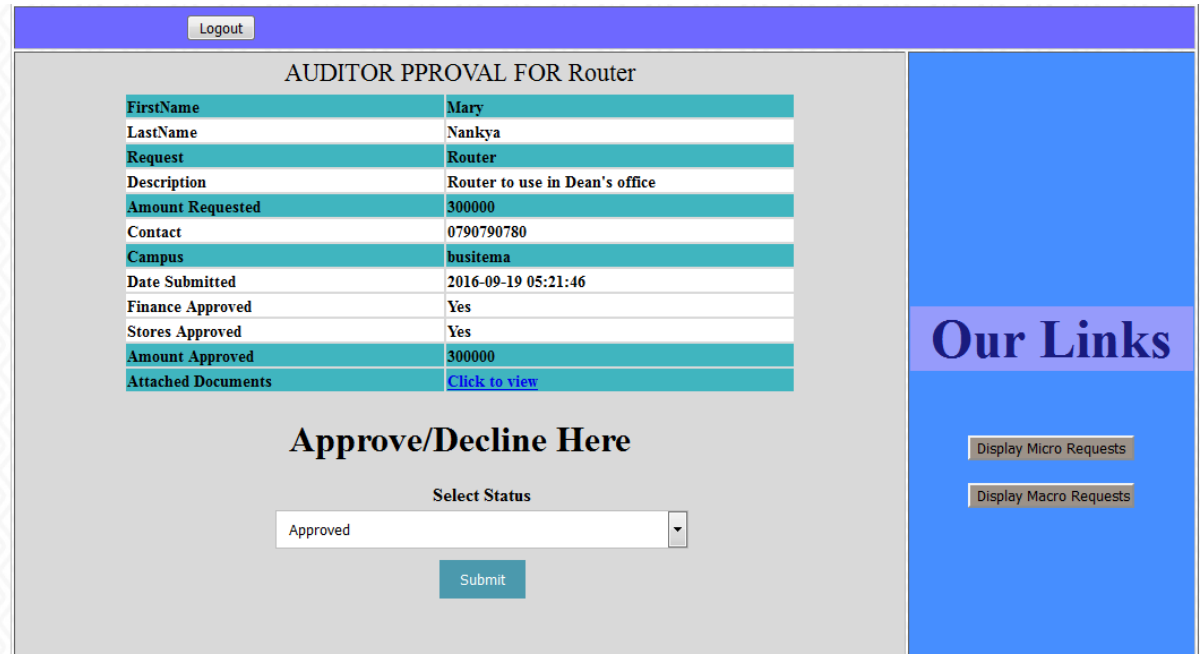

Figure 26: Screen shot of the internal auditors interface clearing a request

5.5 System Verification and Validation

During the implementation process, the system was verified by checking that the system was meeting the specified functional and non-functional requirements. By creating test accounts for the system users and making sure that users can perform the required tasks when logged in.

5.6 Formative Evaluation

The primary goal of formative evaluation is to collect information about the perceptions on learning effectiveness, users' satisfaction and identify any usability issues early in design. In order to achieve this, the researcher used 40 (forty) staff who acted as Auditees. They were grouped together and then a formative evaluation session was started. The participants were given an introductory briefing about the high-fidelity prototype, user goals and requirements derived from the PD sessions. The evaluation was then driven by the following scenario that tends to tease out the users interest in the new web based system. During this scenario, the researcher used a computerized prototype that the staff participated in order to get their ideas and feedback. The participants were then given a debriefing questionnaire in order to capture their experiences with the interface. A number of issues were highlighted as revealed in our subsections that follow. Our participants were seven staff members and formation was as follows; from the office of the University secretary (1 staff), Internal audit unit (2 staff), stores unit (2 staff), procurement (1 staff), finance department (1 staff). The researcher was then able

to identify users' satisfaction and any usability issues early in design, Likert scale attitude statements are utilized as illustrated below:

5.6.1 Learning effectiveness

The evaluation of perceived learning effectiveness on the web based auditing system gives satisfactory results. The first four questions posed sought to measure how easy it is to learn, ease of navigation, enjoy- ability and ease of use after training. The results in table 9 below confirm that users found the high fidelity prototype easy to learn, navigate, enjoyable and easy to learn after training.

Table 9: Prototype learning effectiveness

Learning Effectiveness	SD	D	A	SA
The web based system is not easy to learn.		4	3	
It is not easy to navigate The web based system		5	2	
The web based system is enjoyable to use.	1	1	3	2
The web based system is easy to learn after training.			2	5

SD – Strongly Disagree, **D** – Disagree, **A** – Agree and **SA** – Strongly Agree

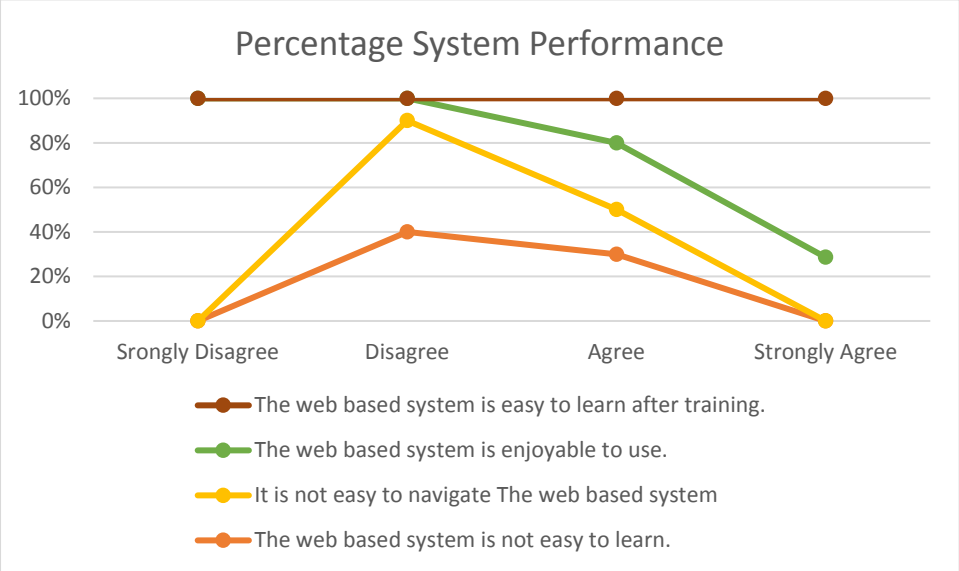

Figure 27: Respondents learning effectiveness

5.6.2 Perceived Benefits

In order to evaluate the perceived benefit of the new system, the researcher asked the users whether they thought the web based auditing system may help make auditing easier, whether

the prototype functions facilitate ease of use and whether the prototype features are easy to understand. The majority of our participants revealed positive results for the three questions except one as shown in the table below.

Table 10: Perceived Benefits

Perceived Benefits	**SD**	**D**	**A**	**SA**
The web based system may help make auditing easier.			**3**	**4**
It is not easy to navigate The web based system			**2**	**5**
The web based system facilitates the ease by which auditing can take place.				**7**
It is easy to understand the features of the web based system.			**3**	**4**

SD – Strongly Disagree, **D** – Disagree, **A** – Agree and **SA** – Strongly Agree

Table 10: *prototype learning effectiveness*

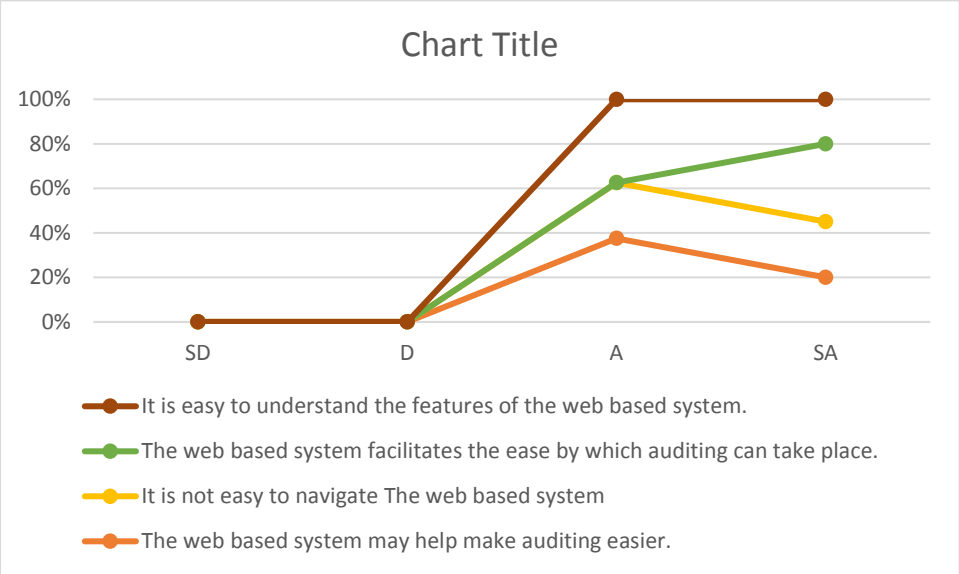

Figure 28: Chart showing the perceived benefits

5.7 User Satisfaction

In order to evaluate the perceived users' satisfaction of the prototype, they were asked four questions. More precisely, the users were asked to answer questions that focused on measuring aspects related to the their reaction to the interaction with the interface, the user's opinion about

the navigation, how the functions are structured, the sequence of screens and whether the prototype could be explored using trial and error.

User Satisfaction

Table 11: User Satisfaction

Users' Satisfaction	SD	D	A	SA
The web based system interface is intuitive (i.e. It can be used without thinking)			3	4
The web based system is confusing to navigate		1	2	4
The web based system functions are not structured suitably.		2	4	1
The Sequence of screens is Confusing			3	4

SD – Strongly Disagree, **D** – Disagree, **A** – Agree and **SA** – Strongly Agree

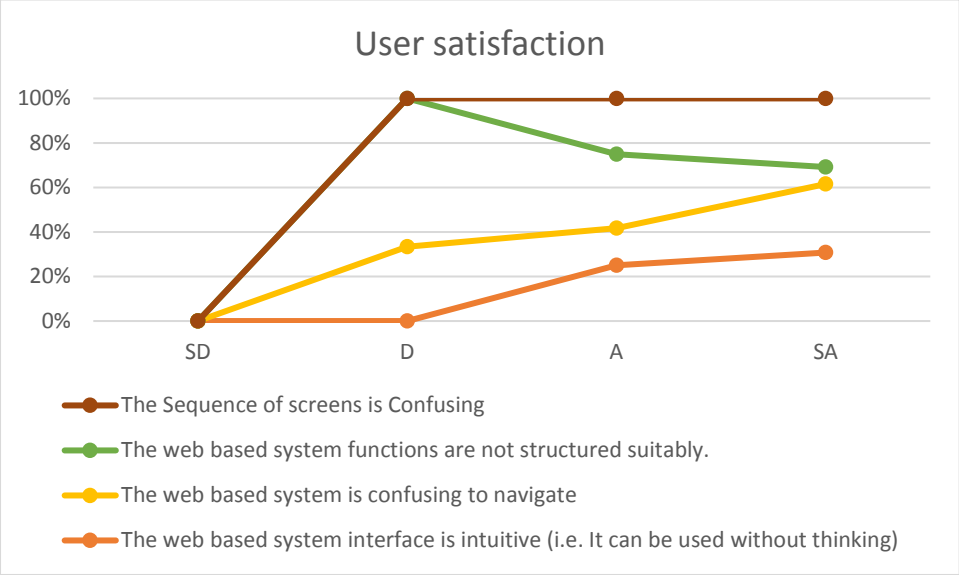

Figure 29: User satisfaction

5.8 Installation

After the development of the system, the application was deployed on a test server where users were given a url to access the web application. Web server to host the web application need the following applications installed

- Webserver-apache/httpd

- Mysql server
- smtp service for sending out notifications

5.9 Deployment

After all the relevant installations, the website is uploaded to the web server and importing of the mysql database is done in order for the application to be accessible.

To ease users access to the application, a domain name is registered to point to the server ip address in order to improve on user access.

CHAPTER SIX: DISCUSSION, CONCLUSION AND RECOMMENDATION

6.1 Discussion

Developing a web based auditing system of institutions with geographically distributed campuses requires thorough requirements collection and analysis from various stakeholders in order for it to be properly designed and implemented. The entire development process needs to be documented and the system tested and piloted in order to get feedback from users and improvements made accordingly. Using Busitema University as a case study provided an opportunity to easily collect requirements for this project given that the staff were very cooperative, the only challenge is that there was no electronic system in place hence the implementing and testing of the system was a complete new idea. For this study, the stakeholders engagement was only limited to the case study. It would have been better to engage all the stakeholders like the different faculties in the multi campus arena so as to get a complete input to the requirements of the system.

6.2 Conclusion

In Busitema University, the method used to conduct the auditing processes is manual. However, some institutions have either changed the paper based auditing system totally or they provide supplemental auditing system. This project proposes a completely web based auditing system for a multi campus institution, particularly to Busitema University, and shows how to solve some of the technical problems timely. The implementation targets on providing an auditing system, which is cost effective, efficient, reduces the security risk associated with internet related software, and helps staff (who are the auditees) to submit their required financial information remotely to the internal auditor using a computerized system to enable timely, effective and efficient auditing and reporting.

The technology is applied in many institutions and brought significant benefits. Similarly, if it is used for Busitema University, it will have contribution to easily manage the audit process. In general, this project contributes an initial work on web based auditing system for Multi Campus institutions.

6.3 Recommendations and future work

Scaling this auditing system to take on any auditing activity within the institution like; other financial transactions like Cash Management and Revenue Receipting/Accounts Receivable.

Also, this can further be utilized for other sectors with similar settings. As per the scope of this project, a lot of focus was put on purchases and payments of goods and services. More focus needs to be placed on the different security proofs at all levels of the system that is at the client end, transmission and the server side.

The system developed seeks to provide new opportunities in compliance auditing, furthering more opportunities that will make auditing easier and more cost effective. In addition, there is an increase financial transactions being cleared by the internal auditors, quick submission of audit reports to management and enhanced timely retrieval of audit information.

REFERENCES

Bagranoff, N. A. (2005). DBA, and Laurie Henry, Ph.D., CPA, CGFM. *Choosing and Using Sarbanes Oxley Software*, Information Systems Control Journal, Volume 2.

Bajdor, P, and Grabara, I. (2014). The Role of Information System Flows in Fulfilling Customers' Individual Orders. Journal of Studies in Social Sciences ISSN 2201-4624 Volume 7, Number 2, 2014, 96-106.

Beaudouin-Lafon, M. and Mackay, W., (2003). Prototyping tools and techniques. *Human Computer Interaction-Development Process,* pp.122-142.

Benedikt, M and Teuteberg, F. (2011). "Risk and Compliance Management for Cloud Computing Services: Designing a Reference Model". *AMCIS 2011 Proceedings. All Submissions.* Paper 228. http://aisel.aisnet.org/amcis2011_submissions/228.

Brown, A.E. and Grant, G.G. (2005), ''Framing the frameworks: a review of IT governance research'',Communications of the Association for Information Systems, Vol. 15, pp. 696-712.

Cohen, A & Sayag, G. (2010). The Effectiveness of Internal Auditing: An Empirical Examination of its Determinants in Israeli Organisations, *Australian Accounting Review* No. 54 Vol. 20 Issue 3 2010, School of Political Science, Division of Public Administration, University of Haifa, Haifa, 31905, Israel.

Creswell, J. W. (2013a). Five qualitative approaches to inquiry. In J. W. Creswell (Ed.), Qualitative inquiry and research design: Choosing among five approaches (3rd ed, pp. 53_84). Thousand Oaks, CA: Sage.

Creswell, J. W. (2013b). Qualitative inquiry and research design: Choosing among five approaches (3rd ed). Thousand Oaks,CA: Sage.

Creswell, J.W. (2009), *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 3rd edn, Sage Publications, Thousand Oaks, California.

Delisio, J., McGowan, M. and Hamscher, W. (1994). Planet: An Expert System for Audit Risk Assessment and Planning. In *International Journal of Accounting, Finance, and Management*. Also available as Price Waterhouse Technology Centre Technical Report 30.

Denzin, N. K., & Lincoln, Y. S. (Eds.) (2011). The SAGE handbook of qualitative research (4th ed.). Thousand Oaks,CA: Sage.

Domingues, J. P. T., Sampaio, P., Arezes, P. M. (2011). Beyond "Audit" Definition:A Framework Proposal For Integrated Management Systems. *Proceedings of the 2011 Industrial Engineering Research Conference. T. Doolen and E. Van Aken, eds.*

DOWLING (2014).-Contemporary_Accounting_Research, *A Big 4 Firm's Use of Information Technology to Control the Audit Process: How an Audit Support System is Changing Auditor Behavior*, CARLIN DOWLING, The University of Melbourne, STEWART A. LEECH, The University of Melbourne.

Fama, E. F.; French, Kenneth R. (1993). "Common Risk Factors in the Returns on Stocks and Bonds". *Journal of Financial Economics* **33** (1): 3–56.

Feizizadeh, A. Strengthening internal audit effectiveness. Indian Journal of Science and Technology Vol. 5 No. 5 (May 2012) ISSN: 0974- 6846

Fink, D. K. D. (2010)."Information technology governance: an evaluation of the theory-practice gap", Corporate Governance: The international journal of business in society, Vol. 10 Iss 5 pp. 662 – 674. Permanent link to this document:http://dx.doi.org/10.1108/14720701011085616

Garcı´a, L. S, Barbadillo, E. R, Pe´rez, M. O. (2010). Audit committee and internal audit and the quality of earnings: empirical evidence from Spanish companies Springer Science+Business Media, LLC. 2010 J Manag Gov. DOI 10.1007/s10997-010-9152-3

Hamscher, (1992). Modeling Accounting Systems to Support Multiple Tasks: A Progress Report. In *Proceedings of the 10th National Conference on Artificial Intelligence*, pp. 519-524. July 1992. Also available as Price Waterhouse Technology Centre Technical Report 26.

Hamscher, W. New Horizons in Audit Technology Director of Research and Development Price Waterhouse Technology Centre 68 Willow Road Menlo Park, CA 94025 USA Walter_Hamscher@notes.pw.com.

Hamscher, W., Console, L. and J. de Kleer, 1992 (eds.). *Readings in Model-based Diagnosis*. Morgan Kaufmann, San Francisco, California.

Herda, D. N, Petersen, M. J, Fontaine, R. (2014)."Does client participation in an external audit affect their satisfaction with the audit service?", Managerial Auditing Journal, Vol. 29 Iss 9 pp. 818 – 836. Permanent link to this document:http://dx.doi.org/10.1108/MAJ-08-2013-0916

Hipp, C., & Grupp, H. (2005). Innovation in the service sector: the demand for service specific innovation measurement concepts and typologies. *Research Policy*, 34, 517-535.

Hyett, N, Amanda, K, and Dickson-Swift, V. (2014). *Methodology or method? A critical review of qualitative case study reports*. Faculty of Health Sciences, La Trobe Rural Health School, La Trobe University, Bendigo, Australia

IIARF (2010a), Global Summary of the Common Body of Knowledge Study 2010, Characteristics of an Internal Audit Activity, Report I, IIA Research Foundation, Altamonte Springs, FL.

IIARF (2011e). International Professional Practice Framework (IPPF), IIA Research Foundation,. Altamonte Springs, FL.

Il-hang Shin Myung-gun Lee Woojin Park, (2013),"Implementation of the continuous auditing system in the ERP-based environment", Managerial Auditing Journal, Vol. 28 Iss 7 pp. 592 – 627 Permanent link to this document: http://dx.doi.org/10.1108/MAJ-11-2012-0775

Keen, P.G.W. (1980). Decision support systems: A research perspective. *Data Base, 12* (1/2), 15-25.

Kogan, A, Alles, M. G, Vasarhelyi, M. A. (2013). *Design and Evaluation of a Continuous Data Level Auditing System*. Department of Accounting & Information Systems, Rutgers Business School, Rutgers University, 180university Ave, Newark, NJ 07102.

Mahzan, N. and Lymer, A. (2014). "Examining the adoption of computer-assisted audit tools and techniques", Managerial Auditing Journal, Vol. 29 Iss 4 pp. 327 – 349. Permanent link to this document: http://dx.doi.org/10.1108/MAJ-05-2013-0877

Ministry of Finance, Planning and Economic Development, Uganda. (2015). The effectiveness of the integrated Financial management system in Uganda, Study report.

Ministry of Information and Communications Technology Uganda. (2009). *ICT Sector Thematic Paper for the National DevelopmenT Plan.* Kampala: Ministry of Information and Communications Technology-Uganda.

Moorthy,M. K, Seetharaman, A, Mohamed, Z, Gopalan, M and San, L. H. (2011). The impact of information technology on internal auditing**.** African Journal of Business Management Vol. 5(9), pp. 3523-3539. Available online at http://www.academicjournals.org/AJBM. DOI: 10.5897/AJBM10.1047. ISSN 1993-8233 ©2011 Academic Journals

Mouelhi, R. B. (2009). Impact of the adoption of information and communication technologies on firm efficiency in the Tunisian manufacturing sector. *Economic Modelling,* 26 (2009) 961–967.

Neuman, W.L. (2011). Social Research Methods: Qualitative and Quantitative Approaches, 7th edn, Pearson/Allyn and Bacon, Boston.

Omoteso, K., Patel, A. and Scott, P. (2010). *De Montfort University, UK,* Information and Communications, Technology and Auditing: Current Implications and Future Directions.

Popa, M, Capisizu, S. (2010). 1Department of Computer Science in Economics, Academy of Economic Studies, Bucharest, Romania, 2Bucharest Bar Association, marius.popa@ase.ro, capisizu@ew.ro. Using Quantitative Methods as Support for Audit of the Distributed Informatics Systems, vol. 14, no. 1.

Rainer, L. G. S. (2012),"Reflections on the internal auditing profession: what might have gone wrong?", Managerial Auditing Journal, Vol. 27 Iss 6 pp. 532 – 549 Permanent link to this document: http://dx.doi.org/10.1108/02686901211236382. Downloaded on: 11 March 2015, At: 16:02 (PT).

Rettig, M. (1994): Prototyping for Tiny Fingers. Communications of the ACM vol. 37, No. 4, pp 21-27.

Rupšys, R and Staciokas, R. (2005). *ISSN 1392-2785 Engineering Economics. No 3 (43). Economics Of Engineering Decisions,* Internal Audit Reporting Relationships: the Analysis of Reporting Lines.

Salehi M, Moradi M, and Ariyanpour A. (2010). A Study of the Integrity of Internet Financial Reporting: Empirical Evidence of Emerging Economy. Global J. Manage. Bus. Res., 10(1): 148-158.

Salehi M, Rostami V, Mogadam A (2010). Usefulness of Accounting Information System in Emerging Economy: Empirical Evidence of Iran. Int. J. Econ. Financ., 2(2): 186-195.

Salehi, M. and Husini, R. (2010). A study of the effect of information technology on internal auditing: Some Iranian evidence, Islamic Azad University, Takestan Branch, Takestan, Iran.
Salehi, M. and Alipour M. (2010). E-banking in Emerging Economy: Empirical Evidence of Iran. Int. J. Econ. Financ., 2(1): 201-209.

Sales. Sales @apexauditsystem.com, support. support@apexauditsystem.com, webhttp://www.ApexAuditSystem.com.

Schultz, N. Mueller-Wickop, M. ( ). Key Information Requirements for Process Audits – an Expert Perspective M School of Business, Economics and Social Sciences University of HamburgMax-Brauer-Allee 60 D-22765 Hamburg {martin.schultz | niels.mueller-wickop | markus.nuettgens}@wiso.uni-hamburg.de

Shi-Ming H, Wei-Hsi H., Yen D. C, Chang I, Jiang D. (2010). Building the evaluation model of the IT general control for CPAs under enterprise risk management.

Snyder, C. (2003) Paper prototyping: the fast and easy way to design and refine user interfaces. Morgan Kauffman Publishers, San Francisco, USA.

Talukder, A.K., Zimmerman, L., and Prahalad, H.A. (2010). Cloud Economics: Principles, Costs, and Benefits, in Nick Antonopoulos and Lee Gillam (Eds.) *Cloud Computing: Principles, Systems and Applications*, Springer-Verlag London, 343-360.

Thomas, G. (2011). *A typology for the case study in social science following a review of definition, discourse, and structure*. Qualitative Inquiry, 17(6), 511_521. doi: 10.1177/1077800411409884.

Trotmana, K. T, Wright W. F. (2012). Triangulation of audit evidence in fraud risk assessments, Accounting, Organizations and Society 37, 41–53. Contents lists available at SciVerse ScienceDirect. Accounting, Organizations and Society.

Vasarhelyi, M. A, Alles, M, Kuenkaikaew, S. (2010). Rutgers Business School, James Littley, KPMG, The Acceptance and Adoption of Continuous Auditing by Internal Auditors: A Micro Analysis.

Vijayakumar, A. N., Nagaraja, N. (2012). Internal Control Systems : Effectiveness of Internal Audit in Risk Management at Public Sector Enterprises. BVIMR Management Edge. Vol. 5 Issue 1, p1-8. 8p.

Wahyuni, D. (2012). The Research Design Maze: Understanding Paradigms, Cases, Methods and Methodologies, Vol. 10 · No. 1·, University of Jember, Indonesia and University of South Australia.

Weill, P., and Ross, J.W. (2004). IT Governance: How Top Performers Manage IT Decision Rights for Superior Results, Harvard Business School Press.

Yaacob H, & Donglah N. K (2012). Shari'ah Audit in Islamic Financial Institutions: The Postgraduates' Perspective. International Journal of Economics and Finance; Vol. 4, No. 12; ISSN 1916-971X E-ISSN 1916-9728. Published by Canadian Center of Science and Education, doi:10.5539/ijef.v4n12p224 URL: http://dx.doi.org/10.5539/ijef.v4n12p224.

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed). Thousand Oaks, CA: Sage.

Yin, R.K. (2012), Applications of Case Study Research, 3rd edn, Sage Publications, Thousand Oaks, California.

APPENDIX

Appendix I interview Questions

Interview Questions

Auditing process in Busitema University

The objective of this study is to learn more how you execute your activities during auditing. This data collection tool is for study purposes only and any data collected will be used for academic reasons only. The interviews targets the staff from the office of the Internal Auditor in order to get their opinion about the web based financial Audit system.

How many times do you conduct auditing [i.e once every month e.t.c]?

Who is responsible for conducting auditing?

What is the average expenditure to conduct auditing in all campuses?

Where does auditing actually take place?

Which group of people are eligible to audit?

What criteria do you use to ensure there is no audit malpractice?

Have you ever encountered any cases of malpractice? And how have you dealt with such cases?

APPENDIX

Appendix I interview Questions

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How many times do you conduct auditing [i.e once every month e.t.c]? In a year
On quarterly basis ie after every 3 months

Who is responsible for conducting auditing?
Chief audit executive (CAE)

What is the average expenditure to conduct auditing in all campuses?
4,000,000=

Where does auditing actually take place?
At the auditee's place of work

Which group of people are eligible to audit?
Auditors

What criteria do you use to ensure there is no audit malpractice?
Adherence to the Code of Conduct for Professionals

Have you ever encountered any cases of malpractice? And how have you dealt with such cases?
NO.

77

Appendix II Questionnaire

Debriefing Questionnaire

The web based Auditing system for Busitema University.

The objective of this study is to get the learning effectiveness of the staff about the newly developed system. This data collection tool is for study purposes only and any data collected will be used for academic reasons only. The Questionnaires targets the staff from the office of the Internal Auditor in order to get their opinion about the web based financial Audit system.

The web based system is not easy to learn.

It is not easy to navigate the web based system

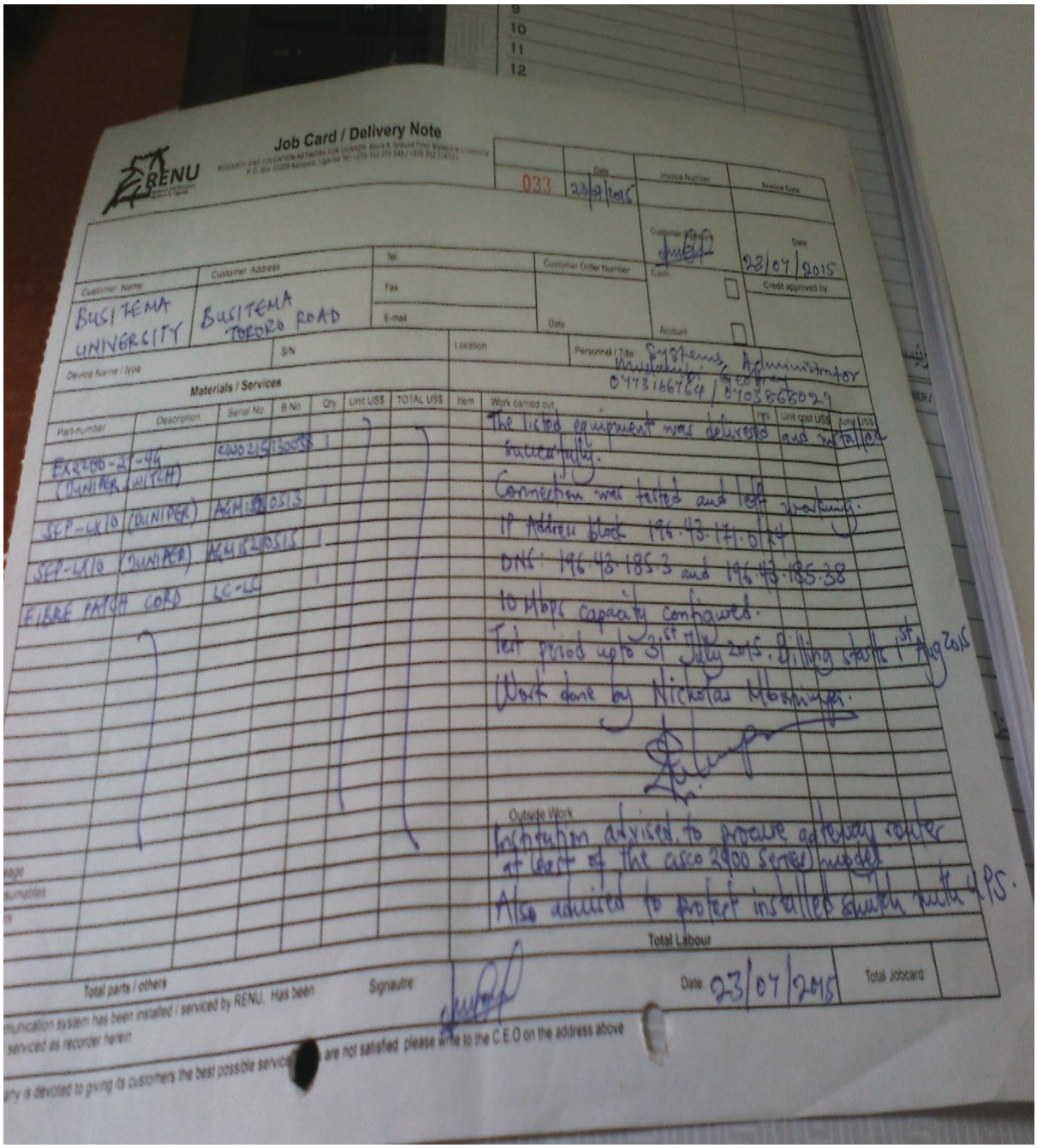
The web based system is enjoyable to use.

The web based system is easy to use after training.

Appendix III: Gantt chart

Activity	2015								2016											
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Concept paper approval, literature review, Research Proposal.																				
Literature review, Data collection and Analysis.																				
Analysis design of Web based auditing system, implementation testing and evaluation																				
Thesis write-up, delivering, presenting & defending.																				

Appendix IV: Copy of a Job card/ Delivery note from a supplier



Job Card / Delivery Note

RENU

RESEARCH AND EDUCATION NETWORK FOR UGANDA

033 Date 23/07/2015

Customer Name: BUSITEMA UNIVERCITY

Customer Address: BUSITEMA TORORO ROAD

Tel:

Fax:

E-mail:

Customer Order Number:

Date:

Cash

Account

Date 23/07/2015

Credit approved by

Device Name / type

S/N

Location

Personnel / Title: Systems Administrator

0773166764 / 0703565029

Materials / Services

Part-number	Description	Serial No.	B.No.	Qty	Unit US$	TOTAL US$
EX2200-24T-4G	(JUNIPER SWITCH)	CW0215130058		1		
SFP-1X10	(JUNIPER)	ACMI[illegible]0513		1		
SFP-1X10	(JUNIPER)	ACMI[illegible]0515		1		
FIBRE PATCH CORD	LC-LC			1		

Item | Work carried out | Hrs | Unit cost US$ | Total US$

The listed equipment was delivered and installed successfully.

Connection was tested and left working.

IP Address block 196.43.171.0/24

DNS: 196.43.185.3 and 196.43.185.38

10 Mbps capacity configured.

Test period upto 31st July 2015. Billing starts 1st Aug 2015

Work done by Nicholas Mbonimpa.

Outside Work

Institution advised to procure gateway router at least of the cisco 2900 series/model

Also advised to protect installed switch with UPS.

Total Labour

Total parts / others

Signature

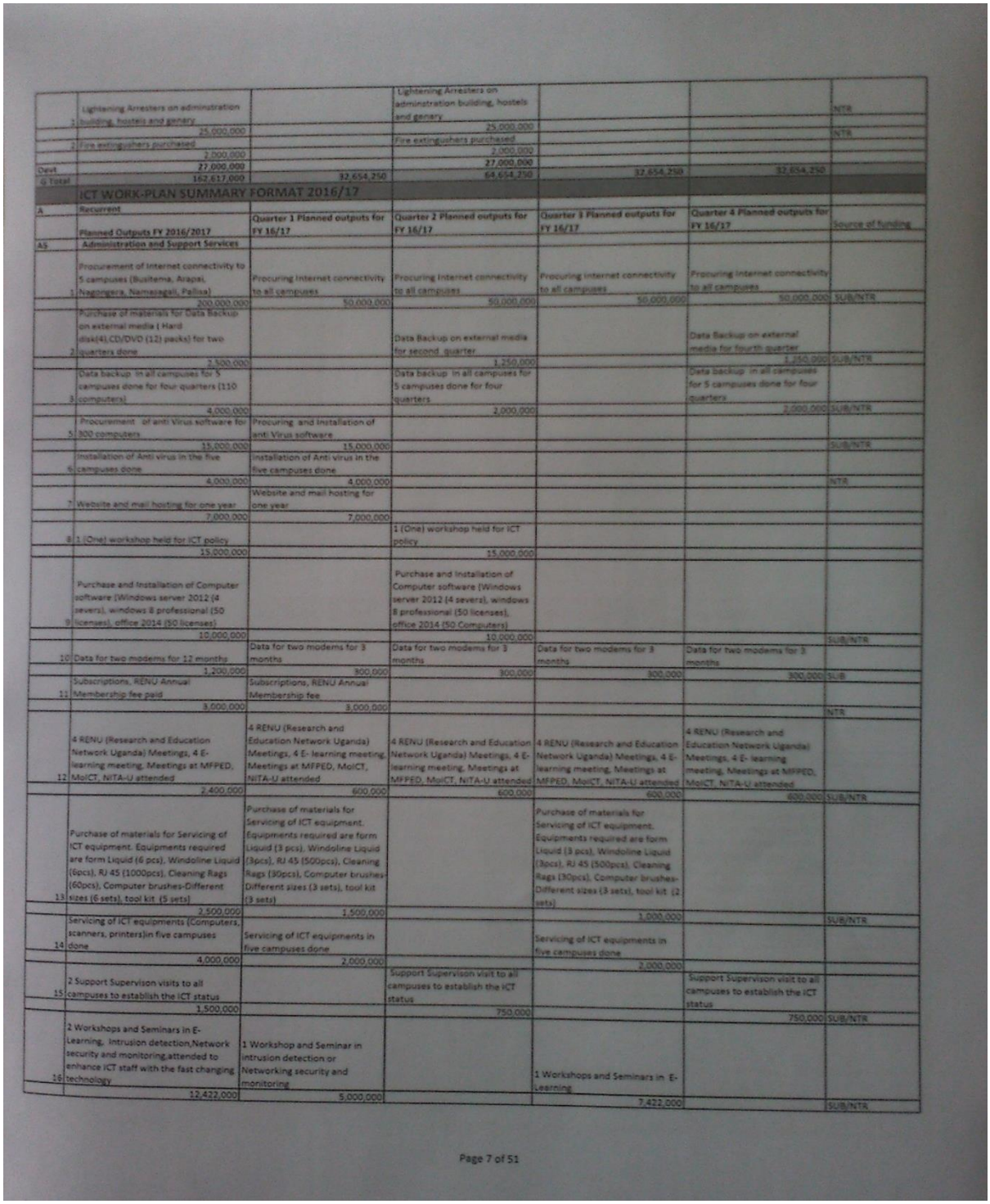
Date 23/07/2015

Total Jobcard

...munication system has been installed / serviced by RENU. Has been serviced as recorded herein

...rty is devoted to giving its customers the best possible service... are not satisfied please write to the C.E.O on the address above

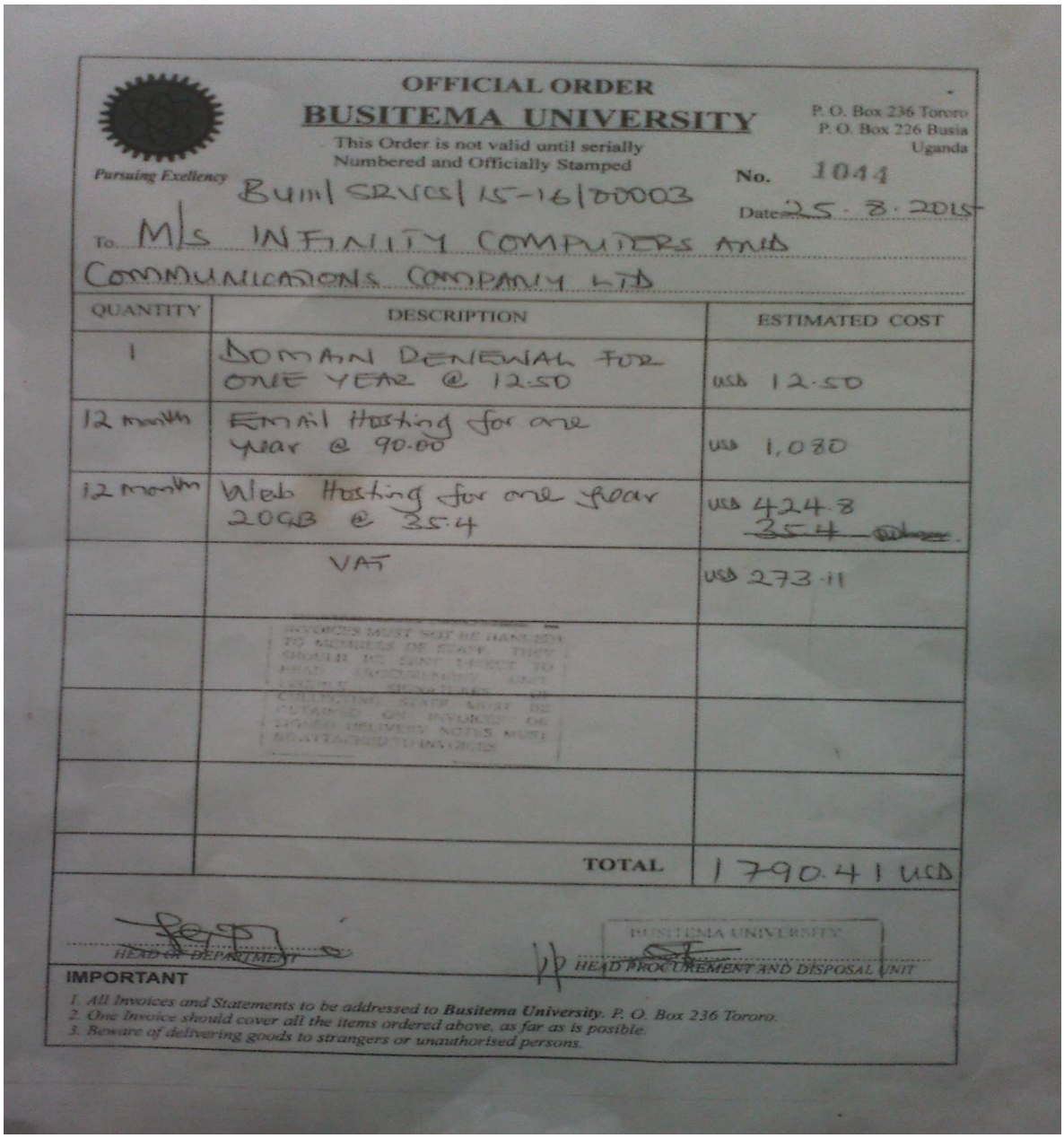
Appendix V: Copy of a Work plan for the financial year for the ICT Unit



1	Lightening Arresters on administration building, hostels and genery		Lightening Arresters on administration building, hostels and genery			NTR
	25,000,000		25,000,000			
2	Fire extinguishers purchased		Fire extinguishers purchased			NTR
	2,000,000		2,000,000			
Dept	27,000,000		27,000,000			
G Total	162,617,000	32,654,250	64,654,250	32,654,250	32,654,250	
	ICT WORK-PLAN SUMMARY FORMAT 2016/17					
A	Recurrent					
	Planned Outputs FY 2016/2017	Quarter 1 Planned outputs for FY 16/17	Quarter 2 Planned outputs for FY 16/17	Quarter 3 Planned outputs for FY 16/17	Quarter 4 Planned outputs for FY 16/17	Source of funding
A5	Administration and Support Services					
1	Procurement of Internet connectivity to 5 campuses (Busitema, Arapai, Nagongera, Namasagali, Pallisa)	Procuring Internet connectivity to all campuses	Procuring Internet connectivity to all campuses	Procuring Internet connectivity to all campuses	Procuring Internet connectivity to all campuses	
	200,000,000	50,000,000	50,000,000	50,000,000	50,000,000	SUB/NTR
2	Purchase of materials for Data Backup on external media (Hard disk(4),CD/DVD (12) packs) for two quarters done		Data Backup on external media for second quarter		Data Backup on external media for fourth quarter	
	2,500,000		1,250,000		1,250,000	SUB/NTR
3	Data backup in all campuses for 5 campuses done for four quarters (110 computers)		Data backup in all campuses for 5 campuses done for four quarters		Data backup in all campuses for 5 campuses done for four quarters	
	4,000,000		2,000,000		2,000,000	SUB/NTR
5	Procurement of anti Virus software for 300 computers	Procuring and Installation of anti Virus software				
	15,000,000	15,000,000				SUB/NTR
6	Installation of Anti virus in the five campuses done	Installation of Anti virus in the five campuses done				
	4,000,000	4,000,000				NTR
7	Website and mail hosting for one year	Website and mail hosting for one year				
	7,000,000	7,000,000				
8	1 (One) workshop held for ICT policy		1 (One) workshop held for ICT policy			
	15,000,000		15,000,000			
9	Purchase and Installation of Computer software (Windows server 2012 (4 severs), windows 8 professional (50 licenses), office 2014 (50 licenses)		Purchase and Installation of Computer software (Windows server 2012 (4 severs), windows 8 professional (50 licenses), office 2014 (50 Computers)			
	10,000,000		10,000,000			SUB/NTR
10	Data for two modems for 12 months	Data for two modems for 3 months	Data for two modems for 3 months	Data for two modems for 3 months	Data for two modems for 3 months	
	1,200,000	300,000	300,000	300,000	300,000	SUB
11	Subscriptions, RENU Annual Membership fee paid	Subscriptions, RENU Annual Membership fee				
	3,000,000	3,000,000				NTR
12	4 RENU (Research and Education Network Uganda) Meetings, 4 E-learning meeting, Meetings at MFPED, MoICT, NITA-U attended	4 RENU (Research and Education Network Uganda) Meetings, 4 E- learning meeting, Meetings at MFPED, MoICT, NITA-U attended	4 RENU (Research and Education Network Uganda) Meetings, 4 E-learning meeting, Meetings at MFPED, MoICT, NITA-U attended	4 RENU (Research and Education Network Uganda) Meetings, 4 E-learning meeting, Meetings at MFPED, MoICT, NITA-U attended	4 RENU (Research and Education Network Uganda) Meetings, 4 E- learning meeting, Meetings at MFPED, MoICT, NITA-U attended	
	2,400,000	600,000	600,000	600,000	600,000	SUB/NTR
13	Purchase of materials for Servicing of ICT equipment. Equipments required are form Liquid (6 pcs), Windoline Liquid (6pcs), RJ 45 (1000pcs), Cleaning Rags (60pcs), Computer brushes-Different sizes (6 sets), tool kit (5 sets)	Purchase of materials for Servicing of ICT equipment. Equipments required are form Liquid (3 pcs), Windoline Liquid (3pcs), RJ 45 (500pcs), Cleaning Rags (30pcs), Computer brushes-Different sizes (3 sets), tool kit (3 sets)		Purchase of materials for Servicing of ICT equipment. Equipments required are form Liquid (3 pcs), Windoline Liquid (3pcs), RJ 45 (500pcs), Cleaning Rags (30pcs), Computer brushes-Different sizes (3 setx), tool kit (2 sets)		
	2,500,000	1,500,000		1,000,000		SUB/NTR
14	Servicing of ICT equipments (Computers, scanners, printers)in five campuses done	Servicing of ICT equipments in five campuses done		Servicing of ICT equipments in five campuses done		
	4,000,000	2,000,000		2,000,000		
15	2 Support Supervison visits to all campuses to establish the ICT status		Support Supervison visit to all campuses to establish the ICT status		Support Supervison visit to all campuses to establish the ICT status	
	1,500,000		750,000		750,000	SUB/NTR
16	2 Workshops and Seminars in E-Learning, Intrusion detection,Network security and monitoring,attended to enhance ICT staff with the fast changing technology	1 Workshop and Seminar in intrusion detection or Networking security and monitoring		1 Workshops and Seminars in E-Learning		
	12,422,000	5,000,000		7,422,000		SUB/NTR

Page 7 of 51

Appendix VI: Local purchase order



OFFICIAL ORDER

BUSITEMA UNIVERSITY

Pursuing Excellency

This Order is not valid until serially Numbered and Officially Stamped

P. O. Box 236 Tororo
P. O. Box 226 Busia
Uganda

No. 1044

BUIIT/SRVCS/15-16/00003

Date 25 · 8 · 2015

To. M/S INFINITY COMPUTERS AND COMMUNICATIONS COMPANY LTD

QUANTITY	DESCRIPTION	ESTIMATED COST
1	DOMAIN RENEWAL FOR ONE YEAR @ 12.50	USD 12.50
12 months	EMAIL Hosting for one year @ 90.00	USD 1,080
12 months	Web Hosting for one year 20GB @ 354	USD 424.8 354
	VAT	USD 273.11
	INVOICES MUST NOT BE HANDED TO MEMBERS OF STAFF. THEY SHOULD BE SENT DIRECT TO [illegible]	
	COLLECTING STAFF MUST BE OBTAINED ON PAYMENT OF GOODS DELIVERY NOTES MUST BE ATTACHED TO INVOICES	
	TOTAL	1790.41 USD

HEAD OF DEPARTMENT

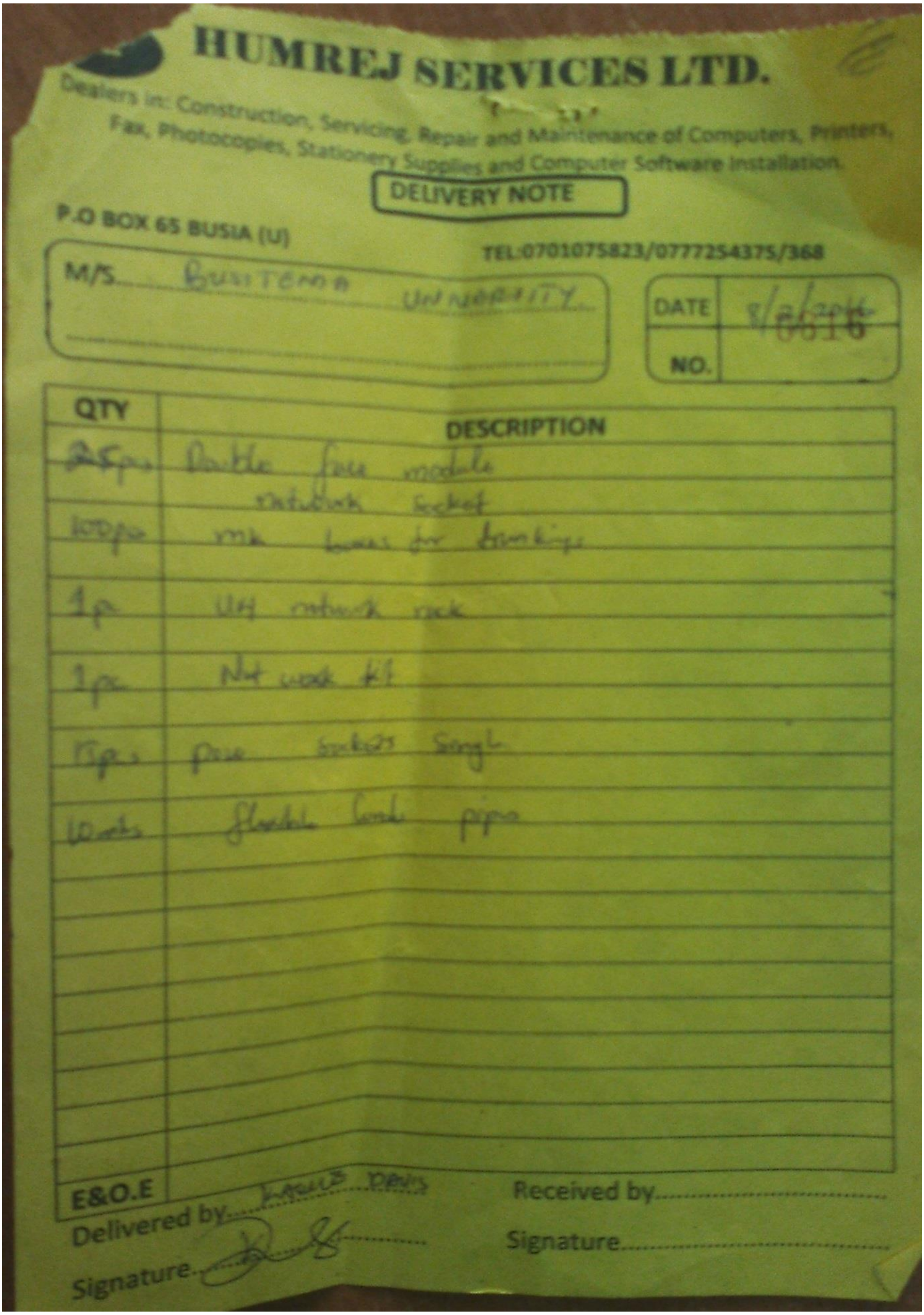
BUSITEMA UNIVERSITY

HEAD PROCUREMENT AND DISPOSAL UNIT

IMPORTANT

1. All Invoices and Statements to be addressed to **Busitema University**, P. O. Box 236 Tororo.
2. One Invoice should cover all the items ordered above, as far as is posible.
3. Beware of delivering goods to strangers or unauthorised persons.

Appendix VII: Delivery Note



HUMREJ SERVICES LTD.

Dealers in: Construction, Servicing, Repair and Maintenance of Computers, Printers, Fax, Photocopies, Stationery Supplies and Computer Software Installation.

DELIVERY NOTE

P.O BOX 65 BUSIA (U)

TEL:0701075823/0777254375/368

M/S. Busitema University

DATE 8/2/2016

NO. 0616

QTY	DESCRIPTION
25pcs	Double face module network socket
100pcs	mk boxes for trunkings
1pc	9U network rack
1pc	Network kit
15pcs	pvc sockets single
10mts	flexible conduit pipe

E&O.E

Delivered by............

Signature............

Received by............

Signature............

Appendix VIII: Copy of a Good Received note

BUSITEMA UNIVERSITY

P.O.Box 236 Tororo

GOODS RECEIVED NOTE

Supplier: CASH HUMPES SERVICES LTD. Department: University Secretary

L.P.O No 6510 Receipt 3180 Date: 08/02/2016

The following Goods have been received as shown below: L.P.O DATE:

S. no.	Description	Qty	Code	Rate	Amount	Remarks
01	Double face module network socket	25	Pcs	30,000/=	750,000/=	
02	MK boxes for trunkings	100	pcs	4000/=	400,000/=	
03	9U network rack	01	Pc	400,000/=	400,000/=	
04	Network kit					
05	Power sockets Single	07	Pc	200,000/=	200,000/=	
06	Flexible conduit pipe	15	Pcs	10,000/=	150,000/=	
06	Flexible conduit pipe		Mtrs	7000/=	70,000/=	
					1,970,000/=	

BUSITEMA UNIVERSITY CENTRAL STORE 08 FEB 2016 Sign: P.O. BOX 236 TORORO

BUSITEMA UNIVERSITY CENTRAL STORE Sign: P.O. BOX 236 TORORO

Delivered by: GRACE ASOLO Date: 08/02/2016 Sign:

Received by: GRACE Cheperegon Juliet Date: 08/02/2016 Sign:

Sign: Destination: STORES ASSISTANT

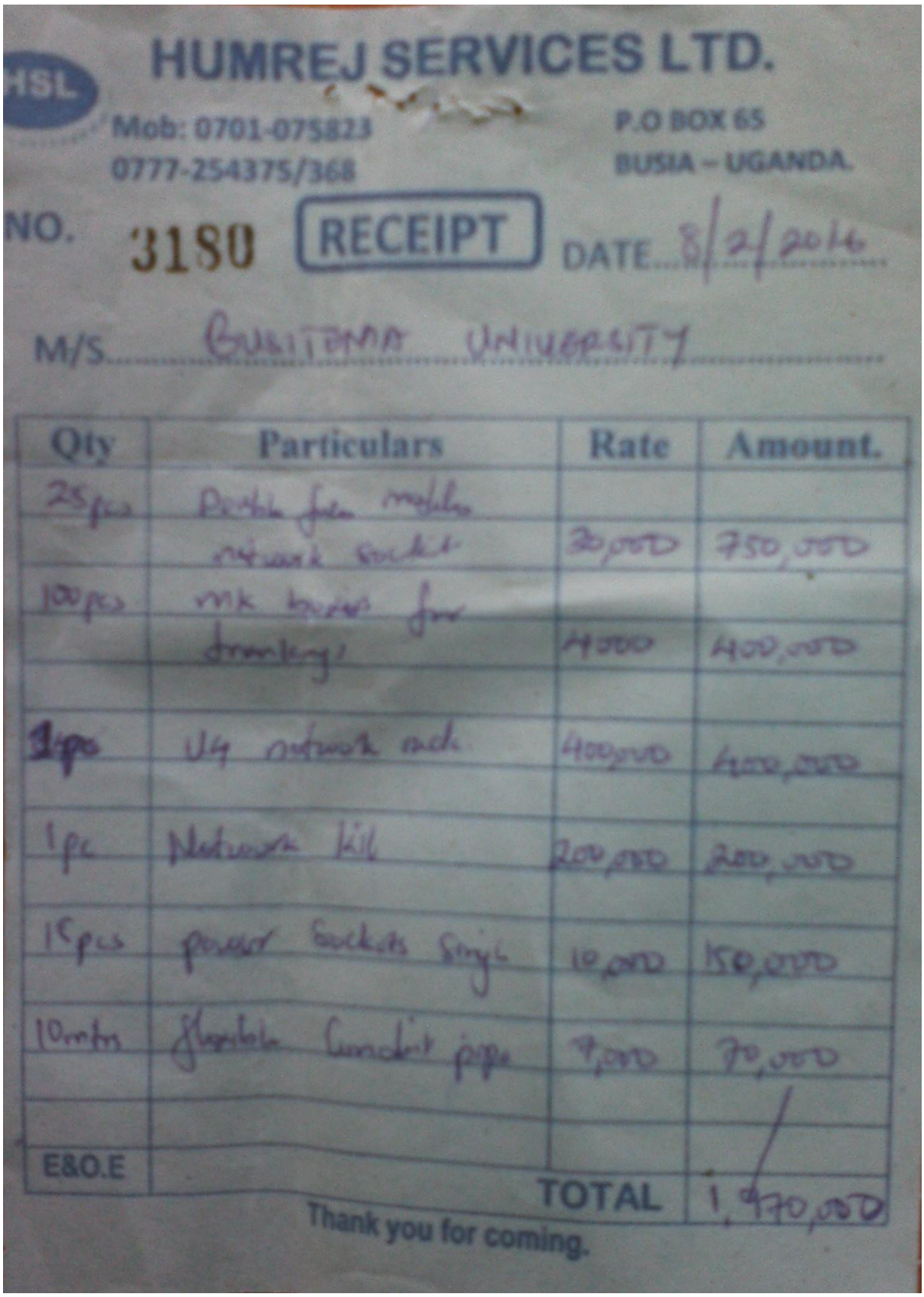
Shortage/Damage Form no:

Verified by: Bwayo Wilson Sign:

Paid by voucher no: Date:

Original and Duplicate to be sent to Finance Dept. Triplicate for Store/Dept.

Appendix IX: Copy of a receipt



HUMREJ SERVICES LTD.

HSL

Mob: 0701-075823
0777-254375/368

P.O BOX 65
BUSIA – UGANDA.

NO. 3180 RECEIPT DATE 8/2/2016

M/S BUGITIMA UNIVERSITY

Qty	Particulars	Rate	Amount.
25pcs	Double face mobile network socket	30,000	750,000
100pcs	mk boxes for trunking	4000	400,000
1pc	U4 network rack	400,000	400,000
1pc	Network kit	200,000	200,000
15pcs	power sockets Single	10,000	150,000
10mtrs	flexible Conduit pipe	7,000	70,000
E&O.E		TOTAL	1,970,000

Thank you for coming.

Appendix X: Systems code

Sample code to register users

```
<?php

//connectivity
require('config.php');

if(isset($_POST['register']))
{
$fname = $_POST['fname'];
$lname = $_POST['lname'];
$uname = $_POST['uname'];
$atype= $_POST['atype'];
$address = $_POST['address'];
$contact = $_POST['contact'];
$campus = $_POST['campus'];
$pass = $_POST['uname']."123";
//$uid=$_SESSION['uid'];

   $query = "INSERT INTO users (
            fname, lname, username, password, account_type, status, address, phone,  campus
         ) VALUES (
            '{$fname}','{$lname}', '{$uname}','{$pass}',
'{$atype}',1,'{$address}','{$contact}','{$campus}' )";

  $result = mysql_query($query);
  if($result)
  {

echo "<center><h2 style='color:red'>NEW USER HAS BEEN ADDED, THANK
YOU</h2></center>";

  }
  else
  {

echo "<center><h2 style='color:red'>UNABLE TO ADD A USER, TRY AGAIN
LATER</h2></center>".mysql_error();
  }
}

?>
<html>
<link rel="stylesheet" type="text/css" href="css/css-forms.css" />
<body style="background-color:#E5E5E5">
<div align="center">
<form method="post">

<h1>New User Registration</h1>
<ul class="form-style-1">
```

```
<li>
      <label>Firstname <span class="required">*</span></label>
      <input type="text" name="fname" class="field-divided" />
   </li>
    <li>
      <label>Lastname <span class="required">*</span></label>
      <input type="text" name="lname" class="field-divided" />
   </li>


     <li>
      <label>Username <span class="required">*</span></label>
      <input type="text" name="uname" class="field-divided" />
   </li>
   <li>
      <label>Account Type</label>
      <select name="atype" class="field-select">
      <option value="normal">Normal Staff</option>
      <option value="stores">Stores Admin</option>
      <option value="procurement">Procurement Officer</option>
       <option value="finance">Finance officer</option>
      <option value="auditor">Auditor</option>
      <option value="admin">System Admin</option>

      </select>
   </li>
<li>
      <label>Address:<span class="required">*</span></label>
      <input type="text" name="address" class="field-divided" />
   </li>

<li>
      <label>Contact:<span class="required">*</span></label>
      <input type="text" name="contact" class="field-divided" />
   </li>

 <li>
      <label>Campus</label>
      <select name="campus" class="field-select">
      <option value="busitema">Busitema Campus </option>
      <option value="nagongera">Nagongera Campus</option>
      <option value="mbale">Mbale Campus</option>
      <option value="namasagali">Namasagali Campus</option>

      </select>
   </li>
   <li>
      <input type="submit" name="register" value="Submit" />
   </li>
```

```
</ul>
</form>
</div>
</body>
</html>
```
Code to display users
```
<?php
//connectivity
require('config.php');

?>
<html>
<link rel="stylesheet" type="text/css" href="css/css-forms.css" />
<body style="background-color:#E5E5E5">
<div align="center">
<table width="594" border="0" style="font-size:14px">
<tr><td align="center" colspan="7" id="hd" >USERS  DETAILS</td></tr>

<tr>
        <td width="17%"><hr style="color:#FF9900"/></td>
        <td ><hr  style="color:#FF9900"/></td>
        <td ><hr style="color:#FF9900; " /></td>
        <td ><hr style="color:#FF9900; " /></td>
        <td ><hr style="color:#FF9900; " /></td>
         <td ><hr style="color:#FF9900; " /></td>
          <td ><hr style="color:#FF9900; " /></td>
           <td ><hr style="color:#FF9900; " /></td>
      </tr>
<tr><td align="center" colspan="7">
</td></tr><tr><td width="98" style="font-weight:bold">FirstName </td>
<td width="107" style="font-weight:bold">Lastname</td>
<td width="89" style="font-weight:bold">Address</td>
<td width="76" style="font-weight:bold">Conatct</td>
<td width="60" style="font-weight:bold">Username</td>

<td width="70" style="font-weight:bold">Account Type</td>
</tr>
<?php
        //$uid=
        $qr="select * from users";
        $sql=mysql_query($qr);
    while($r=mysql_fetch_array($sql)) {
        $i++;
        $d=$i%2==0 ? "" : "#FE9A2E";
        echo "<tr style='background-
color:$d'><td>$r[fname]</td><td>$r[lname]</td><td>$r[address]</td><td>$r[contact]</td>
<td>$r[username]</td><td>$r[atype]</td><td width='70'><a
href='user_details.php?option=udetails&tid=$r[id]'>[Details]</a></td><td width='70'><a
href='user_details.php?option=del&tid=$r[id]'>[Delete User]</a></td></tr>\n";
    }
```

```
?>

</table>

</div>
</body>
</html>
Micro request
<?php
//connectivity
require('config.php');
?>
<html>
<link rel="stylesheet" type="text/css" href="css/css-forms.css" />
<body style="background-color:#E5E5E5">
<div align="center">
<table width="594" border="0" style="font-size:14px">
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        <td ><hr style="color:#FF9900; " /></td>
        <td ><hr style="color:#FF9900; " /></td>
        <td ><hr style="color:#FF9900; " /></td>
         <td ><hr style="color:#FF9900; " /></td>
          <td ><hr style="color:#FF9900; " /></td>
           <td ><hr style="color:#FF9900; " /></td>
      </tr>

<tr><td align="center" colspan="7">
</td></tr><tr><td width="98" style="font-weight:bold">FirstName </td>
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<?php
        //$uid=
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        $sql=mysql_query($qr);
    while($r=mysql_fetch_array($sql)) {
        $i++;
        $d=$i%2==0 ? "" : "#FE9A2E";
        echo "<tr style='background-
color:$d'><td>$r[fname]</td><td>$r[lname]</td><td>$r[address]</td><td>$r[contact]</td>
<td>$r[username]</td><td>$r[atype]</td><td width='70'><a
href='user_details.php?option=udetails&tid=$r[id]'>[Details]</a></td><td width='70'><a
href='user_details.php?option=del&tid=$r[id]'>[Delete User]</a></td></tr>\n";
    }
```

```
?>
</table>
</div>
</body>
</html>
```