ENTERPRISE RESOURCE PLANNING SYSTEM INTEGRATION FOR ACADEMIC AFFAIRS PROCESSES IN SELECTED PUBLIC UNIVERSITIES IN KENYA

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A thesis submitted in partial fulfillment of the requirements for the award of the Degree of Doctor of Philosophy in Educational Planning and Management of Masinde Muliro University of Science and Technology

NOVEMBER, 2018

DECLARATION AND CERTIFICATION

DECLARATION BY CANDIDATE

This thesis is my original work and has not been presented for the award of a degree in this or any other university.

Signed……Date……...

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CERTIFICATION BY SUPERVISORS

We confirm that the work reported in this thesis was carried out by candidates under our supervision as university supervisors. This Thesis has been submitted with our approval as University supervisors.

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DEDICATION

This thesis is dedicated to my husband Joseph Simiyu Nyongesa and children Gideon, Philip, Cynthia and Melissa for their perseverance, encouragement and support during the study.

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ABSTRACT

Despite the strict regulations put in place by the Commission for University Education, it is perceived by the education stakeholders that the academic sector in universities faces difficulties of handling large numbers of student enrollements that has escalated in the recent past due to increase in the number of universities and thirst for education making handling of voluminous data manually very cumbersome. This study was conducted to determine the efficiency of Enterprise Resource Planning system integration as an information system in the management of academic affairs in Kenyan public universities. Despite the difficulties involved in using the system, Enterprise Resource Planning (ERP) systems promise multidimensional benefits and competitive leadership in managing information if integrated in academic affairs. Grounded in systems theory, this empirical study aimed at providing a roadmap for holistic examination of the efficiency of integrating ERP systems in the management of academic affairs in universities. The objectives of this study were to; determine the influence of the implemention of ERP on enhancing accuracy of examination processes; establish the challenges encountered by universities that have implemented ERP in the provision of security to examination data; determine the role of ERP in accessing data in the management of academic affairs and find out the effect of the application of ERP on timely management of data. The study adopted descriptive cross sectional survey research design. The target population was 22 Deputy Vice Chancellor Academic affairs and Registrar Academic affairs, 286 Deans of Faculty / Schools and chairmen of Department, 11 IT Personnel and 1100 Lecturers. Proportionate Stratified random sampling and purposive sampling were used to select respondents for the study. Questionnaires, interview schedules were used to collect quantitative and qaulitatative data respectively. A sample of 16 DVCs and academic Registrars, 8 IT technicians, 120 Deans of faculties/schools and CODs and 320 lecturers were selected for the study from 8 universities. A total of 464 respondents participated in the study. Purposive sampling technique was used to select universities and respondents for the study. Lecturers were selected using proportionate stratified random sampling technique according to the courses they teach. The instruments of data collection were the questionnaire, interview schedules and content analysis. Pearson Product-Moment Correlation Co-efficient was used to test the reliability of the research instruments. The data collected were analyzed using descriptive statistics of mean, frequencies and percentages and inferential statistics; chi square. It was established that integration of ERP and the competency levels determined the accuracy of using ERP in the management of academic affairs.The efficiency of managing academic affairs was determined with data accuracy, accessing of students data, security of data and the application of ERP and improvements attainned. The study revealed that ERP enhanced data accuracy, eased access of students' data, ensured data safety and improved the flow of information. The study recommended that there should be in-servicing of staff on the use of ERP system, adoption of ERP system in improving the efficiency in academic,universities should meet the CUE requirements of integrating technology such as ERP in the management of academic affairs, they should improve on the perception of including technology of ERP in managing academic affairs,the government through the ministry of higher education need to provide funds for the integration of technology which at times can be expensive for universities, and universities should have clear guidelines on the type of information to be accessed when using ERP.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Acronyms and Abbreviations

COD	Chairman of the Department
CUE	Commission for University Education
DVC	Deputy Vice Chancellor
ERP	Enterprise Resource Planning
SAP	System Application and Product
ICT	Information Communication Technology
OSS	Operation Support System
IT	Information Technology
KPLC	Kenya Power and Lighting Company
BCL	Bamburi Cement Limited
ACFC	Agro chemical and Food Company
TDE	Transparent Data Encryption
BPP	Business Process Procedures
KenGen	Kenya Electricity Generating Company

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background to the study, statement of the problem, purpose of the study, objectives and study hypotheses. It also contains the justification of the study, significance, the scope, limitations, assumptions of the study, theoretical, conceptual framework and operational definition of terms used in the study.

1.1 Background to the study

According to Kajuna (2000), the credibility and integrity of university education t world over, is is enhanced when there is efficiency in its academic processes. University education is important in ensuring improvement in innovation and technology in this era of globalization and knowledge economy. Hence Universities as business entities are implementing various information systems to enhance their operations to match our fast pacing world. Among the systems and innovations that are installed include Enterprise Resource Planning (ERP) systems which are implemented to fasten institutional management aspects, given their emphasis on standardization, streamlining and integration of business operations (Nyandiere, 2012). Rico (2002) and Gaska (2003) in their work reported that around the globe and particularly in the United States of America, universities are integrating different enterprise systems to boost efficiency in their management requirements. Their target is to include Enterprise Resource Planning (ERP) systems to manage the massive academic and administrative data in universities prompted by increase in student enrollments.

Elision (1999) in his work referred to Enterprise Resource Planning (ERP) systems as a software architecture that facilitates the flow of information among different functions within an enterprise. It also facilitates information sharing across organizational units and geographical location in the fastest manner ever known to mankind. In fact ERP enables decision makers to have an enterprise retain awide view of information they need in a timely, reliable and consistent fashion.

The terms integration, adoption and implementation have been used to describe how universities included ERP in their management of academic affairs (Nyandiere, 2001). According to Gupta (2008) the integration of ERP in universities began in the 21st century as Information Communication Technology (ICT) software that had gained widespread appeal owing to their do it all approach that handled massive data. ERP systems were effective in managing huge sets of data in an efficient manner (Tuller and Oblinger, 1997). Universities that had integrated ERP system according to Gattiker and Goodhue (2002) benefitted in terms of improved information flow, standardization of data, centralization of administrative activities, reduced information maintenance costs and inaccuracies in data handling.

Globally the integration of ERP was identified in the Swedish dairy company in Sweden that assisted the company to standardize the key process in the diary company (Holmstrom, 2002). At the University of London the management integrated ERP in order to depart from the traditional computer systems that could not translate and capture data easily across boundaries (Pollack, 2005). It was reported that the telecommunication industry in South Africa implemented ERP systems to enhance data accuracy by reducing duplication of data entry (Finger, 2001). The

integration received a positive reaction from the employees at the industry. There has also been a growing increase in using ERP systems developed by SAP, oracle, Baan PeopleSoft and J.D Edwards as business information systems in large organization and government corporations in United State of America, United Kingdom, Canada and Australia due to its ability to handle voluminous data (Davenport, 1998). The systems eliminated manual processes, integrated data on a common system and improved internal communication; analyzed sophisticated data and reduced dependence on paperwork.

The importance of the integration of ERP was thus witnessed in Idaho University in the United State America (USA) in which it integrated all services for the students with uttermost efficiency for all university operations. This was also echoed by Rico (2000) who underscored the fact that the university of Wisconsin-superior and Wisconsin technical college adopted ERP to replace the legacy system and transform enterprise processes. The new ERP system represented an exciting and necessary technology change in the institutions that greatly increased operational efficiency. Moreover Ethridge, Hadden, & Smith (2000) asserted that Georgetown University in the USA integrated an ERP system known as PeopleSoft system that was one of the most prominent ERP systems that served 30,000 students in finance and admission departments. It brought all students computing needs to one location making it faster, easier and more efficient to conduct business. Louisiana state university in the USA also integrated ERP system in 1996 to serve 45,000 students in admission and email campus information. The system made the university to blossom from a few computerized programmes to a plethora of applications used by students, faculty and staff. Talisma and Gaska (2003) also asserted that the University of Nebraska-Lincoln and the University of Houston in USA implemented ERP to serve 22,000 students and 51,000 students

respectively. The systems were used for the management of admission, student records and administrative data that lead to improved internal communication and faster flow of information in the institutions. According to Rivard (2000), Florida Southern college in USA successfully implemented ERP software that enhanced online registration of 2,500 students. The system reserved the information and centralized it for easier accessibility within the institution. Also Massachusetts institute of technology (MIT) integrated ERP in the 1990s to handle the administrative complexes and improved the work environment and according to Goeun (2013) the system shortened the time in data processing.

In Kenya Otieno (2010) found out that different companies had integrated ERP systems that were being upgrade. BIDCO oil refineries, Bamburi cement, Agro chemical and Food Company, KenGEN and Kenya power and lighting company integrated ERP systems to manage their enterprise. The ERP systems integrated improved the performance of the companies in terms of their profit margins, brought changes to the way people worked within the organizations and reduced paperwork despite the complexities of the systems. BIDCO oil refineries had integrated Baan an ERP system package that was widely accepted and offered less investment. The Agro chemical and Food Company integrated Ebizframe an ERP system that was of customized to fit old processes and had low level complexities.

KenGEN and Kenya power and lighting company integrated System Application Product (SAP) systems an ERP system that was developed in the 1970s that was three-tier architectures of data base application and user interface and the largest vendor in the ERP market in the 1990s. The system unified technologies into a single platform and performed the core business function

within the companies. Another study carried out by Njia (2014) established that top level management supported the implementation of ERP in commercial banks in Kenya. The ERP systems effectively implemented affected the firms' performance. Universities in Kenya as any other large organization faces common problems of coordinating resources, controlling costs and facilitating enterprise among staff that involves handling of massive data like any other organization.

ERP systems integration was the standard tools which have been implemented by universities in order to boost data management and process huge volumes of data within set time limits in academic affairs. The ERP systems implemented meant to improve data management asserts the global trend where integration of ERP is meant to handle massive data and enhance management efficiency of academic affairs in universities.

1.2 Statement of the Problem

Globally university education is the highest level of manpower training. It is therefore required to boost the workforce for political, economic and social development of manpower. Continued increase in the number of universities, increase in the programmes offered and enrollements has attracted large number of students which has led to volumiuos data that has put pressure on universities to raise the standards in data mangement. As a result, improvement strategies are constantly being adopted and among them is the implementation and integration of ERP systems that is trending world wide as an education reform to assist in managing the massive data. For instance by 2015 statistical data from the commission for university education indicated that only 23(60%) of the public universities in Kenya were using Information Technology systems like

ERP in areas of admission, library, finance and accounting and examination management with the intent of improving services to staff and students and increase efficiency in operations, modernize university operations and achieve competitive advantages and innovations. The problem is that despite the implementation and integration of ERP, the handling of large sets of data is still wanting, particularly as indicated by Kenya national bureau of statistics of 2015 increased student enrollments in public universities from 97,107 in 2007 to 201690 students in 2013 and it was expected to increase to over 300,000 students by 2017and the student to lecturers' ratio of 1 lecturer to 500 students within the same duration. The massive data generated from increased student enrollments and programmes offered may not be adequately handled faster, easier and more efficiently. Some universities are still relying on keeping information on paper in files, books and scattered computers. In order to clarify any management issues, a lot of consultation is done from one office to the other causing a delay in relying information. In this era of globalization and knowledge economy, technology integration and use should increase in universities, in order to match the fast pacing world in technology implementation and application. There is therefore a need to conduct this study in universities to ascertain whether the integration of ERP in universities academic affairs could improve on the efficient management of data in academic affairs or not since it is presumed that ERP has very many benefits when applied to management.

1.3 The purpose of the study

The purpose of this study was to investigate the enhancement of efficiency of Enterprise Resource Planning System Integration in the Management of Academic Affairs in selected public Universities in Kenya

1.4 Objectives of the study

The objectives of this study were to:

i) Determine the influence of the implementation of ERP in enhancing accuracy of examination processes in universities in Kenya

ii) Establish the challenges encountered by universities in using ERP for the provision of security to examination data in public universities in Kenya.

iii) Determine the role of ERP in accessing data in the management of academic affairs in public universities in Kenya.

iv) Find out the effect of the application of ERP for timely management of data in academic affairs in public universities in Kenya.

1.5 Research Questions

i) What is the influence of the implementation of ERP in enhancing accuracy of examination data processes in Universities in Kenya?

ii) What are the challenges encountered by universities in using ERP for the provision of security to examination data in public universities in of Kenya?

iii) What is the role of ERP in accessing data in the management of academic affairs in public universities in Kenya?

iv) What is the effect of the application of ERP for timely management of data in academic affairs in public universities in Kenya?

1.6 Hypotheses of the study

The study was guided by the following null hypotheses:

$H_{O1:}$ There is no statistically significant difference in the accuracy of data in the management of academic affairs in public universities in Kenya as a result of the implementation of ERP systems.

$H_{O2:}$ There is no statistically significant difference in the challenges encountered in the management of academic affairs in public universities in Kenya as a result of the using ERP systems.

H_{O3}There is no statistically significant difference in the accessing of data in the management of academic affairs in public universities in Kenya as a result of the using ERP systems.

$H_{O4:}$ There is no statistically significant difference in the timely management of data in the management of academic affairs in public universities in Kenya as a result of the application of the ERP systems.

1.7 Justifications for the study

In the world today ERP is being integrated in the educational institutions in order to improve on the efficiency of management particularly in academic affairs. The technologies are perceived to increase connectivity of the institutions and streamline the coordination of the programmes. Literature from the Commission of University Education indicated that not all the universities have fully included the use of technology in the management of academic affairs, instead they are still relying on keeping information on paper in files, books and scattered computers. In

order to clarify any management issues they are forced to rely on the personnel in charge. This at times delays the relying of information from one office to another. There is therefore a need to conduct this study in universities to ascertain whether the integration of ERP in universities academic affairs could improve on the efficient management of academic affairs since it is presumed that ERP has very many benefits when applied to management. Goeun, (2013) revealed that the benefits of ERP included; campus wide integration on a common system; improved internal communications; reduced or eliminated manual processes; enhanced strategic decision making and planning capabilities; established a self-service environment for employees; improved self-service environment for students and faculty; enabled higher availability of administrative systems; supported sophisticated data analyses for use in decision-making; integrated workflow, industry best practices, and reduced dependence on paper.

The technical benefits included reduced or eliminated backup or shadow systems platform for re-engineering business practices and continued process improvements; developed and maintained consistent data definitions; provided accessible, user-friendly administrative and student support services; increased data integrity, validity and reliability; assured system wide security and protection of confidential information; created a more seamless integration between technology and education delivery by providing a single platform based on new technologies and accessed data in real time. There is need to conduct this study to establish the benefits attained when ERP is applied to academic affairs in universities in Kenya that have been facing difficulties in handling large sets of data that pertains to data in admissions, examinations, and other administrative activities in universities.

1.8 Limitations of the Study

Limited number of studies on Enterprise Resource planning system integration for academic affairprocesses in selected public universities in Kenya: a model for efficiency enhancement. Most of the studies were on implementation of ERP and the critical success factors therefore the researcher used related literature to compare the findings. The ERP system is a new technology that is being implemented and therefore some of the respondents did not have all the nformation on its operation and significance and therefore information from the interview schedules with the IT personal were use to clarify the signicance and operations of ERP and the reseaercher also relid on document analysis to get the required data. The area of coverage was wide that made the distribution and collection of questionnaires a challenge. This made the reseaecher to distribute more questionnaires than the minimal acceptable number. T his would make the returned questionaires meet the acceptable return rate.

1.9 Significance of the Study

It is hoped that the study will be of significance to:

i) University academic affairs management to improve the processing of examination data and accessing of students data. The use of ERP is specifically meant to enhance connectivity of institutions and improvement on internal efficiency in academic affairs, enhancing the quality of education, and preparing new and old generations for a technology-driven market place.

ii) The ministry of education in contributing to the existing knowledge about the efficiency of integrating of ERP in managing academic affairs. Several studies have been done on the

contribution of ERP in non academic activities which can be replicated in managing academic affairs in universitiesin western region.

iii) Students who would be enabled to access accurate and timely data in universities in western region as ERP offer benefits to the educational community and the society.

iv) Deans and CODs to improve on the coordination of academic activities in faculties and departments. ERP has the potential to make management easier, more challenging and motivating. Deans and CODs are also involved in a variety of management work that requires technology, such as the computation of administrative and academic information in the universities for a certain year, keeping of records of students and employees and preparation of budget. ERP systems therefore become an extremely useful tool in handling such tasks that has voluminous sets of data.

v) Universities management who would enhance the quality of education offered in churning out the needed labour force in the relevant markets. ERP systems have been recognized as providing a means of helping universities achieve the goal of promoting efficient management.

vi) Lecturers to improve on consistency and confidentiality of students data which is easily accessed when needed because ERP systems will assist to handle the voluminous data to avert the challenges of missing marks.

1.10 Scope of the Study

The study covered universities in Kenya. Only public universities registered under the Ministry of higher Education, in Kenya were involved in the study. The study targeted 22 Deputy Vice Chancellor Academic affairs and Registrar Academic affairs, 286 Deans Of Faculty / Schools

and chairmen of Department, 11 IT Personnel and 1100 Lecturers in the universities as respondents since they are directly involved in the management of academic affairs in universities. The study covered the implementation of ERP for ehnancing accuracy of data in examination processing, safety mechanism of data, access of students' data and timely flow of data.

1.11 Assumptions of the Study

This study was guided by the following assumptions;

(i) That data obtained from universities was accurate and reliable.

(ii) The respondents were honest in their perception on the implementation, hurdles, use, and application of ERP in enhancing efficiency in academic affairs.

(iii) That the universities that were involved in the study had r implemented or were in the processing of integrating ERP in the management of academic affairs.

(iv) The university academic staff involved in the study had knowledge on ERP integration in managing academic affairs.

1.12 Theoretical Framework

This study was anchored in Ludwig Von Bertalanffy's General System Theory (GST) that was later on espoused by Robert Owens in education institutions in 1980s GST refers to the management methods used to enhance quality in which part have strong interactions in an organization. In this theory, according to Bunge (2004) the concrete social systems such as multinationl corporations, universities or hospitals are exceedingly complex entities whose parts are held together by bonds that are logical.one paradigm of GST was the concept of continuous interactions. They can be modelled as having components, structures, mechanisms and

environment. It is assumed that if one part of the system is removed, the nature of the system is changed as well hence parts of the system should be maintained in terms of inputs, processes and outputs and sharing of feedback among each of these three aspects of the systems. In an organization input are ssumed to include resources such as raw materials, finances, technologies and human resources and inputs go through a process where they are planned, organized, motivated and controlled, ultimately to meet the organizational goals. Outputs on the other hand according to Robert Owens (1981) are assumed to be individuals who are more able to serve themselves and society because of improved: intellectual and manual skills, power of reason analysis, values, attitudes and motivation, creativity and inventiveness, communication skills, cultural appreciation, understanding of the world and sense of social responsibility. Feedback was assumed to be information from the consumers of systems output and comes from the larger environment of the organization which includes influences from government, society, economics and technologies. Many educational institutions had recently turned to the use of GST principles and excellence models to meet the needs of society in abetter way(bunge ,2004: luhmann,2000).Successful implementation of quality management systems in universities depended on understanding the need for change within the organization, involvement of technology and the commitment of managers. Therefore an excellent university was one that had efficient systems in its management processes. The overall system framework applies to any system including sub-systems (departments and programmes) in the overall organization. General System theory may seem quite basic in relation with the tremendous changes facing organizations and how they operate today, as educators and managers have come to face new ways of looking at organizations. This theory fits into this research because public universities are systems and they are social organizations which have input,. Processes, outputs and receive feedback from the

government, society, economics and technologies. Universities interactions are in schools or faculties, departments and students. To successfully manage academic affairs then the systems of technology such as ERP will enhance efficiency.

1.13 Conceptual Framework

This study was guided by a conceptual framework showing the inter-relationships between the variables of the student as conceptualized by the author. University education is of great concern in any nation in churning out manpower resources for social, political and economic development. The effiency in academic affairs is important to ensure the production of relevant manpower. Evidence of the effect of efficiencies in managing academic affairs has made universities adopt ERP systems inorder to enhance efficiency of managing academic affairs. The conceptual framework shows that implementation of ERP influenced accuracy of data.security of data and timely management of data. Efficiency in managing academic affairs in universities is illustrated in accurate, accessible of data, security of data and timely data. management. however availability of ERP systems, competency in using ERP,availability of accurate data and accuracy of entriesand security of the systems affect the interplay between implementation of ERP and efficiency in data management.

To enhance efficiency in management of academic data universities have adopted ERP systems to manage the voluminous data. The conceptual framework indicates that the implementation of ERP influenced data management in terms of accuracy, accessibility, secured and improvements in timely flow. However availability of ERP systems, competencies in ERP use and competing

demands for the same resources affecs both the implementation and data management. The Conceptual framework is presented in figure 1.1.

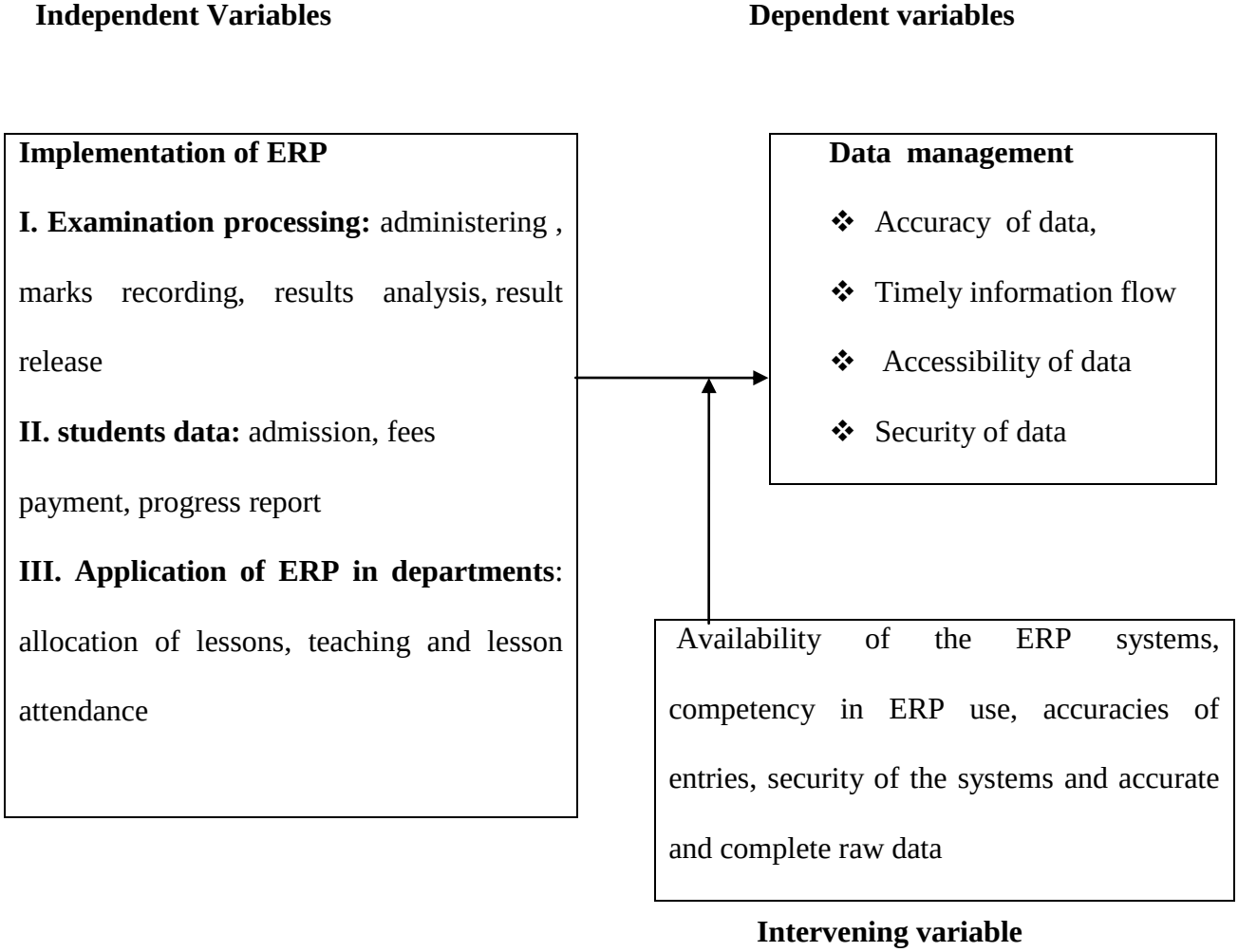


Figure 1.1: conceptual frame work

Source: Author

In order to enable universities realize efficiency in managing academic affairsa number of factors came into play. They included implementation of ERP which determined data ccuracy, accessibility and timely management which translated into efficiency in managing academic affairs. Good implementation of ERP influenced efficiency. Universities were keen on ensuring

integration in all the academic affairs management areas. Others integrated in all areas of academic affairs to realize efficiency and this explains why good inputs translate into good output.

According to SGT which is mainly on interaction of parts, excellence in interactive management was crucial. Universities embarked on implementing and integrating ERP to attain efficiency in data management through the inclusion of ERP in examination processes, students' data and departmental units. The examination processes entails administration, recording of marks, analysis of results, and release of results and storage of results. Students' data includedprogress report, admission, fees payment, and students' results and the application in departments entails lesson allocation and lesson attendance.

The assumption of the conceptual framework is that the outcomes are likely to be determined by intervening variables like availability of the ERP systems influenced examination data processing like marks recording and to some extent accessing of students data. For the university to attain efficiency in academic affairs, data for students should be easily accessed.the data to be accessed include admission, fees payment and progress report. However since the study sampled only universities that had implemented ERP, the influence of these factors was minimal. Implementation of ERP influenced data accuracy, access, security and timely management.

The GST and the conceptual frame workwere used in this study reinforce each other. The implementation and integration of ERP done in universities marked efficient interaction which is key in GST. They both focused on inputs, processes, outputs and feed backs in enhancing efficiency.

1.14 Operational Definitions of KeyTerms

The following were the definitions of terms as used in the context of this study:

Academic Affairs: Refers to the management of students' data, examination processes, graduation data and lecture attendance in the university education.

Efficiency: Refers to the accuracy, ease access, secure and timely information flow when using ERP and the results that are achieved when ERP is integrated in the management of academic affairs in universities.

ERP Integration: This refers to the inclusion of ERP systems as a tool to enhance and support the management of academic activities in universities.

ERP Systems: Is the combination of work practices, information, people information technologies organized to accomplish an information processing task.

Management of university academic affairs: Refers to activities that are done in order to plan organize and run the academic affairs of the university that includes examination processes, data processing, and graduation, learning and teaching.

Universities: In the context of Kenya, these are institutions of higher learning accredited by the commission of higher education.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents review of related literature according to the themes derived from the objectives of the study. They included implementation of ERP and enhancement of data accuracy, the challenges and role of ERP use in the provision of data security, ERP use and ease accessing of students' data and the application of ERP and improvements attained in managing acaedemic affairs in universities in Kenya. The gaps in the literature are articulated and summarized at the end of each sub topic.

2.2 Implementation of ERP and Enhancement of Data Accuracy in Examination Processes

Implementation of ERP system in institutions took various approaches such as phased in by modules and phased in by site. Whichever the approach the implementation of ERP had various impact on the institution or even organization in which it was implemented. Data accuracy featured as one of the major impacts of ERP. Aiken (2002) established that ERP reduced duplication of data entry tasks and that ERP functionality improved performances in data provision and that ERP systems were extraordinary wide in scope and for many larger organizations ERP systems ultimately require significant changes on staff and work practices and that ERP systems were based on the provision of accurate data in the similar way data was entered in the system. Therefore, the integrated nature of ERP required that if someone enters the wrong data then the mistake could have a negative domino effect throughout the entire enterprise. This study lacked clear design, population and sample size for the study and had no

information on how data was collected and analyzed. The study emphasized more on the operation of ERP than explaining how efficiency was witnessed in the organization.

Goeun (2013) investigated ERP implementation between corporate and university environment that involved Massachusetts Institute of Technology (MIT) and ENGCOa global engineering company. It also reviewed previous studies that determine Critical Successful Factors (CSFs) and risk factors to implement ERP in both environments. The case studies emphasize the organizational dynamics involved in ERP implementation by using CSFs and three phases of framework that is antecedent condition, implementation process, and outcomes. The study established that at the beginning of 1990, the Massachusetts Institute of Technology (MIT) in Cambridge, had 10,000 students and faculty and staff totaling 8,000, who faced budget problem. Federal research spending and growth in U.S. research spending had decreased, and increasing MIT's tuition fee would lead to enrollment barriers for many students. These problems caused increased operating gap, resulting in difficulties to attract and support MIT's major stakeholders – students, faculty, staff, alumni, sponsors, and employers. Further the study found out that MIT's administrative processes were too complex, leading to errors, requiring repeated work, and wasting effort. To reduce the operating gap,the study established that MIT introduced a project, known as the "Re-engineering MIT" initiative, aimed at improving the work environment and MIT's competitive position for research awards, and provide leadership in streamlining university administration.

The scope of the reengineering efforts included facilities operations, management reporting, buy-pay process, student services, and research proposals. Further the study established that MIT

adopted an ERP system from a vendor which provided pre-packaged standard business functions and processes based on corporate industry best practices. MIT implementated SAP in the Business administrative units. It was established that the university ability helped them to make decision on business effectively and efficiently. Moreover, overseas sites could access to new ERP system and input data without any limitation by using global standards. The new ERP system shortened the monthly closing process from one month to five days. Since "go-live" of the ERP system in 2004, ENGCO the engineering company in the United Kingdom had grown up on average 30 percent every year. Manager of ENGCO recalled "If the company had not put an ERP system in place, it could not have supported such fast growth in its business" (Geoun, 2013)

Geoun, 2013 through the two case studies presented, established distinctive contributions of ERP system implementation for the corporate sector and universities. Especially, Universities chosen by this study – MIT (the main case study), University of California, San Francisco, and University of Wisconsin-Madison which are classified as research universities conducting very high research activities in the Carnegie Classification of Institutions of Higher Education. This study did not consider the different contributions that the corporate sector and universities may have had in terms of their characteristics, and how ERP increased the benefits of ERP systems in spite of noted prevailing circumstances. The study did not have clear design, sample and data collection instruments.

Additionally, the few studies available on ERP adoption in the literature were conducted in public sector organizations (Gable, 2003; Sedera & Gable, 2004), although some studies were

conducted in private firms to allow comparison to be conducted on ERP implementation practices between private and public organizations. However, the operational environments of the public and private sectors differ considerably (Mansour & Watson, 1980; Khandelwal, 2001) and findings from one may provide insights into the other. This study discussed ERP systems at a generic level by concentrating on its basic functionality rather than distinguishing between top brands and mid-market ERP products. Empirical evidence suggested that in some respects the benefits of ERP may be comparable even when systems types differ (Mabert, 2003; Laukkanen, 2005). This study incorporated large, medium and small size organizations. The studies failed to indicate where was implemented and it did not have clear methodology for the studies.

All the ERP implementation life-cycle phases were studied in this research. This is due to the fact that research area and ERP technology is subject to dynamic change. The Context as used in this dissertation is limited to the three aspects of an organization's context which previous studies by Tornatzky & Fleischer (1990) and Rogers (1983) reported to influence the process by which organizations adopt, implement, and use technological innovations: Technological context described both the existing technologies in use and new technologies relevant to the firm, Organizational context referred to descriptive measures about organization such as scope, size, and the amount of slack resources available internally, Environment context is the arena in which a firm conducts it business.

The choice of the three contexts was consistent with the innovation diffusion theory which emphasizes technological characteristics and both the internal and external characteristics of an organization, as drivers for technology diffusion. Finally; the study's unit of analysis is at the

national and organizational level. This study adopted the multi-paradigm approach unlike the current study. Multi-paradigm research involved mixing of methods from different paradigms (Petkov, 2006).

Mingers (2001) claimed that multi-methodology or critical pluralism as he called it, was seen as a new paradigm which can encompass multi-paradigm research combinations without taking the extent paradigm's assumptions at face value. Fernandez *et al.* (2006) adopted multi-paradigm approach to grounded theory while studying ICT in Australia. Their study was designed to have three phases each including data collection and analysis: phase one in which the survey instrument was developed, phase two in which the survey was conducted and analyzed, and phase three which involved the conduct and analysis of the interviews and the integration of conceptualizations. The case study research method was used for carrying out the qualitative or interpretive paradigm part of this research while the survey was used for the quantitative part of this research. The case study research method is particularly well-suited to Information Sysems research, since the object ofthe information system discipline is the study of information systems in organizations, and interest has shifted to organizational rather than technical issues" (Benbasat., 2002).

This was to ensure the coverage of post-implementation activities being undertaken by organizations to optimize performance of their ERP systems. The research design for this study aims to address this limitation by incorporating a survey in the second phase of the research. The benefit of using surveys was that the researcher can easily cover large populations quickly at a relatively low cost especially with the availability of modern communication technologies. Data

collection procedures were not indicated and the studies were without clear sample size, the reviewed study was done in phases unlike the current study that filled the gaps.

Muscatello (2003) focused on implementation activities that foster successful installations which were developed using information gleaned from field studies of the four projects of small and midsize manufacturing firms. The study sampled 4 companies on the basis of the type of business and manufacturing. This research adopted a multiple case study approach to investigate the implementation process in small and midsize manufacturing firms in the United States. The research focuses on implementation activities that foster successful installation that standardized the processes on the four companies. Multiple methods were used to collect data for this study. These methods included direct observation by two of the authors who were academic observers for the projects from the project initiation stage. The authors were given free access to historical documents and other records including financial data, and non-personnel related operations statistics. The authors were also allowed to sit in on regularly scheduled project-team meetings. Ongoing, open-ended interviews were also held with corporate officers, divisional managers, project-leaders, super-users, consultants and various project team members both during and after the implementation of the ERP projects. These interviews permitted the project participants to identify and frame the important issues and factors that affect ERP implementation success. This approach is consistent with the recommendation that, in an area where theory is relatively undeveloped, researchers should use an inductive approach to the process of identifying issues for inclusion in the study (Muscatello, 2003).

Muscatello (2003) also showed that managing the strategic integration between manufacturing and marketing provided the successful firms congruence of purpose and function for the new ERP systems processes and that understanding corporate objectives, order qualifiers and winners, process choices and support infrastructure provided the ERP implementation team valuable knowledge for developing business cases, performance measurements (current and future), long term strategic and tactical goals and package selection techniques. The strategic understanding was that successful firms had an easier time selecting their software package since they understood what they needed for the future. While this report deals with some of the major activities involved in the adoption of ERP systems, it could not adequately cover all implementation actions. Although these four cases were diverse enough to illustrate some common traits that can contribute to successful implementations, more detailed studies are required to help develop theory in this area. This study did not determine if there is a one-to-one matching of successful implementation actions across all types of integrated technology adoptions, or if dissimilar technologies had some unique success characteristics.

Implementation of ERP for data accuracy enhancement in the South African ICT operator was reported by Finger (2001) who showed a strong need and demand for ERP in the ICT Industry. The study focused on determining the need for the implementation of ERP systems within the ICT industry in SA and provided recommendations in that regard, and determined the perception of the role and functionality of ERP as an integrated management system. The aim was also to assess the benefits of implementing ERP in SA and the disadvantages of not implementing it.

The research was conducted by soliciting responses from a sample of managers and employees in the telecommunications industry in SA. The sample was based on the length of service in the industry, duration in the current position, nature of position and current/ previous employer. Due to the sensitivity of information in the sector, only 36 respondents out of 50 were prepared to take part in this study. The study focused on the implementation of ERP in SA and did not include respondents from other countries. The research was designed to determine the ICT industry perception on the role and functionality of ERP as an integrated management system, determining the impact of deregulation, that influenced the Information Communication Technology industry in SA, Investigating and determining the operational effectiveness of ICT service provider's sub-systems in SA and establishing the possible trends of integrated management systems, which could be implemented by service providers in the South African ICT industry within the next five years was put in place.

Further Finger (2001) in his study concluded there was positive perception towards integrated management systems. The study showed that supplier management tools of their organizations were not effective during tender processes and 58 per cent thought that these tools were not fully functional. From the questions posed to the respondents, it seemed that they were, on average, still in the beginning phase of utilizing the information technology to their advantage. However, indications were that thestudy had realized what a powerful instrument they had in the ERP and that they were expecting more integrated management systems. This study revealed that a very strong positive support was obtained for the impact that ERP tools may have on ICT operators. Further findings showed that ERP tools enabled ICT operators to have integrated networks and IT systems and that ERP tools allowed a single system engineering group to manage fully

integrated IT and network systems. Excellent support was obtained for the view that ERP tools enabled organizations to share information resources across divisions with the guarantee of proper protection. There was also the added advantage of enabling all information resources to be available on a common intranet. As to the administrative functions of ERP, the study supported the idea and was of the opinion that the human resources information systems of their organizations were fully functional. On the aspect of online financial reporting, the study showed that reporting was performed on line and also travel claims and budgeting were performed online. The study further revealed that public relations issues were available online in their organizations for communication purposes, but did not show that enterprise management processes for financial, legal and regulatory management were fully integrated in their organizations. This study was not clear on who the respondents were , the type of research design adopted and it did not indicate how the data was collected for the study.the study dealt with the telecommunication industry unlike the current study.

Studies on the implementation of ERP systems in Kenyan public universities is in the case of Masinde Muliro University of Science and Technology. Makokha, Musiega and Juma (2013) found out that 85% of implementation of ERP system was accounted for by integration of Human Resource, Finance, Procurement, Students Affairs and Computer Science. The study also revealed that gender and duration of use of ERP system were important to the implementation of ERP system which was accounted for by gender and duration of use. This study did not consider implementation in academic affairs.

Nyandiere (2007) reported that universities that had or were implementing computer-based systems took different strategies, but the most common was a combination of strategies. There were those that develop their applications internally. This assumed that the institution had enough capacity-finances and staff to undertake computerization projects. The demerit for this is usually poorly developed and implemented systems. This study further rindicated that where institutions wanted to guarantee quality, many went for off-the-shelf packages while others contract specialist developers to implement the systems. In such cases, Sevilla (2008) noted that an institution could choose to contract local vendors who understood standard commercial applications or go for international vendors with proven systems and long track records. The demerits here were that the former were often inexperienced on academic requirements and usually offer unclear long term sustainability and support while the latter were usually very expensive and may require expensive travelling. In addition, Nyandire (2007) showed that some institutions were going for freeware or what they commonly referred to as Free and Open Source Software (FOSS). Here, the institutions customized these systems to their needs and where it was done well, there were no regrets. A good example in this front was Strathmore University in Kenya that had successfully implemented freeware systems to enhance its integrated management processes. This study did not emphasize the reasons for implementation but the sourcing of ERP systems, was not clear on twho the respondents were and how data was collected unlike the current study.

Otieno (2010) investigated the organizational and national context within which ERP is adopted and used in Kenya, and how the context and ERP influence each other. Also the study investigated the challenges faced by organizations implementing ERP systems in Kenya and

factors influencing ERP upgrade decisions. The study was based on the need to study organizations in their societal contexts and information systems in their organizational settings. This study provided some key insights into the implementation and use of ERP systems in the public and the private sectors in Kenya. Case study findings suggested that the company sector played an important role in ERP implementations in several key dimensions. ERP systems with in-built business practices expressed the tendency toward standardization.. Findings of this research suggested that ERP implementation and upgrade is influenced by, but not necessarily bound by, existing contextual factors.

Thie study also proposed an IT strategy framework which could be used by organizations planning to implement ERP to align their business and IT strategy. Finally, the study provided practical guidelines to practitioners on ERP implementation and upgrade based on the experience of the case study organizations and the ERP consultants interviewed. The reason for inclusion of private organizations was that adoption of ERP systems is more widespread in private organizations than in public sector organizations in Kenya. Otieno (2010) further showed that the data collection instrument that involved questionnaires were developed based on insights gained from the preliminary literature review. This instrument was used to gather data relating to ERP implementation project management practices among Kenyan organizations. Administration of the questionnaire and a letter outlining the motive of this research were distributed by email to organizations which had implemented, or were in the process of implementing ERP systems in Kenya. The study was conducted at the sites between July 2004 and February 2005, after which steady correspondence has been maintained with different informants at the sites.

Data was also collected using the revised questionnaire (interview protocol) gathered via project documentation analysis, and interview. A total of 39 interviews were conducted with 17 end users, 12 ERP project team members, and 10 senior/mid-level managers at the case the case study organizations. The interviews lasted an average of 1 hour each. In addition, two consultants were interviewed; one from Price water house Coopers and one from Symphony. In addition, participant observation was employed. Data gathered through participant observation and document analysis allowed the researcher to colloborate what was heard in the interviews with what was observed on the site or read in the documents. The choices that were made during the course of designing this research brought with themsome limitations. While this study covered all aspects of an ERP implementation, it was not designed to study such issues as the rationale for doing things in certain ways or to determine exact outcome relationships. For example, one key question that the study could not answer definitely is the cost and benefit relationship. The study did not clearly state whether early ERP adopters or late ERP adopters receive the better returns. It also had a small population and sample, this elicited biases in the findings (Otieno, 2010).

A study by Ndung'u (2011) conducted an investigation on the ERP implementation experiences in public universities in Kenya that involved the attributes of data accuracy. The study was carried out on evaluation of implemented integrated enterprise resource planning systems in selected public universities in Kenya. The study sought to investigate existing implementation of enterprise resource planning systems in public university management in Kenya and how they have influenced automation efforts in these institutions. The study examined how ERP systems used affect implementation experiences for public universities, how ERP based communication

affects implementation experiences for various public universities in Kenya and how ERP systems in service delivery influence implementation experiences in public universities in Kenya.

Ndung'u (2011) study also sought to establish the experiences of various public universities in Kenya in their implementation of Enterprise Resource Planning Systems to automate their operations. In carrying out the study, the target population comprised of 15 (fifteen) ICT administrators and technicians in each of the three public universities in Kenya under study. The choice of ICT administrators and technicians in public universities as target respondents owed to their knowledgeable background on the research problem. This helped to obtain relevant data for use in the research study. The study adopted a descriptive research design to provide a comparative approach to the use of enterprise resource planning systems in integrating management of public universities in Kenya against a backdrop of other success cases in developing and developed nations. A sample population was derived from their respective ICT departments. The choice of ICT departments in these institutions owes to their familiarity with the subject of the proposed study. Purposive sampling was employed in arriving at sample populations that were used in the research study. Out of a total population of 45 (Forty five) ICT technicians and administrators in the three public universities that were studied based on an informal survey by the researcher, a census was carried out to maximize responses to the study. Data collection comprised of data sources, research instruments and data collection procedures. The research study relied on both primary and secondary data sources. Primary data was gathered using structured questionnaires. In addition to the primary data, secondary data from

journals, white-papers and e-books was also used to provide comparative perspectives to the study. The research study utilized questionnaires as the primary research tools.

Ndung'u (2011) established that ERP system attributes had significant influence on implementation experiences of enterprise systems in public universities. Quality and functional attributes of implemented ERP systems have a significant influence on implementation experiences of Kenyan universities. With respect to integration with existing systems prior to ERP implementation, choice of systems by public universities had average effect reflecting significant contribution towards shaping their implementation experiences. Integration of ERP systems with business software used by public universities, migration of data to ERP platforms and data security over ERP platforms had average effect on implementation experiences for public universities in their quest to automate their operations over an ERP platform. As brought out in the study findings, successful implementation of ERP systems in public universities was dependent on availability of adequate mix of internal and external human resources. In implementing ERP systems in public universities, the main influential factors affecting implementation strategies undertaken included project cost overruns where initial budgets hadfallen short of total implementation costs. Study findings also indicated that performance monitoring information in ERP application management strategies was effective. This study considered a small sample in the three universities and the experiences of the end user at faculty or school were not explained in the study.

Njihia (2014) in his study established that the introducation of ERPs into small and medium enterprises was the best ways to manage the change process to get a competitive advantage over

its rivals. The study had five objectives of finding out how the financial resource availability, organizational complexities, employees perceptions, regulatory requirements, and having a top management support affects the effective implementation of an ERP system which in turn affected the firm's performance. The research adopted a descriptive design employing the use of mainly questionnaires as the primary data collection tool. Data was collected using questionnaires and analyzed by finding out the mean, maximum, minimum, standard deviation and the correlation between the variables in the findings. The presentation of data was done by use of tables while hypothesis test was done by chi-square test of independence.This study found that financial resource availability, organizational complexities, employee's perceptions, regulatory requirements, and having a top management support all affected the effective implementation of an ERP system which in turn will affect the firm's performance. The descriptives used were frequencies, averages and other statistical calculations.

In addition Njihia (2014) study was a quantitative research where the study was concerned with the measurement of attitudes, behaviors‟ and perceptions and included interviewing methods such as telephone, written questionnaire and interviewing as well as self-completion methods such as mail outs and online surveys. The study targeted all the commercial banks using ERPs in their organizations. The target was population of 44 commercial banks in Kenya as listed by the Kenya finance directory July 2013. The study covered all the commercial banks that had a national coverage and were using the ERP systems in their operations.

Further the study was designed to examine the determinants that affect the implementation of ERP which in turn influences the firm's performance. Five objectives were stated based on

factors influencing implementation of ERP. Five indicators were used to measure the influence of complexity of an organization structure and implementation of ERP system. The indicators used were change accommodation, proper infrastructure, good data management systems, level of communication and strong organizational culture. Based on the responses a significant 80.56% affirmed that indeed that complexity of an organization structure does influence implementation of ERP system. The study revealed a significant relationship between complexity of an organization structure and the implementation of ERP system. Also the study revealed that employee's perception did influence the implementation of ERP system. The study further revealed a significant relationship between employee's perception and the implementation of ERP system. Financial resource availability affected the implementation of ERP which in turn influences the firm's performance.

The study found out that financial resource availability, organizational complexities, employee's perceptions, regulatory requirements, and having a top management support all affects the effective implementation of an ERP system which in turn will affect the firm's performance as some of the determinants of implementing ERP except for data accuracy. the availability of regulators, amd top management support was the affected the implementation of ERP system. The respondents and sample size were not clear and the banks involved were not specified and the research design was not indicated and the study was interested only on the implementation to enhance performance that was not clarified (Njihia, 2014).

From the reviewed literature, the following gaps were identified. Aiken (2002) study established that ERP reduced duplication of data entry tasks and that ERP functionality improved performances in data provision and that ERP systems were extraordinary wide in scope and for many larger organizations ERP systems ultimately require significant changes on staff and work practices however the study had no clear sample size and even population and the study did not show how information was collected for the study. The current study filled the gap by using a population of 1541 and sampling 508 respondents for the study and used the questionnaires and interviews to obtain data

Finger (2001) focused on determining the need for the implementation of ERP systems within the ICT industry in SA. The study found out that 57.4 per cent of respondents showed apositive perception towards integrated management systems. Only one question attracted more negative responses than positive responses. However the study was not clear on who the respondents were, had Low numbers of participants and it was lacking the research design and it did not indicate how the data was collected for the study of which the current study filled the gap.

Makokha (2013) found out that 85% of implementation of ERP system was accounted for by integration of Human Resource, Finance, Procurement, Students Affairs and Computer Science. The study also revealed that gender and duration of use of ERP system were significant to their implementation where 28.8% of implementation of ERP system was accounted for by gender and duration of use. This study failed to consider implementation in academic affairs and adopted a case study approach, the current study filled the gap by putting strong emphasis on the implementation of ERP in academic affair in universities in western region of Kenya for enhancing data accuracy and adopted a descriptive design.

Nyandiere (2007) posits that universities that had or were implementing computer-based systems took different strategies, but the most common was a combination of strategies. There are those that develop their applications internally however this study did not emphasis the essence of the implementation of ERP but strategies of implementation and sourcing such as the free and open source software. The current study filled the gap by considering the implementation of ERP for enhancing accuracy in managing academic affairs.

Otieno (2010) conducted the study on companies like BIDCO oil refineries, Bamburi cement etc, either private or public. Promoted the upgrading of ERP systems in the companies studied. Basically used interviews, didn't state whether early ERP adopters or the late ones received better returns. However this study limited itself to interviews as the only method of obtaining data and it had no clear sample for the study and it put more emphasis on ERP upgrading than implementation. The current study filled the gap by using a clear sample, conducted the study in universities and emphasized implementation to enhance data accuracy.

Goeun (2013) did the study in both corporate and university environment and determined the critical success factors. This study provided and confirmed distinctive challenges in ERP system implementation for the corporate sector and universities. Did not consider how ERP impacted and how benefits increased. The current study filled the gap by considering the impact of implementing ERP for the enhancement of data accuracy. Gable & Sedera (2004) studied private firms and public concentrated on Basic functionality and Marbel et al (2003) conducted on large, medium and small size organization.Tornatzky & Fleischer (1990) used the unit of analysis at national organizational level and adopted multi paradigm research of multiple methods for

different paradigms. This study was designed in three phases, both case study and survey design were adopted and it did not have a clear sample size. The current study filled the gaps by studying the implementation of ERP systems in universities using the descriptive research design and the study was conducted in one phase.

Ndung'u (2011) focused on ERP implementation experiences in public universities. As brought out in the study findings, successful implementation of ERP systems in public universities has been dependent on availability of adequate mix of internal and external human resources. In implementing ERP systems in public universities, the main influential factors affecting implementation strategies undertaken include project cost overruns where initial budgets have fallen short of total implementation costs. Study findings indicated that performance monitoring information in ERP application management strategies was effective however this study had a small sample from the three universities and experiences of end users were not considered. The current study filled the gaps by presenting information on implementation of ERP for the enhancement of data accuracy which established great improvement and also used a large sample size of 508 respondents.

Njihia (2014) conducted the study on small and medium size enterprises and reported that the correlation coefficient showed a moderate positive correlation of 0.459 between top management support and implementation of ERP system. The respondents and sample size were not clear and the banks involved were not specified and the research design was not indicated and the study was interested in only on the implementation to enhance performance that was not clarified. This

study found that financial resource availability, organizational complexities, employee's perceptions, regulatory requirements, and having a top management support all affects the effective implementation of an ERP system which in turn will affect the firm's performance as some of the determinants of implementing ERP except for data accuracy. However this study used only questionnaires for data collection and did not show how ERP affected firms, it had no clear number of the respondent in the study and the performance of ERP was not discussed in the study. The current study filled the gap by using a clear sample size and clarified the impact of the implementation of ERP in enhancing data accuracy.

2.2.2 Type of ERP Integrated in Enhancing Data Accuracy

Otieno, (2010) revealed that different companies in Kenya integrated different types of ERP. And that the type of ERP integrated depended on costs of purchasing the systems, benefits accruing from the systems, vendor that were to supply the systems, information technology assets such as hardware, software, tools, networks database and data centers and compatibility of the systems. Empirical data also revealed that ERP implementation scope was a great determinant of the level of ERP integration. Bidco Oil Refineries integrated Baan systems which had mixed modules like finance, inventory and sales from different vendors. This was based on compatibility of the systems. The Agrochemicals and Food Company (ACFC) integrated Ebizframe that was designed in Indian markets and not for global markets. It requires a lot of customization systems, still be developed and therefore not suited for information systems requirements. ACFC ruled out on SAP R/3, oracles and JD Edwards on the basis of costs.

Bamburi Cement Limited (BCL) adopted SAP R/3 with several modules of sales and distribution, treasury and production planning with the expectation of decreasing the information technology costs and for easier maintenance of the systems. Kenya power and lighting (KPLC) andKenya electricity generating company (KenGen) implemented only two SAP R/3 core modules of finance and material management because they relied heavily on SAP's Online SupportSystem (OSS) to solve their technical problems. OSS was a database which contained SAP native code solutions that could be downloaded and applied to fix problems.

Wang (2011) indicated that application module in SAP is a collection of a number of related business process procedures (BPPs). BPPs are the smallest program units that provide the functionality of the SAP System. The study established that many of the BPPs were reused by more than one of the application modules. Business processes and business functionality found in the organization were built with these application modules upon BPPs. SAP Enterprise software integrates the core business processes found in an organization. Each business process consists of a set of business application modules. SAP systems were considered expensive but very efficient. Further Cotteleer and Bendoly (2006) indicated that the ERP suite supports critical business processes in many business operation areas. SAP, Oracle, Baan and PeopleSoft are some of the best-known ERP systems. This study was interested in the basis of integration of ERP but not on the efficiency of the systems. Also the study focused on companies that were involved in either manufacturing, production or service but little was said on academics in institutions of higher learning.

Wei and Thuraisingham (2007) gave an overview of the major ERP systems vendors. That included SAP which was the most prominent of the ERP systems. Other included PeopleSoft and Baan. However, PeopleSoft had been purchased by Oracle, and Oracle was emerging asa major ERP systems vendor. Furthermore, Oracle provided the server technologies that ERP applications could utilize, while SAP and Baan relied on various vendor products for server technologies. Baan has been purchased by SSA. Microsoft is also becoming a major player in ERP software. The study established that SAP (Systems, Applications, and Products in Data Processing) was formed in 1972 by five former IBM employees in Germany. SAP focused onthe development of application software for real-time business processing, beginning with its first accounting software developed in 1973. Its first ERP product, SAP R/2, was developed in the late 1970s using a centralized database and dialog control system. In the 1990s, SAP R/3, which uses the three-tier architecture of database, application, and user interface, was unleashed on the market. R/3 was a breakthrough, making SAP the largest vendor in the ERP market by 1999.

By 2005, there were around 100,000 installations worldwide, more than 1500 partners, over 25 industry-specific business solutions, and more than 30,000 customers in over 100 countries. SAP NetWeaver unifies the integration technologies into a single platform, which lays the groundwork for the integration allsystems SAP runs or non-SAP software. SAP R/3 was the third generation set of highly integrated software that performed the core business functions within a company; while SAP, which also includes R/3 component as an important building block, was intended to empower the collaboration between organizations.

On Oracle, they established that it was founded in the 1970s inthe USA, was most famous for its well-known relational database Oracle and is the second-largest software company in the world.

In 1987, Oracle offered its first ERP software known as Oracle General Ledger. Oracle developed other ERP softwaresuch as self-service applications, strategic procurement solution, financial consolidation engine, 157 Security for Enterprise Resource Planning Systems and flow manufacturing product. Oracle's ERP system is now known as Oracle E-business Suite, whichhas more than 50 different modules covering the following areas: finance, accounting, human resources, manufacturing, supply chain management, project, and front office. Oracle also had many other well known products in other fields such as database, data warehousing, and workflow. Additionally another type of ERP was the PeopleSoft Enterprise which was the business application suite that offered Web services integration with multi-vendor and home grown applications; it is admittedly onsidered easier to configure and more flexible thanits competitors (Wei, 2007).

JD Edwards Enterprise One and J.D. Edwards World were both the business applications from J.D. Edwards Company, which had extensive experience supplying software for the IBM series platform. JD Edwards World provides the Web enabled applications for the management of plants, inventories, equipments, finances, and people. Eventually Sage was founded in England in 1981, entered the ERP market and gained a solid market share using the strategy of acquiring small ERP vendors such as Tetra and Interact Commerce Inc. By 2005, Sage had revenue of $1.4 billion in the ERP market and claimed 6% market share as the third-largest ERP vendor. Sage Line 500 was the newest version ofthe Sage Line 500 product family, which was the Webbased integrated ERP solution covering core functionalities in a company. Sage 1000 is new, single business management software designed to offer the operations within mid-size

organizations.Finally there was the Microsoft that founded in 1975 that was the biggest software company in the world with its famous Windows series products (Wei, 2007).

Microsoft Business Solution Group (MBS) is the department that focuses on providing ERP solutions, such as Microsoft Dynamics (formerly Microsoft Business Solutions), which was an integrated business management solution that included financials, customer relationship management and supply chain management. By 2004, MBS had revenue of around $800 million, giving it a 4%ERP market share.Others in addition to the major vendors were several other ERP vendors that are emerging. In 2004, the biggest ERP vendors SAP, Oracle, Sage, Microsoft, and SSA accounted for around 70% ofERP market share by revenue. The other 30% was shared by other ERP vendors such as Geac, Intentia, Infor Global Solutions, and Lawson**.** The overview featured the types of ERP and not where they were suited for implementation. There was no methodology of how data was obtained and the study population was not specified and the study concentrated on the profitability of the systems and not their efficiencies in management (Wei, 2007).

Penver, (2012) reported that oracle as one of the systems had complete security for databases allows the encryption of data and protects both the data in the operational database and the data from backups as it transits the network. Oracle Advanced Security doesn't need any additional configuration at the application level and provided a transparent encryption of all sensible system datait integrates management of encryption keys, transparent encryption of sensitive columns, and transparent encryption of the entire table space and hardware security module integration. Transparent data encryption (TDE) creates a new encryption key every time a column is

encrypted. If more columns of the same tables are encrypted, the same encryption key will be used. Each encryption key is stored in its internal oracle dictionary and is encrypted itself using the master TDE encryption key. This encryption key resides outside the database in the Oracle Walletfile. Starting with Oracle Database version 11g, it's possible to transparently encrypt a whole table space. Oracle application tier security provides harden operating environment; harden apache configuration, remove application server banner, remove unnecessary directives, remove unnecessary modules, prevent search engine indexing, protect administrative web pages - limit web page access to trusted hosts and configure logging and oracle application server respects apache's logging parameters. The data remain consistent and confidential of which this study intended to investigate. However the ERP systems were integrated in non academic management systems.

From the reviewed literature, the following gaps were identified, Otieno (2010) reported that different companies be it private or public had integrated different types of ERP depending on costs, benefits, vendors that supply information technology and compatibility of the system. BIDCO oil refinery had Baan, Agro Chemicals and Food Company had Ebizframe, Bamburi Cement Limited had SAP R/3, Kengen and Kenya Power and lighting also had SAP R/3. This study emphasized the upgrading of the systems to better their performances however the improvements in the performances were not clarified. The current study filled the gap by considering the implementation of ERP in universities' academic affairs to improve on data accuracy.Wanga (2011) gives the functionalities of SAP and Cotteleer & Bendoly (2006) and Wei *et al* (2007) gave an overview of major ERP systems that included Oracle, People Soft, Baan, SAP, Microsoft and others and concentrated on the historical highlights, profits of the

systems, functionalities and popularities other than their integration in management. The current study filled the gap by considering where the type of ERP had been integrated in managing academic affairs in universities. Penver (2012) reported that oracle as one of the systems had complete security for databases allows the encryption of data and protects both the data in the operational database and the data from backups as it transits the network. Oracle Advanced Security doesn't need any additional configuration at the application level and provided a transparent encryption of all sensible system data it integrates management of encryption keys, transparent encryption of sensitive columns, and transparent encryption of the entire table space and hardware security module integration reported that oracle was itself complete security for data bases hence dealt more with its functionality than on integration into management. The current study dealt with its integration and the efficiencies of the systems in managing academic affairs.

2.3 The Challenges encountered in the Provision of Security for Examination Data

The challenges facing examinations in universities are a reason why there was need to implement ERP in the examination processes. TheWhite Paper (2010) presented in the united kingdom reported that ERP improved productivity by reducing duplication of data entry tasks, empowering employees with the right information at the right time, streamlining processes through automated workflow, improving organizational task management and reduced duplication of data entry tasks. The challenges that universities facing could to a higher level be resolved when ERP is applied in the management processes.

A study by Mbirithi (2013) focused on management challenges that compromised the quality of university education. The study found out that insufficient fund was the biggest management challenge that in turn affected research, teaching and learning. The curriculum was not adequately implemented due to inadequate teaching and learning resources. These challenges had implications on the quality of education offered in the selected universities in Kenya.The study sought to investigate the nature and magnitude of management challenges that face Kenya's public universities and their implications for quality education. The study had four research objectives that were to determine the nature and magnitude of management challenges facing Kenya's public universities in relation to their missions, the implications of management challenges on the quality of university education, identify the strategies public universities have put in place to cope with challenges to ensure quality of education and proposed strategies the universities could adopt to mitigate the management challenges.

This study was both qualitative and quantitative in nature; hence it employed descriptive design. The study was carried out in three Kenya's public universities which were purposively sampled. The sample constituted the following: 3 vice-chancellors, 8 deputy vice-chancellors, 53 deans of schools, 158 chairpersons of departments, 12 leaders of academic and non-academic staff unions each, 12 leaders of students associations in the three public universities and 3 heads of boarding and accommodation sections. Four types of research instruments were used in data collection: questionnaires for deans of schools, chairpersons of departments and leaders of academic and non-academic staff unions, interview guides for VCs, DVCs and heads of boarding and accommodation sections, observation schedule, and document analysis. The data were analyzed both quantitatively and qualitatively. Quantitative data were analyzed using descriptive statistics

aided by statistical package for social sciences (SPSS). Quantitative data were presented in frequencies, percentages and tables while qualitative data were organized into thematic categories according to the objectives of the study (Mbirithi, 2013).

Mbirithi (2013) further established that public universities that took part in the study did not have enough teaching and learning resources, especially lecture halls, computers, textbooks and library space. The study found out that insufficient fund was the biggest management challenge as it affected all the other areas of research, teaching and learning. It was also revealed that the curriculum was not adequately implemented due to inadequate teaching and learning resources and teaching staff. All these management challenges were found to have an implication on the quality of education offered in the universities. In management of examinations, over 60% of respondents from all three universities indicated that there was late submission of examinations by staff, while more than 45% of the respondents from all universities indicated that there was also lateness in marking and submission of results. Concerning loss of data and examination leakages, over 35% of respondents from all the universities indicated that there was loss of data due to computer crashes and examination leakages from secretaries and lecturers. Over 60% of respondents from all the universities indicated there were high rates of cheating due to high student numbers and low numbers of invigilators. At least 45% of respondents from all the universities indicated that there would be loss of quality university education, while over 50% indicated that students' integrity would not be measured accurately and at least 45% indicated that there would be low quality grades. The study established that there was examination supervision problem due to large numbers of students sitting for examinations against few supervisors.

Further Mbirithi (2013) found that 34(48.1%) of the deans of schools and heads of departments from Kenyatta University, 14(31.2%) of the deans of schools and heads of departments from Egerton University and 34(34.8%) from University of Nairobi had inadequate computers. The trend implies that the computers available in most schools were not adequate to meet the needs of the students and lecturers alike. More than 35% of deans of schools from Kenyatta and Egerton universities indicated that the ratio of students per computer was high. Six (46.0%) of deans of schools from Kenyatta University and 22 (73.3%) deans of schools from Nairobi University indicated that there should be at least two students per computer, 7 (54%) of Deans of schools from Kenyatta University and 4 (40%) of Deans of schools from Egerton University indicated that teachers have little access to computers except those in IT department.

Only Nairobi University deans of schools 28 (93.3%) indicated that measures are being taken to ensure levels of computerizations are high. Document analyses had shown that there was inadequate ICT infrastructure across the three universities. This study did not give clear information on whether the challenges were resolved via technology application and it had a small sample size whose findings could not be concrete. Mbirithi (2013) focused on management challenges that compromised the university quality education and he was not clear on how the challenges were mitigated. The current study filled the gap by providing information on the implementation of ERP to resolve the examination data challenges.

2.3.1 Implementation and Competency in ERP

Muscatello (2003) reported that the rectification of the training deficiencies wasaccomplished in three ways: reassignment or replacement of managers, hiringof new personnel with substantial knowledge in manufacturing and ERPsystems, and training of managers and key employees. Two types of training were provided: fundamental ERP systems education and technical training inthe usage of the ERP software.In companies A, C and D, ERP training was provided by outside consultants.In company B, since substantial implementation time was lost in the prolonged reengineering exercise, executive management made a decision to replace several managers with new managers with ERP knowledge and experience, rather than losing more time training the managers. The new managers helped to train the retained managers and other key employees. Vendor personnel implementing ERP systems provided software training. All the companies spent considerable time and training emphasized the keystrokes, screens, reports and other tools needed to obtain user information.

However, Muscatello (2003) indicated that most mid-market manufacturing managers had not increased their education or training to the level of larger corporations. Thus, the concepts of ERP processes are somewhat foreign andvague to mid-market managers. This may cause a smaller firm to have to invest significantly more time and money than a larger firm, and in some cases may require the demotion or replacement of individuals who cannot meet the new responsibilities. The companies A, B, C and D's names were concealed for the purposes of data collection. The study focused on the training of the managers and not their competency in using ERP systems.

Kajuna (2009) in his study indicated that technology competency is a pre-requisite in technology implementation; he purposed to investigate and evaluate the nature of technology implementation at the University of Dar-es-Salaam in Tanzania. The study examined the classroom practices and what surrounded the learning and teaching processes using technology from the perspective of teachers and students. It also evaluated the use of technology at the University based on four of Ely's eight conditions for adoption of innovations and ACOT's stages of development of technology integration. Two research strategies were used: Interviews and document analysis. Twenty-four students, ten faculty members, one head of a department, and one faculty dean were interviewed. They were selected from the Faculty of Science and Faculty of Education.

Kajuna (2009) revealed that although there were significant efforts and positive attitudes toward the use of computers in learning and teaching, the process of technology integration at the university faced impediments that affected its effectiveness. The impediments included lack of enough computers, absence of sound computer knowledge and skills of teachers and students so as to effectively integrate technology into learning and teaching, absence of adequate and effective teachers' professional development the programs on technology, and lack of effective technology planning and technology plans.The result of this study indicated that the four Ely's conditions of diffusion ofinnovations were not effectively met at the university and that the university's technology integration process was leveled at entry and adoption stages of ACOT's Stages of Development. The researcher used semi-structured interviews of students, faculty academic staff (teachers), and heads of department/faculty. Semi-structured interviews were conducted in order to remain focused, given a limited time for administering the questions, yet to

also allow for flexibility but this give room for biases since it was the only method of data collection.

Kajuna (2009) also focused on what technologies were available, strategies to implement, technology plan and training and the stakeholders perceptions, knowledge and skills of technology. The study found out that lack of enough knowledge was a challenge. The respondents did not use technology in teaching because they did not have knowledge of computers. The illiteracy made technology integration ineffective, the current technology was said to be changing very fast and that teachers were overwhelmed because they did not have time to train in the advanced technology. Some teachers also indicated that most students especially first years entered the university completely computer illiterate so it was difficult to use technology to teach them. This study did not attempt to look at the challenges facing the whole academic affairs and other examination processes except teaching and learning limiting technology integration to the class room and not all the academic processes in the University of Dar es salaam.In terms of methods, this study used telephone interview asone of the methods that could not provide more concrete evidence of what the process of technology integration at the university looks like that theresearch could have done by physical presence in the field.

A study by Otieno (2010) revealed that all the company leaders were not qualified to use the company computers. They had only trained on the beginning of windows and DOS and the training was internal especially in the finance department. ERP systems were perceived as being difficult and had a lot of complexities to understand and use. The complexity of the systems discouraged its adoption and led to greater difficulty in its implementation and further usage. The

implementation was quiet involving and required cooperation between vendors, project teams and the management. For instance SAP R/3 has more than 3000 configuration tables and one can spend more than a year to go through the tables.

Further Otieno (2010) indicated that lack of confidence, Insufficient training and knowledge led to ERP failure and the use of foreign experts in implementing the systems as well as reliance on their headquarters abroad often led to lack of confidence in ERP consultant. Lack of skills by both users and high staff turnover compromised lack of capacity to cope with ERP. This study did not address the competency of the human resource in handling the ERP system but instead highlighted why the systems failed where they were implemented, the current study has detailed the competency of the human resource in the usage to enhance data accuracy in the examination processes.

From the reviewed literature, the following gaps were identified. Kajuna (2009) focused on the nature of technology available implementation at the University of Dar es Salaam and the findings revealed that although there were significant efforts and positive attitudes toward the use of computers in learning and teaching, the process of technology integration at the university faced impediments that affected its effectiveness. The impediments included lack of enough computers, absence of sound computer knowledge and skills of teachers and students so as to effectively integrate technology into learning and teaching, absence of adequate and effective teachers' professional development the programs on technology, and lack of effective technology planning and technology plans. However this study used telephone interviews hence it could not provide concrete evidence the current study filled the gap. Otieno's (2010) findings revealed that

the company leaders were not qualified to use the ERP technology due to insufficient training and knowledge that lead to failure and using of foreign experts in implementing the systems and Muscatello (2003) showed how the companies rectified training deficiencies to assist in the installation of ERP. This study had high level of ICTs incompetency the prompt training. The current study majored on ERP competency to enable implementation that enhanced data accuracy.

2.5 The role of ERP for data management

The white papers (2010) indicated that the role of ERP was to reduce duplication and improve efficiency, although it also eliminated errors, conflicting data, and reduced administrative costs. In addition, the systems requires that entering data is done at once for the most accurate and up-to-date information is availed to front-office and back-office at the same time so as to improve efficiency by reducing the need to redo work due to erroneous information. An integrated system eliminates this type of error. As universities look forward to improve the efficiency of their operations, they are turning to ERP technology for a solution to play thee role of providing security on examination data.

2.5.1 Data Confidentiality and Centralization

Pollock, (2005) showed that ERP when applied to all aspects of an organization attempted to bring together unrelated functions under the umbrella of one system. One notable aspect of previous university systems was that they were kept within the domain of the centralized

administrationthat had little influence on the primary functions of universities and their chalk-face workforce. Wang (2011) reported in a case study that ERP SAP was utilized as an ERP software tool for illustration of the case. The purpose of the study was to provide guidelines for ERP researchers, practitioners and academia to better understand object reuse and integration in ERP systems. Wang (2011) also focused on ERP systems and their centralized data storage and object reuse in large organizations. The study revealed an illustrated ERP infrastructure and components on 12 application modules of SAP that are used to centralize data in the USA. He indicated that twelve application modules were organized into the four categories in SAP which included modules like Financial Accounting (FI), Controlling (CO), FixedAsset Management (AM) and Project System (PS). The logistic modules include Sales & Distribution (SD), Material Management (MM), Production Planning (PP), Quality Management (QM) and Plant Maintenance (PM). The Human Resources (HR) module supports human capital management (HCM), payroll and the planning and control of personnel activities. The Common Systems modules include Workflow (WF) and Industry Solutions (IS). Work flow integrates the functionality of these application modules and centralizes all the information in the specific organizations.

Further Wang (2011) indicated that each application module in SAP was a collection of a number of related business process procedures (BPPs). Business warehouses provided users with centralized historical data to identify trends, patterns and provide business solutions to decision makers in organizations. For instance Heidelberg composite in German merged with Frankenstein bikes to form global bike incorporation which integrated a shared service services model in a centralized process. The study revealed that unlike other computer applications, ERP

has the multi-disciplinary scope of enterprise system concepts that required internal cross-disciplinary coordination, ERP was a set of large and complex database and data warehouse applications that provide the data necessary for the enterprise business processes and all ERP systems are heavily dependent on centralized data repository. Wang (2011) further reported that the central repository of information allows authorized users to access the same information in one location using an ERP system. This feature allowed for one version of information to be used. With the central data repository comes the decline of data redundancy. The data was kept in one location where all authorized users had access. Having one central place for the information to be stored reduces the likelihood of human error of not using the correct information for future transactions. This study focused on data centralization from multiple business application and lacked research design, study population, sample size and data collection methods.

A study by Pollock (2005) focused on the contribution of ERP in reshaping of universities and how the systems are being reshaped for universities and why universities are adopting ERP. The universities in London wanted to depart from traditional computer systems strategies since ERP translates easily across boundaries. The appropriateness of ERP in higher education was indicated in capturing and integrating the full range of activities and transactions across the organization. The study focused on ERP as a 'generic' and 'global' solution and showed how this presents universities with particular sets of issues regarding the control and shaping of their systems and ultimately their institutional and organizational autonomy. The report is based on an ongoing programme of academic research on the reshaping of universities and the role of Information & Communication Technologies (ICTs) within that reshaping process. The study

conducted ethnographic research over a four-year period at a large red-brick university in the UK, and at SAP, the large German ERP supplier, as well as the associated higher education 'user group'. This study lacked the design, target population, sample size and methods of how data was collected and did not specify the re-shaping in the universities with the use of ERP.

Ranganathan and Brown (2006) suggest that the use of a centralized data repository in an ERP system result in an integrated database for multiple functions and business units, providing management with direct access to real-time information at the business process, business division, and enterprise levels. The studies' shortcoming was that, representativeness of the sample was not clear because the total respondents were not indicated and the research design and data collection procedures were lacking. Carton (2000) focused on attributes related to the implementation of ERP such as centralization and integration attributes and use of information technology control to make information accessible to be understood in south Africa. Data was collected using interviews with 76 managers from different functions affected by the implementation of ERP. Interviews were carried out using semi-structured format. Observations from transcripts were extracted. The study revealed a strong linear relationship between centralization and integration. That is, the stronger the consensus around the need for a centralizing forces in the organization, the stronger the perceived need among managers for integration.

Based on field work involving two multi-national manufacturing companies, Carton (2000) proposed a framework for ERP integration, which describes the evolution of functionality gaps as an ongoing and inevitable process that requires management. The objective of this research

was to propose a framework which would allow the question of integration to be modeled alongside other related organizational attributes. The research objective was operationalised into three separate research questions which together yield a picture of the scope of integration in the organization, and a suggestion for the interdependence between integration and other organizational attributes. In this research, two case studies of successful multinational companies (KPC and SIT) were used to explore the impact of integration on the organization. Both cases studied are multi-national manufacturing organizations with mature ERP implementations.

Further Carton (2000) included both core operational and support functions, as ERP is inherently an administrative (support function) tool, yet its impact was most felt at the transactional level (operations). The data from interviews regarding ERP impact was classified with respect to organizational parameters, and these parameters had been identified as seed categories from the literature, but other themes also emerged from the analysis of managerial perceptions. The seed categories included themes such as centralization of responsibility, standardization of processes and gaps between template process and reality. Business processes were used to analyze findings as an embedded unit of analysis, in order to better identify areas of the organization where the integration impact was most strongly felt. Interviews with managers from both cases were carried out in the period from April 2005 to August 2005 and involved meetings with 76 managers from different functions affected by the implementation of the ERP system. SIT had gone live on their ERP system in October 2001, so these interviews reflect the views of managers using a relatively mature system. Interviews were carried out using a semi-structured format, and each interview lasted one hour. The interviews were recorded and transcribed,

yielding over 400,000 words of raw research material. A robust coding methodology was applied to reduce the data and avoid paralysis by data analysis.

Observations done by Carton (2000) indicated that transcripts were extracted to a matrix structured by research question, yielding a total of 3,202 observations. Cell entries were either abridged versions of the original quote, summarized to capture the issue raised. Using hyperlink functionality between Microsoft Excel and Word, each extracted observation was linked back to the original transcript, thereby retaining richness and avoiding "too thin cell entries. These results revealed a strong linear relationship between centralization and integration. This study was interested in multinational manufacturing companies and not academic institutions. Interviews were carried out using semi-structured format that increased the data unreliability.

Spectrum Tech (2013) reported that Education establishments mainly depend upon technology to manage student data. students reports like admission list, class wise, area wise, profession wise, student address report, ID card, label printing, and admit card printing and that Student information systems provided capabilities for entering student records and other assessment. centralized of information in an institution made student schedules, tracking student attendance, and managing many other student-related data needs in a school accessible and ERP has emerged as crucial aspect of Educational Institute. The product included a Intranet and Web-based suite of applications and some of the sub systems are Administration Management, Student and Staff Information Management System, HR Management, Academic Management, Student and Staff Attendance Management, Library Management, Inventory, Internal Assessment Management,

Alumni Management, online dashboard etc. This study hardly had information on the nature of data collected and the sample size for the study.

From the reviewed literature, the following gaps were filled Pollock (2005) focused on the ERP functionalities and on the contributions of ERP in reshaping universities and how the systems were also being re-shaped and why universities were adopting ERP. The study had no clear number of participants and how data collection was done and reshaping with ERP was not clearly specified.

Wang (2011) focused on the provisions of guidelines for ERP researchers, practitioners and academia. Auganathan and Brown (2006) focused on centralized data repository in the ERP system, the studying had no clear procedure for data collection and lacked research design. Carton focused on attributes related to the implementation of ERP such as confidentiality and centralization, used interviews trhat were semi structured and observation. The study lacked clear sample size and design and it was conducted on multi national manufacturing companies. The current study filled the gaps by conducting the study on univesrites and it had a research design, clear methods of data collection and specified the role of ERP in centralization of data for improving confidentiality of data.

2.5.2 Data Consistency and Standardization

ERP systems have the potential to contribute to standardization and integration of organizational data through an off the shelf solution. In practice results of ERP systems implementation has varied greatly. Considering their implications on business processes and the complexity of the

systems this should not come as a surprise. (Holmström,*et al* 2002) in their study in a diary industry in Sweden addressed the question of how to make use of Enterprise Resource Planning (ERP)systems in companies in the process industry where there was a pervasive need of process standardization. They reported that ERP systems had the potential to contribute to the standardization and integration of organizational data through an off-the-shelf solution, that the ERP systems implementation had varied greatly and ERP systems not only imply standardization of data but also standardization of key processes in the company.

Holmström,*et al*, (2002) described a case study of the Swedish diary company Norrmejerier and the implementation of the ERP system as analyzed from a perspective of complex system and standardization. The use of IFS at Norrmejerier can be characterized as a loosely coupled integration with the ERP system as a central integration facilitator. This solution allowed thecompany to make use of standardization benefits, filling the need of special functionality and at the same time limiting the negative unexpected consequences such as decreased activity support and increased complexity. The key contributions of this study was that it showed how ERPs contributed to standardization and integration efforts in IT environments with peculiar demands on functionality. Secondly it demonstrated how negative side effects related to implementation of ERP systems can be managed and limited. This research is based on an interpretive epistemology where people's impression and understanding of their world are at center stage (Walsham, 1995).

The data used by Holmström,*et al* (2002) was generated by semi-structured interviews conducted with seven persons, two of whom were working in the IT consultancy business, and five at

Norrmejerier. Interviews with a limited number of respondents that yielded qualitative data was chosen due to the explorative character of the research question. Further on a relatively small number of persons were judged to possess deeper insight into the research area at the organization in question. This led to the conclusion that the interpretive paradigm, and a deeper examination of the experiences among the key-respondents, would be the approach best fitted to help answer the research question at hand. The selection of respondents was based on specific requirements in different parts of the research project.

In the beginning a basic understanding of the nature of ERP systems and Norrmejerier's business were judged to be important which resulted in interviews with a wide perspective and respondents suited to provide this knowledge. As data and knowledge of the author were generated respondents with more specialized knowledge of systems and processes were chosen. Before the data was generated somewhere between five to ten interviews were judged to be a suitable sample size. As it turned seven interviews were deemed to provide enough material since the relevant new knowledge gained from respondents was dramatically decreasing. The interviews lasted between 30 minutes and one and a half hour and where performed at the respondents' work place. All but one that provided deeper understanding of the issues but not directly relevant material for the study of them where later fully transcribed in order toenable a broad analysis of the impact of the systems and minimizing the risk of neglectingrelevant information. In the analysis phase the transcribed material was read through at least two times and then divided into four different categories; standardization, integration, effects on processes and the ERP infrastructure, (Holmström,*et al* 2002).

The case study by Holmström,*et al* (2002) described how an ERP system was used as a platform that provided integration and standardization of data and processes, rather than a fully integrated IT solution. Hereby the system played an infrastructural role, enabling other more specialized systems to use standardized and quality secured data while they provide the needed functionality. The ERP system thus contributed to data quality improvement, integration, and a process-based mindsetin the company. At the same time negative side effects seems to have been limited. Apre-requisite when creating this solution was the modular structure of the ERP system that allowed a less complex system and hereby reduced possible side effects. This study illuminated the importance of reducing ERP structure complexity and the importance of modularity when struggling to achieve this. While the modular architecture at Norrmejerier satisfied functional demands for the organization, negative organizational side effects typically associated with ERP use were also limited. Moreover, the ways in which Norrmejerier's system played a role in the standardization of processes throughout the firm had a pervasive effect on the organization and its performance. Implementing the ERP systemwas not only an issue of IT; it was also about implementing processes.

More than anything else the modular architecture helped to limit the side-effects of the technology as the modularity enabled Norrmejerier to act in order to contain undesired side-effects. The main contribution of the paper is that it provides an example of what seems to be asuccessful implementation of the ideas. Applying this thought on ERP systems seems to be one way to decrease complexity related problems, decrease the risk of reflexivity issues and away to make use of ERP systems despite organizational process deviations from the model this study. However the number of respondents in this study was not made explicit beforehand. Instead the

aim was to gather enough data in order to be able to make a relevant comparison in respect to the research question.

From Holmström,*et al* (2002) One limitation of the data set is that none of the respondents from Norrmejerier worked directly with the production process, the reason being a focus of the research on organizational effects rather than on user centered ones even though a clear distinction between the two of course is hard to make and practical limitations. This might have the effect that perceived disadvantages in the form of system rigidity and limitations imposed on users is not as clearly stated as they would be otherwise. As mentioned the study however focused on organizational impacts and on this level these problems does not seem to have been a major issue. This study was conducted on the Swedish diary company Norrmejerier as a case study that could have restricted data collection and the number of participants was low. The study also used only interviews as a method of data collection that could be biased in their conclusion.

A study has reported that the ERP infrastructures are made up of standardized interfaces and standards constitute a condition for infrastructures rather than bilateral arrangements (Ciborra 2000) and hence creating infrastructures is never done in a vacuum, in some way they are always linked to what already exists, the installed base. The installed base implies that infrastructure is not something that can be easily changed in a radical way. The installed base has to be formed or linked to the new infrastructures and actors wanting to make use of it (Davenport 1998, Hanseth 2001).

Further still the studies revealed that ERP systems functionality and organizations were able to integrate all functional units, standardize and manage information sharing within their entire departments and then extended it to suppliers and customers in order for suppliers to expedite the delivery of necessary raw materials and also in order for customers to place an order faster and smoother. For example, Turban (2008) reported that Northern Digital Inc. implemented ERP system from Intuitive Manufacturing Systems which provided a level of ERP system functionality that could immediately improve inventory management, expandability of entire system, and flexibility in the whole supply chain in order to support the company in current competitive business environment. These studies concentrated on the functionalities of ERP systems in the business enterprise and lacked the sample size, design and did not specify the role of ERP in the business enterprise.

The white paper (2000) reported that standardizing and automating business processes locally as well as across multiple locations and countries was done to accelerate business operations. This offering a fully integrated suite of business management applications that share a common dataset and extending these applications over the Internet, allowing visibility and collaboration across departments, as well as with customers, partners, suppliers, and remote users. ERP solutions improve efficiency by automating business processes, furnishing integrated applications that share data to give employees instant access to the information they need, and by providing business intelligence and analytics to improve decisions and planning. The Standardized processes accelerated operations manual processes that was considered to be tedious and time-consuming, and employees could easily miss vital steps or provide customers with an inconsistent experience and that why, according to Aberdeen, the majority of "best-in-

class" companies (54%) were looking forward to use ERP solutions to standardize and accelerate business processes. Additionally the study reported that ERP solutions standardize and accelerate processes through automation, which ensures that processes are performed efficiently and correctly. Alerts warn managers of exceptions so they can address any issues proactively. This study did not inform on what standardizing the processes using ERP did to make it efficient but dealt with its functionalities and it focused on business processes and not academics.

Rico (2000) in his survey on ERP in institution of higher learning especially in the university of Wisconsin-superior and Wisconsin technical college focused on technical details of adopting and integrating ERP solution into university environment. The study examined the top reasons for universities that included replacing of legacy systems, improving customer service, transforming enterprise processes, modernize computer systems, improve administration and increase operating efficiency. The study revealed that the top reasons why universities adopt ERP solutions were to replace legacy systems, improve customer service, transform enterprise processes, correct year 2000 problems, modernize computer systems,improve administration, maintain competitiveness, increase operating efficiency, and adhere to regulatory compliance. Serving its primary purpose was three in depth case studies of ERP implementations in a small, medium, and large university. In particular, it examines ERP at the University of Wisconsin-Superior, the University of Massachusetts, and the Wisconsin Technical College System.

What was learned from these Rico (2000) was that ERP implementation served several primary purposes with the objectives of replace expensive custom systems with off the shelf solutions, exploit the accessibility advantage of the Internet, and integrate and automate a single

standardized solution. The cases focused on the technical details of adapting and integrating ERP solutions into the university environment. Little attention was placed on strategic planning, organizational culture, and use of disciplined project management principles.

King, Kvavik, &Voloudakis, (2002) studies reported that the benefits of ERP solutions were that an ERP project was good for one's career; the new systems offered improved services for faculty, staff, and students; administrative, academic and student data are standardized; university data is globally accessible over the Internet; and the new systems involveless cost and risk than legacy systems (Kvavik, Katz, Beecher, Caruso,King, Voludakis, & Williams, 2002). These studies did not examine the specific areas of implementation and the efficiency of ERP in academics especially standardizing data. The current study considered standardizing data as one of the roles of implementing ERP in managing academics in universities.

Shang and Seddon (2000) reported that ERP assisted universities to achieve a variety of benefits such as reduced operating costs, accurate demand forecasts, managers improved decision making and better resource management, greater support for alliances, building innovations and cost leadership, IT infrastructure, building business flexibility, reducing ICT costs and organizational benefits, supporting organizational change, facilitating business learning and empowerment. This study did not consider the benefit of ERP in bringing standardization across a variety of organizational functions of which the current study filled the gap.

Following the information from reviewed literature, the following gaps were identified. Holmstrom et al (2002) conducted the study on Norrmejeries dairy company in Sweden and

focused on the use of ERP for standardization however the number of respondent was not explicit and none of them was from of Norrmejeries dairy company and focused on organizational impacts. Ciborra (2000), Davenport (1998) and then sethet (2001) concentrated on the functionalities of ERP Systems in business enterprise and not how ERP provided the safety of the data, the studies had unspecified participants and no procedure of how data was collected. The White paper (2000) findings indicated that ERP standardized and automated business across multi locations and countries but it had no clear way in which data was obtained. Rico (2000) focused on technical effects of adopting and integrating ERP solutions.K, ng, Kvavik of voloudakis ([2002) indicated that ERP was good for career and its standardized data but this study did not have specific areas of implementation and efficiency in academics. The gaps were filled by the cureent study that greatly emphasized the role of ERP in standardizing data.

2.5.3 ERP use in Accessing Students' Data

Access of students' data in the management of academic affair is very crucial. Data that is accessed quickly improved on efficiency. The ERP project facilitate web access to all student records, replacement of custom legacy systems with off the shelf solutions required less internal software maintenance effort. Spectrum Tech (2013) revealed that ERP creates zero redundancy, Secure shared and personalized web based service. Management could access students and staff data, department data, school data from personal login ID as per authority defined.

Brazel (2002), examined whether ERP system implementations had affected the extent to which firms manage earnings amounts and release dates. This study found out that there was a positive relationship between the extent of ERP module adoption and the extent of earnings management.

With respect to earnings release dates, firms with incentives to increase the timeliness of their release dates experienced a decrease in reporting lag after implementing ERP systems. The study developed and tested hypotheses that ERP implementations influence the degree to which firms manage earnings and the timing of their earnings release dates and whether the extent of ERP module implemented adoption magnifies these effects. To test the hypotheses, the study obtained a sample of ERP system adoptions from a proprietary data set of license agreements maintained by an international ERP system provider was obtained consistent with prior research.

Brazel (2002), used the absolute value of discretionary accruals and the reporting lag between fiscal year-end and the earnings release date to measure the extent to which adopting firms manage earnings and release dates. The dataset includes the name of the firm that purchased the license, the start date of implementation, the date when the installation was complete and the system went live, and the modules (e.g., financial accounting, human resources) that the firm implemented. This dataset is used for real operational decisions at the ERP provider. This study was conducted on 625 unique firms that purchased the ERP system and started the implementation process between 1993 and 1999. The average implementation period was 1.73 years. The study sampled these firms on COMPUSTAT by firm names, and 315 firms that did not have Ticker IDs were removed from the sample. This study, investigated whether ERP implementations positively affect the management of earnings and earning srelease dates using a one-group pre and post-test design. The chief advantage of such a design is that it allowed for adopters, in the pre-adoption phase, to serve as their own control group to evaluate post-adoption effects.

This study of Brazel (2002), considered the perception of the respondents who were also not clearly indentified. Data collection methods were not stated hence there was no clear ways in which data was obtained and the way sampling was done could have easily left out the firms that had the required data for the study. This study is subject to several limitations. Although the data was very accurate, there was a selection bias because it was obtained from only one primary provider of ERP systems. This limitation suggests caution in generalizing the findings of this study. Also, in the development of our earnings management hypotheses, the study relied on prior research indicating that the safeguards of audit and internal control may have been suspect during the period of study.

Allen & Kern, (2001) found out that, ERP enabled universities to consolidate disparate data and legacy systems and adopt best-of-breed processes and modern technology. As different departments across an institution share an integrated database, end users can access data in real time. Best-of-breed information technology such as web technologies, mobile phones, and on-line services offer additional benefits not only to the administration within an institution, but also to people who constantly interact with the institution faculty, students, and staff to observe their progress. The study had unspecified scope of respondents and limited itself to the success factors of implementing ERP and not the areas where ERP was implemented to ehance efficiency.

Rico (2000) examined the use of enterprise resource planning (ERP) solutions by institutes of higher education. In particular, this study examined the cost, technical, and customer risks of implementing ERP solutions by universities. ERP is an information technology solution that

integrates enterprise functions such as planning, financials, sales, purchasing, human resources, logistics, customer service, and manufacturing. For universities, ERP is an information technology solution that integrates and automates recruitment, admissions, financial aid, student records, and most academic and administrative services for easy accessibility of data. This study examined three successful cases from small, medium, and large universities, and numerous problematic ERP implementations. In doing so, this study laid a foundation for a general management framework for implementing ERP solutions in institutes of higher education for easier access of data.

Rico (2000) also examined the use of enterprise resource planning (ERP) by institutes of higher education. In this context, ERP was referred to be used of commercial solutions for both administrative and academic purposes by universities. Typical administrative functions may include human resources, accounting, payroll, and billing. Academic functions include recruitment, admissions, registration, and all aspects of student records. The study finding on Georgetown University showed that the award winning alumni system now served over 30,000 students. Financial aid and admissions were successfully automated with PeopleSoft. In addition Louisiana State University implemented an award winning ERP system 1996, which now serves over 45,000 students (Ethridge, Hadden, & Smith, 2000). Course listings, libraries, human resources, e-mail, campus information, public relations, registration, admissions, and other campus functions were successfully implemented using Lotus Domino Notes.

Again Rico (2000) indicated that the University of Nebraska-Lincoln successfully implemented an ERP system for recruiting and admissions for it's more than 22,000 students using, Talisma

(Gaska, 2003). Gaska reported that the University of Houston successfully implemented an ERP system in 1995 to serve 51,000students using PeopleSoft for recruiting, admissions, registration, student records, and administration. Gaska indicated that Florida Southern College successfully used ERP software from Jenzabar for an online registration for its 2,500 students. Gartner estimated that 80% ofuniversities with more than 1,000 studentshad implement ERP systems by 2005 (Rivard, 2002).These studies virtually considered all the functional areas of the universities and did not address the efficiencies of the ERP implemented instead it was the large numbers of students that propelled them to implement ERP. The study did not consider the use of ERP for management purposes but to serve the interest of large number of students in terms of recruiting, registration and student records.

Studies found out that ERP solutions improved efficiency by automating business processes, furnishing integrated applications that share data to give employees instant access to the information they need, and by providing intelligence and analytics to improve decisions and planning. Examination results in term of provisional results approved by School of Graduate Studies and degree certificates could be accessed from personal login ID as defined. ERP marked the current generation of resource planning and is a central system, which replaced "islands of information" with a single, packaged software solution that integrates all traditional enterprise management functions that is finance, human resources management, project management, data management, warehouse management, customer relationship management, supplier relationship management, e-business and the internet function (Marchand, Kettinger and Rollins, 2000).

Jutras (2004), reported that ERP systems used database technology and a single interface to control the all-encompassing information related to a company's business. Along with functionality for enterprise and supply chain management, Jakovljevic, (2004) reported that ERP was typically associated with the use of client/server relational database technology and mainframe operating systems that is applicable to universities in accessing data. The studies did not have a clear sample size and method of data collection and they limited themselves to operationalizing the systems than determining their efficiency.

King (2002) in his study reported that ERP in universities improved information access for planning the business. The benefits include the following: campus wide integration on a common and managing the institution, improved services for the faculty, students and staff, lower business risks, and increased income and decreased expenses due to improved efficiency.

Sabau (2009) in study on an evaluation framework for higher education ERP systems provided that ERP benefited the universities in terms of business and technology. The systems improved internal communications, reduced or eliminated manual processes; enhance strategic decision making and planning capabilities, establish a self-service environment for employees, improved self-service environment for students and faculty, enabled higher availability of administrative systems; support sophisticated data analyses for use in decision-making; integrated workflow, industry best practices, and reduced dependence on paper. The Technical benefits included the following: reduced or eliminated the need for backup or shadow systems; platform for re-engineering business practices and continued process improvements; developed and maintained consistent data definitions; provided accessible, user-friendly administrative and student support

services; increased data integrity, validity and reliability, assure system wide security and protection of confidential information, create a more seamless integration between technology and education delivery by providing a single platform based on new technologies, access to data in real time. These studies were not clear whether the sample was drawn from one institution or several and the criteria for the selection was neither given nor justified. The respondents were also not categorized. Also the study solely focused on the business and technology benefits of ERP and not the management of the organization.

A study by Hitt, Wu, & Zhou, (2002) done on the University of Pennsylvania and Drexel University identified financial measures for ERP implementations and another study on California State University identified operational measures for ERP implementations in 23 campuses with 400,000 students. These studies showed that Fortune 1000 firms that implemented ERP systems exhibit high levels of financial performance and that Wall Street rewards Fortune 1000 companies that implement ERP systems with high market valuations in the universities under study. California State University developed a balanced score card in response to state level congressional pressure to establish and achieve progress towards a series of technology policy goals andUWS used PeopleSoft's Admissions, Student Records, Student Financials, and Financial Aid Modules. It also used First Logic to format addresses to minimize the entry of redundant studentrecords. UWS automated recruiting, admissions, schedules, registration, grades, fees, payments, grants, loans, and lending. The studies had no clear sample size and specific respondents. These studies had no clear selection of the population to the studies. The study focused basically on costs for implementation and not on the efficiency in data access.

The findings from studies showed that Kenyan universities are in a position to implement enterprise systems to facilitate their operations. They however noted that universities need to allocate more funds to systems implementation if they have to successfully implement enterprise systems which generally require more resources than ordinary software applications. It was established that Kenyatta University (KU) has implemented multiple integrated Management Information Systems (MIS) which include: UNIPLUS for registration (allowing students to register online), student finance (allowing students to check their fee balance online), and examinations (allowing students to check their results online); the Sage Accpac Enterprise Resource Planning (ERP) system, which integrates all financial data and processes of Kenyatta University into a consolidated system; the Human Resource Management Information System, which captures staff records and staff-related processes (Saide& Ruforum, 2010).

According to Saide And Ruforum (2010) the impact of the Management Information System on Kenyatta University was that it accomplished the following: Financial gain of $4 million a year as a result of being able to track student non-payment of fees; an increase in the number of graduates as administration systems now contain less room for human error, prevent against loss of student records and enable quicker processing of marks; improved efficiency for lecturers who are able to enter examination marks electronically as soon as they are available; and improved institutional expansion strategy enabled by increased fee collection. This study employed a case study approach which could be biased in the conclusions. This study also failed to specify the respondent sand did not provide information on how data was collected.The following gaps were identified from the above literature. Brazel focused on ERP implementation and its effect on the

firm management of earning and release dates .it was not very clear on how data was obtained, failed to consider the perceptions of the respondents.

Allen & Kern (2001) had unspecified respondents and failed to clarify how ease data could be accessed. Spectrum tech (2013) had no information on the nature of data collected and sample size, it failed to clarify how the technology in place eased the access of student data. The several products of the intranet and web based suits of applications did not include the ERP systems to access the students data. Rico (2000) considered all the functional areas of the university and did not address the efficiencies of the ERP System implemented. The study had no clear number of participants and research design. King (2002) concentrated on the benefits of ERP. Sabau,(2009) enumerated some of the business and technological benefits of ERP in higher education. The study was not clear on the number of respondents involved in the study and it had no information on how the data was collected. Hitt, Wu Zhon (2002) did their study on major universities in the USA but the study focused on the financial resources and valuations of ERP as the basis of implementation. This study also lacked a clear sample size and research design of which the current study filled the gaps.

2.6 Applications of ERP and timely data management

The purpose of ERP is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders. This software, used by many enterprises, particularly by multinational corporations, had a critical role in ensuring increased efficiency. The application of ERP within higher education is a notable departure from traditional computer system strategies that are easily threatened. In order to carry

out basic administrative functions institutions have typically relied on small systems which were often developed in an ad-hoc manner and maintained by in-house specialists. Sometimes such configurations were supplemented with the 'bolting on' of other packaged software purchased from software houses but these tended to be relatively small and inconsequential and usually remained well within the control of the technical for the safe keeping of information.

Before ERP systems were implemented each department in an organization would most likely have their own computer system, data and database. Unfortunately, many of these systems would not be able to communicate with one another or need to store or rewrite data to make it possible for cross computer system communication. For instance, the finances of a company were on a separate computer system than the HR system, making it more intensive and complicated to process certain functions. Once an ERP system is in place, usually all aspects of an organization can work in harmony instead of every single system needing to be compatible with each other.

Rudy (2010) in his study reported that Enterprise Resource Planning (ERP) Systems had the potential to streamline Information flow processes but the costs of implementation were high. Despite the high costs the benefits of efficient flow of data and reporting functions were considered more valuable to commit the costs. The study focused on success factors that are claimed to aid the success of an ERP implementation processes in a large aerospace and defense company. The company used SAP to handle data flow related to accounting, finance, manufacturing and procurement, The study revealed that strategic implementation of ERP required operation resources and technical knowledge to allow data flow. This study lacked clear sample size and had unspecified respondents, it had no information on how data was collected and there was no evidence of the type of information that was to flow across the sub divisions.

The study was conducted in a large aerospace and defense company and the study was not in alearning institution and the study was silent on whether ERP aided the success of the company.

Vajargah (2010) conducted a study on the application of ICTs in higher education in the case of Shahid Beheshti University in Tehran in Iran. This research was conducted at the National University of Iran, the second largest university in the country. The research population consists of the university academics and students. A questionnaire was administered for collecting the data.

The research of Vajargah (2010) was conducted at the Shahid Beheshti University (SBU) the National University of Iran, during the 2006-7 academic years. Also is one of the two best and largest universities of the country. The Research population consisted of the three major groups: University academics, curriculum planners and ICT`s professionals. The population of university professors was 578 working at the 16 faculties and researchcenters. Due to the large size of population as well as impossibility of conducting the survey with participation of all academic members of the university and also shortage of resources and time for the investigators, a sample selected using stratified sampling technique n=231 was done. Due to the small size of other sections of population (23 for curriculum planners and 18 for ICT`s professionals) all of them were requested to participate in the study.

The research of employed a survey research method using a questionnaire designed through a documentary study on literature of ICT application in higher education. The study reported that web-based presentation of curriculum before and during the semester was done using email in teaching and learning activities, Web-based diagnostic, formative and summative assessments,

using supplementary soft wares for effective teaching and learning, designing a dynamic feedback system, Producing digital unlimited leaning materials (e-books, handouts) were some of the activities of ICTs. Using digital libraries and internet-based information for enrichment of curriculum content and process, Sharing and exchanging learnings and experiences among university professors working inside and outside the university, including students' interests and needs in curriculum decision-making through web based needs assessment. The research overlooked the implementers of the curriculum and did not clarify on the types of ICTs applied. No clear information was given on how the ICTs facilitated information flow in the university. The study focused on teaching and learning and was silent on the management of academic affairs using technologies.

Kajuna (2009) conducted a study on the university or Dar es Salaam and purposed to investigate and evaluate the nature of technology implementation in classroom practices at the UDSM, which is the major center of higher education in Tanzania. The research looked at what technologies were available, strategies that were employed to implement the integration of technology in the university curricula (teaching and learning processes), the stakeholders' perception of their knowledge and skills of technology use, training programs and technology plans. The research also used Stages of Development technology model to generally determine the stage of technology integration at UDSM.

There is potential of technology had indicated by numerous people, Valdez (2004) observed that technology offers many opportunities to improve learning and that it has the potential to provide people in their own homes and work settings with access to knowledge and learning resources

possible until recently only in very large universities. Furthermore, he argued that technology had the potential to make everyone a producer oforiginal knowledge that can be shared with the world at very little cost. On its effectiveness in classroom practices, Franklin (2000), Blankson (2004) observed that technology in education promote new learning environments in which enquiry and problem solving increase student achievement. Hansen (2003) highlights the importance of technology in teacher preparation, pointing out three benefits. Firstly, technology can be a powerful tool for helping individuals achieve personal and shared goals. Secondly, technology alleviates human suffering and promotes social justice to help people make a difference in their worlds. Thirdly, people must have knowledge and skills to evaluate and decide appropriate courses of action when confronted with problems.

According to Barron (2003), technology provides an excellent avenue for student motivation, exploration, and instruction in a multi sensory diverse world. They further argued that technology touches more aspects of our daily lives. They observed that the integration of technology into the school curriculum was no longer a luxury, rather "it is a means to survival in the future that will be driven and supported by technology"

The findings of Barron (2003) revealed that there was no doubt that integrating technology is very valuable in the process of learning and appeals to many aspects of students' learning. In short, technology integration in education provides students with ample opportunities to benefit from and manage their learning while it facilitates the teaching process. The benefit can be looked at from a wider perspective outside classroom situations. These from the teachers' perspectives, the benefits were that the use of technology saves time, enables good storage of

knowledge, makes students understand better, makes learning interesting, gives wide knowledge on many subject matters, makes teaching effective, enhances instructional presentation, and makes it easier to deliver knowledge toa large number of students. These conceptual beliefs were obtained from the written interviews. From the telephone interviews, the responses were almost the same except that they were more elaborate.

According to Barron (2003) one of the benefits of using technology in learning was that you could involve alot of people. For example, technology could be used to teach large classes and also people get more information on their own instead of taking information from the teacher. Technology facilitated the implementation of the program in the teaching and learning process and also the facilitation. The use of technology when teaching large classes came up from another teacher who indicated, the benefit of using technology in relation to large classes, that you could teach a large class many things at once and that if illustrations are used it would be easier for students to copy them, than when they are shown on the chalkboard. The responses of teachers revealed that teachers perceived the use of technology in teaching to have significant advantages and impacts on their students.

Further Barron (2003) revealed that there were concerns about large classes at the university to be discussed. The students were positive about the use of technology in their learning. They stated they used computers in their day-to-day learning and indicated the presence of numerous benefits of using computers. The benefits that they indicated included the technology facilitates better learning, helps them in solving many problems, helps to learn easily, makes learning interesting, makes learning more interactive, gives access to different resources of knowledge

and to a lot of information, saves time, gives access to current and up-to-date information, and helps in an easy search for learning materials. The benefit of technology helping in searching for materials or information recurred more frequently than other benefits, suggesting that students use computers more for searching for information on the Internet.

These findings on the concept and benefits of technology integration suggest positive viewpoints and the appreciation of what technology brings in the process of learning. It suggests the presence of motivation, awareness, and positive attitudes by implementers in striving to use that technology in the educational process. Having a positive attitude and appreciating the benefits of integrating technology in the process of learning/teaching were the indications that teachers and students were positive about the process of technology integration. This demonstrated that the respondents were aware of the trend of information technology in this information age. Both teachers and students realized what computers could bring into the environment and processes of learning and teaching.This study was limited to interviews as the method of data collection and overlooked the other methods which increased biases in their conclusions. The type of technology used in learning was not specified and there was hardly any details of how ICTs were used to management the academics in the university (Barron, 2003).

Leena (2008) focused on improving internal information flow in the case company. He examined the possibilities of improving the internal information flow, the current and improvements. She reported that organizational communication and efficient information flow are a crucial part of any organization's operational process without information flow no financial or material flow can exists and having a well organized information flow provided a competitive advantage to an

organization through reduced costs, improved service and more efficient processes. Computer based information systems such as ERP facilitate the information flow. The software integrates data and process into a unified data base which contains information from top managed, financial, academic, administrative and human resource and decisions support systems, ERP enabled real time sharing of information throughout the organization and support its process. several ways in which the information can move in an organization with the most important route for communication being vertical flow, there is also horizontal and free flowing communication. The information needs to travel efficiently between departments in order to facilitate planning coordinating and managing the processes such as communication and flow of information are made efficient within the application of ERP in university were mentioned. The study used case study approach that allowed the use of both qualitative and quantitative information however the study lacked clear sample and clear methods of data collection and the case study approach was restrictive on the data. Also the study mainly emphasized on data flow in the case company and failed to show whether it was efficient.

Studies have shown that Kenyan universities, just like other institutions elsewhere in the world, are implementing various information systems to facilitate their operations. They include ERP systems which are implemented to enhance institutional management given their abilities to standardize, streamline operations, and integrate business processes (Nyandiere, Kamuzora, Lukandu & Omwenga, 2012). In their study, Nyandiere (2012) established that Kenyan universities had mainly implemented systems for finance and accounting, student admissions, examinations management, and library services to promote data flow. The authors also

established that there were no significant differences in information systems needs among Kenyan universities, but there were significant differences in strengths and weaknesses among the private and public universities in the capabilities of systems they had implemented. This study employed a case study approach that could affect the authenticity of the findings and it failed to indicate the number of participant and methods of data collection.

A study by Makokha (2013) purposed to examine the implementation of ERP system in Kenyan public Universities. The research designs used was descriptive survey designs. Th target population was 115 staff and the study sample consisted of 60 staff. The study used questionnaires and interview schedules as research instruments which were given tothe specialist in the Department of Business Management in the School of Human Resource Development whose views were incorporated in redrafting the final instruments. Both qualitative and quantitative data were collected and analyzed. Analysis of data collected was done using regression, correlation and descriptive statistics.

The study findings revealed that 85% of implementation of ERP system is accounted for by integration in Human Resource, Finance, Procurement, Students Affairs and Computer Science. Also Gender and duration of use of ERP system were significant to ERP systems implementation where 28.8% of implementation of ERP system was accounted for by gender and duration of use.Implementation of ERP in MMUST improved by 0.737 Integration of ERP in Finance department, 0.006 integration of Human Resource department, reduced by (0.48) while integration of Procurement department, increased by 0.307 of Integration of Computer Science department and reduced by (0.997), integration of Student Affairs department. Also 85% of implementation of ERP system is accounted for by integration of Human Resource, Finance,

Procurement, Students Affairs and Computer Science. This study avoided the implementation of ERP in the academic affairs and did not clarify why it was implemented. This study also was a case study hence the data collected was restrictive and the study solely focused on business management of the university and not academic activities.

The following gaps were identified from the above literature. Rudy (2010) indicated that the efficiciency in the flow of data/information formed the basis of intergration despite the cost implications. The focus was on success factor that aided ERP implementation processes in large aerospace and Defence Company. However the study did not have clear participants and had no information on how data was collected of which the current study has done. Makokha (2013) study focused on the implementation of ERP system in Kenyan public universities in which she reported that gender and duration of the use of ERP was significant in the ERP system implementation and not for timely information flow of which the current study filled the gap by investigating the application of ERP for timely information flow. Vajargah (2010) focused on the application of ICT in higher education in Shahid Beheshti University. The study reported that web-based presentation of curriculum before and during the semester was done using email in teaching and learning activities, Web-based diagnostic, formative and summative assessments, using supplementary soft wares for effective teaching and learning, designing a dynamic feedback system, Producing digital unlimited leaning materials (e-books, handouts) were some of the activities of ICTs. Others included using digital libraries and internet-based information for enrichment of curriculum content and process, Sharing and exchanging learning and experiences among university professors working inside and outside of the University.

The research overlooked the implementers of the curriculum and did not clarify on the types of ICTs applied. No clear information was given on how the ICTs facilitated information flow in all the academic activites in the university. The current study filled the gap by considering the application of ERP in all the academic activities in the universities. Leena (2008) focused on improving internal information flow in the case company but did not have clear sample size and the methods of data collection were lacking. Nyandiere (2010) conducted a study on both public and private universities and established that Kenyan universities had mainly implemented systems for finance and accounting, student admissions, examinations management, and library services to promote data flow. However this study employed a case study approach that could affect the authenticity of the findings and it failed to indicate the number of participant and methods of data collection of wich the current study filled the gaps.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was used to carry out the study. It consists of the area of study, the research design, the study population, sample size and sampling procedure, data collection instruments, procedure for data collection, quality controls, methods of data analysis and ethical considerations.

3.2The study Area

This study was conducted in Kenya which comprises the former western, central and eastern parts of Kenya. The regions were used because the universities as institutions of higher education are scattered and are few in Kenya. Also Kenya was considered due to the fact that the region is experiencing fast growth in university education and the departments in the universities have their own computer systems , data and data base that could not communicate with one another making it difficult to process certain functions. Table.3.1 below shows the distribution of universities regionally in Kenya.

Table 3.1: The Universities in Region of Kenya

Region	Number of universities
Eastern	2
Central	5
Western	4
Total	11

Source: Commission of University Education(2015)

3.3 Research Design

The study adopted cross-sectional descriptive survey design which is a method of collecting both qualitative and quantitative data. Descriptive survey design is a method of of collecting information by interviewing or administrating questionnaires to a sample of individuals (Orodho, 2003). Surveys are used to measure associations or relationships between thing and the ensuing data could be used to provide a causal explanation (polland, 2005)**.** This design is considered appropriate for collecting information when the goals of the research call for quantitative and qualitative data. This study collectd data on efficiency the integration of ERP which was essentially quantitative since it was presented in the form of percentages means and on the hurdle encountered with the use of ERP. Qualitative data were collected from the perception of the respondents on accessing of data and the effects of the applications of ERP in managing academic affairs. Descriptive survey design has limitations of being rigid and wrong information may be collected, a number of methods were used to source the required information , any descripancies were easily detected.

3.4 The Study Population

The study population is the one from which the researcher used to generalize the finding of the study to the whole population. From the study population accessible population was drawn. The accessible population was established from the 11 universities found in the western region of Kenya. The study therefore targeted 22 DVC for academic affair and Registrars Academic, 11 IT personnel, 286 CODs and Deans of schools or faculties and 1100 Lecturers the respondents who were included for the study because they are directly involved in the dealing with the management of university academic affairs. The DVCs for academics affairs initiates the policies for the managemengemnt of academics in universities geared to efficiency, the Deans and CODs directly deal with the management of students' academics and the lecturers are directly involved in the learning and teaching of students. Therefore they were best suited to provide information on the efficiencies of ERP in manging academic affairs. The information technology personnel are directly involved in technology implementation and training in technology use. Therefore they are expected to provide information on the types of ERP implemented and their efficiency in managing academics in universities.

3.5 Sample size and Sampling Procedures

Stratified Samplingwas employed in order to have subjects in various srata for subsequent analysis that would make it easy to make comarisos and draw conclusions. This is a technique that provided increased accuracy in sample estimates. To obtain a representative sample the 11 univesirties classified as public universities in Kenya were stratified into three categories using university mapping data. These were universities that were involved in implementation of ERP

and those that had implemented and integrated into academic affairs.this was the best waay because it ensured homogenous sub sets thsat shared the same characteristicswere represented in the sample. According to polland (2005) in drawing a sample, the goal is to draw that which represents the population on all relevant and important characteristics. Atotal of 8 universites representing 30% of the target universities were used in the study. The sampling was under probability and non- probability sampling design, the universities were proportionately selected. According to Gay (1983) a sample of 30% was considered to be appropriate for the studies in social sciences. The following Mugenda and Mugenda sample size formula was then used the following formula was used to establish the number of requied respondents (mugenda and mugenda, 2003).

$$N = \frac{Z^2pq}{d^2}$$

Where n =the desired sample size (if the largest proportion is greater than 10,000)

z=the standard normal deviate at the required confidence level.

p=the proportion in the largest population estimated to have characteristic being measured

q=1-p.

d=the level of statistical significance set.

If there was no estimate available of the proportion in the target population assumed to have the characteristics of interest, 50% should be used as recommended by (Fisher1983).

For example, if the proportion of a target population with a certain characteristic is 50, the z-statistic is 1.96, and the desire accuracy at the .05 level, then the sample size is;

$$n=\frac{(1.96)^2(.50)(.50)}{(.50)^2}=384$$

If the target population is less than 10,000, the required sample size will be smaller. In this case the sample estimate (nf) was calculated using the following formula:

$$nf = \frac{n}{1 + n) N}$$

Wherenf = the desired sample size (when the population is less than 10,000)

With a population of less than 10,000, Fisher (1983) recommended adifferent formula to establish the sample size as follows:

$$nf = \frac{n}{1 + n/N} = \frac{384}{1+384/264} = \frac{384}{2.45} = 157$$

Where:

nf = the desired sample size (when the population is less than 10,000)

n = the desired sample size (when the population is more than 10,000)

N = the estimate of the population size

n = the desired sample size(when the population is more than 10,000)

N = the estimate of the population size

Table 3.2: Sample size of respondents in universities in Kenya

Region	No. of univs	DVC / Registrar	Deans / CODs	IT personnel	Lecturers
Eastern	1	2	15	1	40
Western	3	6	45	3	120
Central	4	8	60	4	160
Total	8	16	120	8	320

Source: university mapping data

The data in Table 3.2 shows different sizes of sample for this study. Stratified random sampling was used to select the Lecturers, Deans and CODs for the study but purposive sampling was used to select the DVCs academics, Registrar academics and the IT technician. Eighlic t pub universities were selected for the study. The stratification for Lecturers was based on the courses they teach while Deans and CODs were based on the school of faculty and the department they headed respectively. The number of respondents for each category depended on the size of the respective population, in total there were 516 respondents.

3.6 Data Collection

To achieve the objectives of the study the researcher used the following instrument to collect both quantitative and qualitative data

3.6.1 Questionnaires

To collect quantative data the questionnaires were used, a Questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms. This instrument gives the respondent adequate time to give well thought answers hence large samples can be made use of and the results obtained are dependable and reliable (Kothari,2003). The questionnaires were used to collect data from DVC academic affairs, Registrar academic affairs, CODs and lecturers. The respondents were required to tick the appropriate answers provided for and give their views in the questionnaires. The questionnaire was preferred because the respondents were many and it is suitable for collecting quantitative data. Also the Questionnaire was easy to administer and more time saving compared to other tools, (Mugenda and Mugenda, 1999). However the response rate could be low and the respondents could lack the opportunity to clarify some answers and had no room to ask any further questions. The questionnaire was designed to seek information concerning the implementation of ERP to enhance data accuracy, the role of ERP in the provision of safety mechanism, use of ERP in accessing students' data and the application of ERP for timely information flow in the management of academic affairs in universities.

3.6.1.1 DVCs and Registrars questionnaire (DVC/RQ)

THE DVCs and Registrars responded to the questionnaires given to them. The questionnaire considered information on the background of the respondents and the universities, implementation of ERP and enhancining of data accuracy, the role of ERP in ensuring safety of data, ERP use in accessing students' data and application of ERP for timely flow of information.

The questionnaire had both open-ended and closed-ended questions that were used to obtain data.from the respondents.

3.6.1.2 Deans and CODs questionnaire (D/CODQ)

The Deans and CODs gave their responses to the questionnaires. Part one consisted of general information and the rest had both open ended and closed ended questions on implementation of ERP and enhancining of data accuracy, the role of ERP in ensuring safety of data, ERP use in accessing students data and application of ERP for timely flow of information. They also responded to a four to five point rating scale on the extent of their perception on data access and safety mechanisms.

3.6.1.2 Lecturers questionnaire (LQ)

Majority of the lecturers responded to the questionnaires. The questionnaire captured data on their bacgruond, on implementation of ERP and enhancining of data accuracy, the role of ERP in ensuring safety of data, ERP use in accessing students' data and application of ERP for timely flow of information. The questions were closed-ended ad open-ended. They also responded to a four to five point rating scale on the extent of their perception on data access and safety mechanisms.

3.6.2 Interview Schedule for the IT personnel

The Interview schedule were used to collect qualityative data , it was administered to the IT personnel who had a clear knowledge and understanding of ERP systems operations. The selection of this tool was necessitated by the nature of data to be collected, the time available and the objectives of the study. The research was mainly concerned with views, perceptions, feelings

and attitudes of the respondents in terms of the implementation of ERP to enhance data accuracy, the role of ERP in the provision of safety mechanism, use of ERP in accessing students' data andthe application of ERP for timely information flow in the management of academic affairs in universities.Therefore, qualitative and sure information was collected through this technique. Asample of the interview schedule had questions that were answered by the IT personnel.

3.6.3 Document Analysis

Document Analysis was used to collect data that already exists in documents on implementation of ERP for enhancing data accuracy, safety mechanisms, and access of students' data and timely flow of information across departmental sub units. The researcher reviewed secondary data like the prints on the types of ERP and its functionalities kept by the IT personnel plus the computer based software operations on the computers. This was to clarify on the operations of ERP as provided by the academic staff in the universities.

3.7 Quality Controls

A pilot study was conducted in two universities representing 10% of the study population to acertain that the instruments were valid, the words were well understood and all questions were interpreted similarly by all the respondents.Creswell (2012). The two universities were part of the 11 universites in Kenya but did not form part of the final sample. From these universities 4 DVCs and Registrars, 2 IT personnel, 20 CODs and Deans and 50 Lecturers were used. The accuracy and the consistency of the instruments were determined before they were used for the actual collection. This established the extent to which they measured accurately the attributes

under investigation. Reliability of the instruments was established by computing a reliability coefficient correlation through test-retest method. It yielded a coefficient correlation of 0.84 for DVCs and Registrars IT personnel and, 0.86 for Deans and CODs and 0.82 for the Lecturers averaging r=0.84. According to Mugenda and Mugenda (2003) a coefficient of correlation of 0.80 and above showed that the instrument was reliable and it could be used for data collection for the final study. Given the high correction the instrument was therefore regarded reliable. Two aspects of of validity were determined for the instruments. Face validity was established by supervisors who assessed the items in the instruments and ensured that they appeared relevant, meaningful and appropriate to the respondents. Content validity was also determined by supervisors who critically and carefully examined the items in the instrument and ascertained that the instruments contained adequate traits expected to measure the domain under study. Their corrections were incorporated and the instrument was fine-tuned those modification of the questionnaire.

3.10 Procedure for Data Collection

Before embarking on data collection, an application letter was made through the school of graduate studies from Masinde Muliro Uuniversity of Sceince and Technology inorder to facilitate the issuance of research authorization permit from the National Council for Science, Technology and Innovation. The permit enabled the collection of the necessary data from the universities in western region. Consent was sought from the university management who authorized the researcher to carry out research in the university. The regional administration was notified of the intended study and research assistant based at the universities were indentified

that could assist to conduct the respondents easily. The researcher identified one research assistant per every university. Interviews with the IT personnels were conducted by the researcher inorder to gain the indepth information on the implementation, use and application of ERP. The questionnaires were distributed and collected after they had been filled. In administering the questionnaire the respondents were assured that the information they provided was treated with utmost confidentiality and was used for the research purpose only. Data collection was done in 6 months and the response was expected to be 100%. Due to a wide geographical coverage a research assistant was hired to assist in data collection. The research assistant was tutored on the research activities such as administering the questionnaire and the ethical consideration issues.

3.11 Data Analysis Approaches / Techniques

The data that were collected through questionnaire and interview schedules were coded and appropriately organized for analysis. The coding depended on how many options were provided. The option provided determined the numbers to be used in coding.The coded data were then keyed in the Statistical package for social science programme (SPSS version 21.0) which was used to analyze quantitative data for both descriptive and inferential statistics. Descriptive statistics were given numerical and graphical techniques of presenting, organizing, analyzing and making conclusions were used. SPSS version 12 programme on computer based programme analyzed the quantitative data for both descriptive and inferential statistics. Qualitative data was analyzed by coming up with common themes obtained from the open ended questions and interview schedules.

The first objective was to determine the influence of the implemention of ERP on enhancing accuracy of examination processes in universities in western region of Kenya. The data to be collected was result analysis, administering of exams and recording of marks. The statistics used were frequencies, percentages and totals. The analyzed data was presented using table and graphs.The null hypothesis that there is no statistically significant difference in the accuracy of data in the management of academic affairs in public universities in western region of Kenya as a result of the implementation of ERP systems was tested using Chi square and the significant level was at 0.05 that was used to determine which means were significantly different from each other.

The second objective was to assess the hurdles encountered by universities that have implemented ERP in the provision of security to examination data in public universities in Western region of Kenya. The data collected was standardization of academics, centralization of information, maintenance of consistency and confidentiality data. Frequencies, percentages and chi square were used to summarize the analyzed data. The null hypothesis that there is no statistically significant difference in the hurdles encountered in the management of academic affairs in public universities in western region of Kenya as a result of using ERP systems was tested using chi square.

The third objective was to determine the role of ERP in accessing data in the management of academic affairs in public universities in western region of Kenya. The data collected was on admission records, fees payment, progress report and examination results. The null hypothesis that there is no statistically significant difference in the accessing of data in the management of academic affairs in public universities in western region of Kenya as a result of the using ERP systems was analyzed using chi square.

Table 3.3: Summary of statistical Data Analysis

No. Objectives	Independent Variables	Dependent variables	Statistical tools
1. To determine the influence of the Implemention ERP for enhancing data accuracy in managing examinations processes in universities in western region of Kenya	Implementation of ERP	accuracy of data	frequencies percentages mean chi square
2. To establish the hurdles encountered by universities that have implemented ERP for the provision of security to examination data in universities Western Region of Kenya	hurdles encountered	security provision	frequencies percentage mean chi square
3 .To determine the role of ERP in accessing of data in the management of academic affairs western region of Kenya	role of ERP	accessing data	mean frequencies chi square
4. To investigate the effect of the application ERP on timely management of data in the management of academic affairs in universities	application of ERP	timely data	mean frequency chisquare

3.11 Ethical Consideration

Ethical considerations are the basic regulations that govern data collection (Kombo and Tromp, 2006). According to Creswell (2012) the ethical considerations apply to qualitative and quantitative and mixed method research and to all stages of research. Prior to conducting the study the research conducted the relevant professional associations in educational planning and management. The researcher submitted the proposal, selected site for the study, identified key personnel to help and decided on authors for future publications. At the beginning of the study the research conducted a need assessment with the participants, conducted participants and informed them about the purpose of the study, obtained the appropriate consent and respected the cultural, religious, gender and other difference that needed to be respected. During the collection of data the researcher treated all the respondents well by building trust with them, avoided deceiving the participants, discussed the purpose of the study and avoided leading questions during the interviews to obtain qualitative data. The researcher did not disclose sensitive information, withheld sharing personal impressions and did not involve participants as collaborators. The researcher stated the questions as they were in the interview protocol and thanked the interviewee for the time and answers. During the analysis the researcher avoided siding with the participants, disclosing only positive results and respected the privacy and anomymity of the participants. During reporting, sharing and storing data the researcher did not falsify authorship, evidence of data , findings and conclusions. The researcher did not plagiarize the report. The researcher avoided disclosing information that was harmful to the participants and the researcher communicated in clear, straight forward and appropriate language. The researcher provided copies of the report to the stakeholders and shared results with other researchers. The researcher refrained from using the same material for more than one publication

and disclosed funders for the research and the research provided complete proof of compliance with the ethical issues and did not have conflict of interest.

CHAPTER 4

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents data analysis, presentation, interpretation and discussion of findings of the study on ERP systems integration and its efficiency in the management of academic affairs in universities in Kenya. The study was designed to determine the influence of the implementation of ERP in enhancing the accuracy of examination processes and the hurdles encountered with the use of ERP in the provision of data security. The study also sought to identify the role of ERP in the provision of safety mechanism data in academic affairs. In addition the study was designed to establish the use of ERP in accessing students' data in the management of academic affairs and lastly the study sought to establish the application of ERP for timely data management and improvements attained in data management in the managing academic affairs in universities in western region.

4.2 Demographic data of respondents

The demographic data provided the basis for data analysis and interpretation of the findings. The demographic data sought during the study included gender, age, working experience and academic qualifications, university establishment and courses offered in the sampled universities. Table 4.1 presented gender of the repondents who participated in the study.

Table 4.1: Gender of respondents from the universities

Respondents	Expected	Responded	Gender	
	No.	Total %	Male	Female
DVC & Registrar	16	16(100 %)	13	3
Deans & CODs	120	102 (85%)	80	42
LECTURERS	320	297 (92%)	173	124
IT personel	8	8 (100 %)	5	3
Total	464	423 (91 %)	271	152

Source:Field data, 2016

Findings on gender revealed that most of the respondents were male as shown by 271(64%) out of the 423 respondents that participated in the study. The findings indicated that the number of male respondents was almost twice that of the female respondents. The expected respondents were 464 out of which 423 responded forming 91% of the respondents that participated in the study which according to Mugenda and Mugenda (2003) the return rate of more than 70% is good enough for representing the sample whose findings could be generalized to the population. Interviews were conducted for the 8 Information Technology personnel in every university. The respondents length of stay in their current universities was sought and the findings are shown in table 4.2

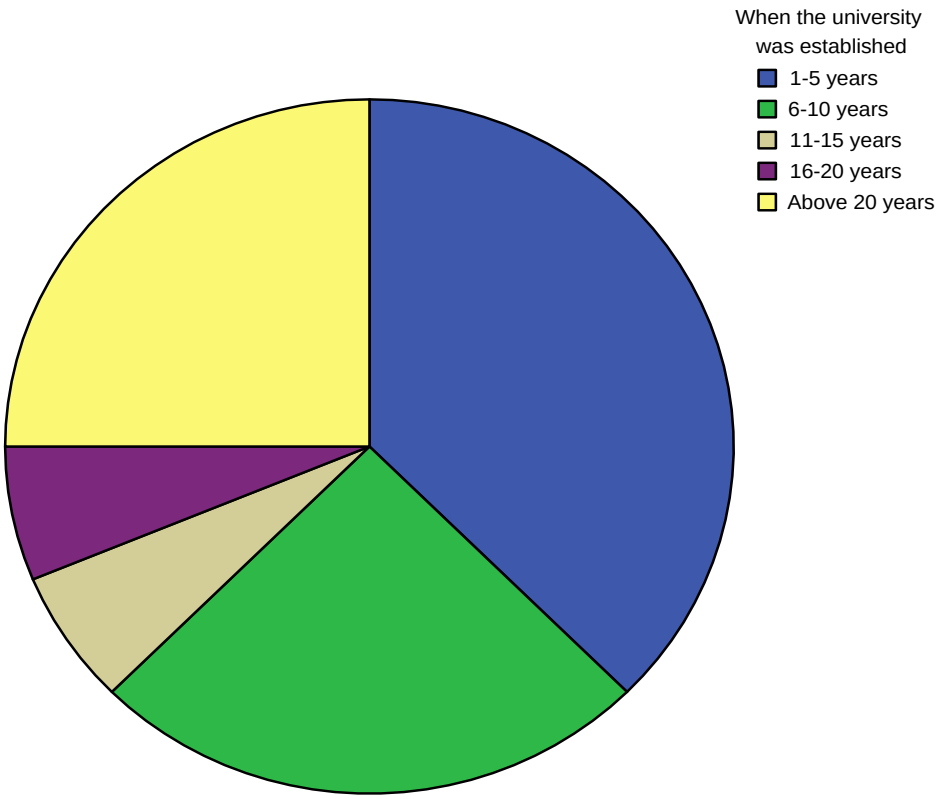
Table 4.2: Working Experience of Respondents in their current stations

Respondents	Below 5 %	6 - 10 %	11- 20%	Above 20 %	Total%
DVC & Registrar	6 (1.4)	7 (1.7)	3 (0.7)	0(0.0)	16 (3.8)
Dean & CODs	45(10.6)	49 (11.6)	8 (1.9)	0(0.0)	102(24.1)
Lecturers	69(16.3)	51(12.1)	60(14.2)	17(4.0)	297(70.2)
IT	4 (0.9)	4(0.9)	0 (0.0)	0(0.0)	8 (1.9)
Total	123 (29.3)	111(26.2)	71(16.8)	17 (4.0)	423 (100)

Source:Field data

The findings showed that all the respondents had 5-10 years of working experience in their current universities, 60(14.2%) of the Lecturers had an experience of over 15 years and 3(0.7%) of the DVCs and Registrars had at least stayed in their current universities for at least over 10 years. This implies that the data obtained form the universities were authentic to be used in this study. It was also important to eatablish when the universities were established to consider whether it could be sampled into the study. Figure 2 indicates when the universities were established.

Figure 2: when the univerities were established



The findings in figure 2 indicated that 6(37.5%) of the universities had been established between 1-5 years and between 6-10years at least 4(25%) of the universities had long been established hence they were suitable to be used in the study. The universities that had a long period of establishment like above 10 years had the high opportunity of integrating such technology due to their financial stability and high enrollment that calls for technology implementation in managing academic affairs. Every university had several academic programmes offered. Table 4.4 show some of the programmes offered in the universities that were involved in the study

Table: 4.3 The responses of the DVCs and Regiostrars on the programmes offered in public universities universities in kenya

Programmes	programmes offered %	programmes not offered %
Education	16(100)	0(0.0)
Agriculture	4(25.5)	12(75.0)
Engineering	7(43.8)	9(56.5)
Law	6(37.5)	10(62.5)
Health sciences	10(62.5)	6(37.5)
Medicine	10(62.5)	6(37.5)
Disaster management	6(37.5)	10(62.5)
General Sc/Arts	9(56.5)	7(43.8)

The findings revealed that most of the universities offered a variety of programmes, 16(100%) of the respondents indicated that education was offered in all the univesites, 10(62.5%) of the responses indicated that health sciences programmes were offered in some of the universities and 9(56.5%) of them indicated that general sciences and arts was also offered in some public universities. However 12(75%) and 10(62.5%) of the respondents indicated that Agricultural programmes, law and Disaster management programmes respectively were not offered in all the Universites. This implied that the more the progrmmes the university offered the more number of students they enrolled. This propelled the universities to include technology in the academic

affairs to handle the maasive data generated. This was enchoed in the interview schedule with the IT personnel who indicated that the increased programmes offered necessitated the need to intragate ERP to assist in handling large sets of data.

The findings from the demographic data in the current study indicated that majority of the respondents were male with the ages of between 40-50 years. Again most of the respondents had sufficient experience in working in the universities. Also most of the universities had been established for a long period of time. The programmes offered in the universities were many due to increased demand for university education and number of students. The findings were similar to what was reported by Kajuna (2009) which indicated that the courses offered and the large number of students in the universities propelled the implementation of ICTs. The technology implementation depended on the large number of students hence large classes were considered suitable for technology implementation for the purposes of efficiency in data management. The experiences provided the know how in desiring to integrate technology for enhancing quality in university education. The findings of the current study showed that most of the university's academic staff were highly qualified and experienced hence capable of adopting ERP in managing academic affairs. The findings agreed with Kajuna (2009) which indicated that potential knowledge and skills acquired through experience was a prerequisite in technology implementation especially the ICTs. Again the current study on the establishment of univeristies were similar to those of Rico (2000) which revealed that universities had long been established and had overwhelming number of students being admitted in the universities of Georgetown, Louisiana and university of Nebraska-lincoln. The many courses offered was a clear indicator that the universities were dealing with large sets of data due to large number of students the propelled universities to integrate ERP.

4.3 Implementation of ERP and Enhancement of Data Accuracy in Examination Processes

The study was to determine the efficiency of the implementation of ERP and the enhancement of data accuracy of examination processes in universities. The respondents were to indicate areas where ERP had been of implemented and integrated, the types of ERP integrated and accuracy of ERP use. The null hypothesis that there was no statistically significant difference between the the accuracy of data with the implementation of ERP processes in universities was tested.

4.3.1 ERP implementation in the Academic Affairs in Universities

The respondents were asked to indicate wether they had implemented ERP in academic affairs. The findings are shown in table 4.4

Table 4.4 Areas where ERP was Implemented

	DVCs and registrars n=16		Deans and CODs n=102		Lecturers n=297		
Areas of ERP	I %	NI %	I%	NI %	I %	NI%	TOTAL
Admission	2 (0.5)	0 (0.0)	10(2.4)	0 (0.0)	18 (4.3)	0(0.0)	30 (7.2)
Automate systems	2 (0.5)	0(0.0)	6(1.4)	6 (1.4)	21 (5.1)	0(0.0)	35 (8.4)
Examination	2 (0.5)	0(0.0)	14(3.4)	0 (0.0)	57(13.7)	0(0.0)	73 (16.6)
Teaching	2(0.5)	2 (0.5)	12 (2.9)	4(1.0)	66 (16.0)	24 (5.4)	110(26.5)
Finance	2(0.5)	0 (0.0)	15(3.6)	0 (0.0)	48 (11.6)	10 (2.4)	75(10.1)
Time Tabling	2 (0.5)	2 (0.5)	21(5.1)	14(3.4)	53(12.8)	0(0.0)	92 (22.2)
TOTAL	12 (2.9)	4 (1.0)	78(18.8)	24(5.8)	263(63.4)	34(8.2)	415(100)

I- Implemented NI- not implemented Source: field data, 2016

The findings from the table 4.5 showed that 30(7.2%) of the respondents had implemented ERP in the admission section, 35(8.4%) of the respondents had it in the automation of systems, 73(16.6) of the respondents indicated that it had been implemented in examination and 110(26.5%) of the respondents showed that it had been implemented in timetabling. From the table it was established that at least every university had implemented ERP systems in the management of academic affairs with the highest being in teaching and examination therefore

Universities are embracing technology in managing the crucial activities such as academics. DVCs and Registrars being the top level management play an important role on policies formulation and their implementation. The decision for implementing any technology is done by top level management who identifies and determines whether the technology is viable for use, then establish the strategies and the scope of implementation.

The finding further indicated that 78(76.5%) Deans and CODs indicated that at least ERP had been implemented in the management of most of the sections of academic affairs in universities, , while 24(23.5%) had not implemented ERP in the management of academic affairs. Mostly internet services (26.9%) was highly implemented followed by finance 15 (19.2%) and examination14 (17.9%). This means that the Deans and CODs had at least implemented ERP in the faculties/schools and departments respectively for the management of academic affairs. This implies that the Deans and CODs recognized the need for technology to run their faculties/schools and departments respectively because they were able to identify the short fall experienced with the current technology in use.

The finding showed that only 242 (81.56%) of Lecturers indicated that ERP had been implemented in the management of academic affairs. This is sufficient for the universities to include technology such as ERP in improving efficiency while only 55(18.5%) had not integrated ERP in academic affairs. The highest level of implementation was in teaching 66(27.3%), then examination 57(23.6%).

The current study differs with Otieno (2010) who found out that the company top level management played an important role in the implementation of ERP in several key areas of the companies in terms of policy implementation. The practical implementation and upgrade was

done by information system managers due to their vast skills and knowledge in the area of information technology unlike in the current study where tha academic staff was all involved in the implementation of ERP systems. The interviews with the IT personnel confirmed that the implementation of ERP first involved the upgrading of the IT infrastructures by connecting the fibre optics in most of the building of the universities as the information management system had been implemented on a limited scale.

It was important to establish whether universities had integrated ERP in the management of academic affairs. Table 4.5 below shows ERP integration in universities for the management of academic affairs.

Table 4.5: The Integration of ERP in the Management of Academic Affairs

	DVC & registrar	%	Dean & CODs	%	Lecturers	%
Integrated	14	87.5	77	78.3	225	75.8
Not integrated	2	12.5	25	21.7	72	24.2
total	16	100	102	100	297	100

Source: Field data, 2016

The findings in table 4.6 indicate that most 14(87.5%) of the DVCs and Registrars had integrated ERP in the management of the academic affairs, only 77(78.3%) of the Deans and CODs had integrated ERP in academic affairs while 225(75.8%) of the Lecturers had integrated it into academic affairs management. Only 2(12.5%) of the DVCs and registrars had not integrated ERP meaning at least one of the universities had not attempted to include ERP in the

management of academic affairs.

Deans and COD 25(21.7%) had not implemented ERP in academic affairs while 72(24.2%) of Lecturers indicated the universities had not include ERP in academic affairs management. This implies that the majority of the academic staff had integrated ERP in their university academics to support and enhance efficiency.

The findings of the current study on integration of ERP in academic affairs agreed with to some extend with those of Nyandiere (2007). The similarity was in the implementation of fully integrated IT and network systems to have information on a common intranet in order to guarantee quality. The difference was that the universities had simply implemented computer-based systems, Free and open source software and not ERP.

Again the findings of the current study agreed with those of Kajuna (2009) which revealed that the use of technology in education was a trending in educational reforms all over the world and that the integration of technology was perceived as a great assert in the reforms. The difference was that the current study coverd the integration in the management of academic affairs while the reviewed study dealt with the integration of technology in teaching and learning processes in the university of Dar es Salaam.

Also the findings of the current study indicated that ERP was implemented in most of the areas of academics. The respondents showed that integration was high in academic affairs. This concurs with the report by Rico (2000) which revealed that ERP was implemented in universities to handle large sets of data in admission, students' records and academics to enhance easy accessibility of data.

4.3.2.1 The Types of ERP System Integrated In Management of Academic Affairs in Universities

The respondents were to indicate the type of ERP integrated in their universites table 4.6 presents the type of ERP integrated in the management of academic affairs in universities that necessitated the implementation of ERP.

Table 4.6: The Types of ERP Integrated in Universities

Types of ERP	DVC & Registrar %	Dean & HODs %	LECTURERS%	Mean	SD
SAP	12.5	18.4	13.1	1.05	0.121
Data oracle	25.0	26.3	17.2	1.32	0.349
Navision	12.5	15.8	26.3	1.00	0.000
Single ERP Package	25.0	2.6	3.0	1.00	0.000
ABNO UNISOL	25.0	36.8	34.3	1.08	0.217

Source: Field data, 2016

The finding in table 4.7 showed that most of the DVCs and Registrars 4 (25%) had at least included data oracle, single ERP package and ABNO UNISOL in the management of academic affairs. Majority of the Deans and CODs 39(36.8%) had implemented at least ABNO UNISOL, ERP systems in the management of academic affairs and also102 (34.3%) of the Lecturers had included ABNO UNISOL in the management of academic affairs. The interview schedules conducted established that most of the lecturers had limited knowledge on the type of ERP and its integration. The universities had different types of ERP systems in place. Most of the academic affairs staff at least had knowledge of the type of ERP integrated although not all of them used it for academic purposes as per the interviews.

The finding of the current study indicated that universities integrated different types of ERP systems. This agreed with the report of Otieno (2010) which revealed that different companies under study integrated different types of ERP depending on costs, benefits and compatibility of the systems. Empirical data also revealed that ERP implementation scope was a great determinant of the level of ERP integration. Bidco Oil Refineries integrated Baan systems which had mixed modules like finance, inventory and sales from different vendors. The Agrochemicals and Food Company (ACFC) integrated Ebizframe Bamburi Cement Limited (BCL) adopted SAP R/3 with several modules of sales and distribution, treasury and production planning with the expectation of decreasing the information technology costs and for easier maintenance of the systems. Kenya power and lighting (KPLC) and Kenya electricity generating company (KenGen) implemented only two SAP R/3 core modules of finance and material management because they relied heavily on SAP's Online Support System (OSS) to solve their technical problems. The difference was that the current study dealt with public universities while the reviewed study covered public and private companies in Kenya had integrated ERP which required upgrade to better their performance. The current study showed that the integration of different types of ERP had minimal impact on efficiency of data accuracy while the reviewed study indicated that different types of ERP integrated had major input onefficiency in data management.

4.3.5 DVCs and Registrars perception on the use of ERP to Enhance Accurate Data in Examination Processes in Universities

The respondents from the sampled universities were asked to show the extent to which ERP implemention had assisted to enhance data accuracy ,the findings are shown in Table 4.7

Table 4.7: Descriptive Statistics on DVCs and Registrars Perception on the Use of ERP for Enhancing the Accuracy of Examination Processes

Accuracy of	Extent of Accuracy of examination data in %									
data	VH %	H%	M %	L %	NAA %	Mean	SD	X^2	df	sig
Exam administration	75.0	12.5	0.0	12.5	0.0	2.63	1.147	0.762	2	0.683
Mark recording	56.3	18.8	12.5	12.5	0.0	2.06	1.526	1.778	3	0.620
Result analysis	56.3	18.8	12.5	12.5	0.0	2.06	1.526	1.039	2	0.595
Result release	56.3	18.8	12.5	12.5	0.0	2.06	1.526	3.810	2	0.149

Key - VH-Very high, H-High, M-Moderate, L-Low, NAA-Not at all SD-Standard deviation

Source: Field data, 2016

The respondents were expected to show the extent to which ERP implementation had enhanced accuracy of examination data. Table 4.7 showed that (75.0%) of the respondents from the universities had very high extent in examination administration and (56.3%) of the respondents had very high accuracy in marks recording, result analysis and release. The number of those with low accuracy was 12.5% of the respondents. For storage of information the response was moderate at (43.8%). At least in all the data there was some extent of enhanced accuracy in the management of examination data. The accuracy of data was at a mean score of 2 except for the storage of data 1.33. The standard deviation of more than one indicates that the scores were not close to one another but were spread in the four.

The chi-squre values were greater than the critical value of 0.05 therefore the null hypothesis was rejected. This implied that the implementation of ERP enhanced examination data accuracy to a greater extent. The perception of the deans and CODs was also sought and the findings are summarized in table 4.8

Table 4.8: Descriptive Statistics on Deans and CODs Perception on the Use of ERP for Enhancing Accuracy of Examination Data

Accuracy of	Extent of Accuracy of examination data in %									
examination data	VH %	H %	M %	L %	NAA %	Mean	SD	X^2	df	sig
Exam administration	21.3	29.8	21.3	27.2	0.0	2.55	1.113	11.540	2	0.009
Mark recording	31.9	34.0	23.4	10.6	0.0	2.13	0.986	34.779	2	0.000
Result analysis	32.6	32.6	15.2	15.2	4.3	2.26	1.194	21.406	2	0.000
Result release	31.9	23.4	23.4	21.3	0.0	2.34	1.141	16.609	1	0.001

Source: Field data, 2016

Key - VH-Very high, H-High, M-Moderate, L-Low, NAA-Not at all SD-Standard deviation

The Deans and CODs' response as indicated in table 4.8 showed that 32.6% of the respondents had very high data accuracy of examination in result analysis and also 31.9% of the respondents had very high accuracy in marks recording and result release while 34.0% and 32.6% of the respondents had high accuracy in both marks recording and result analysis respectively. The standard deviation of more than one indicates that the scores were not close

to one another but were spread in the four. Examination administration was rated high with a mean of 2.55 and marks recording had the lowest mean score.

Analysis of the chi- square showed that there was no significant difference in the perception of respondents on the use of ERP in enhancing data accuracy on the five rated factors as the chi-squre values were less than the critical value of 0.05 therefore the null hypothesis was not rejected. Further the perception of lectures was sought on extent of ERP use to enhance data accuracy and the findings are summarized in table 4.9

Table 4.9: Descriptive Statistics on Lecturers' Perception on the Use of ERP for Enhancing Accuracy of Examination Data Using ERP

Accuracy of	Extent of Accuracy of examination data in %									
data	VH %	H %	M %	L%	NAA%	Mean	SD	X^2	df	sig
Exam administration	6.3	36.5	38.1	15.9	3.2	2.73	0.915	78.182	2	0.000
Mark recording	13.8	46.2	26.2	10.8	3.1	2.43	0.963	116.517	2	0.000
Result analysis	20.6	33.3	31.7	11.1	3.2	2.43	1.037	100.970	2	0.000
Result release	19.0	23.8	36.5	17.5	3.2	2.62	1.078	50.245	2	0.000

Source: Field data, 2016 N=297

Key - VH-Very high, H-High, M-Moderate, L-Low, NAA-Not at all SD-Standard deviation

The findings in Table 4.9 indicate that 46.2% and 36.5% and 33.3% of the respondents ranked high in marks recording, examination administration and result analysis respectively as the extent of using ERP to enhance data accuracy and 38.1% of the respondents indicated that there was moderate ranking for examination administration. The means and standard deviations are very close. The mean and standard deviation for individual factor are also close. Analysis of the chi- square showed that there was no significant difference in the perception of respondents on the use of ERP in enhancing data accuracy on the five rated factors as The chi-squre values were less than the critical value of 0.05 therefore the null hypothesis was not rejected. The findings of the current study concurred with those of Aiken (2002) which revealed that ERP reduced duplication of data and improved performance in data provision.

The current study showed that the implementation of ERP to a larger extent enhanced accuracy. Respondent in the current study indicated that the implementation of ERP streamlined the examination processes to a larger extent. This agreed with the White Paper (2010) which indicated that integrating ERP solutions improves productivity by reducing duplication of data entry tasks, empowering employees with the right information at the right time, streamlining examinations processes through automated work flow, and improving organizational task management will therefore be guaranteed when ERP is applied. With an integrated ERP system, information is captured once at the source and then automatically propagated to all relevant fields throughout the ERP environments without the need for rekeying and revalidation as it passes from one system to the next without any form of alteration.

The current study dealt with enhancement of data in public universities while the reviewed study of Njia's (2010) was conducted in commercial banks that found out that financial resource availability, organizational complexities, employee's perceptions, and regulatory requirements played a role in the implementation of ERP to enhance data accuracy.

The findings of the current study agreed with those of a study in the Massachusetts institute of technology (MIT) and ENGCO in which ERP was implemented to enhance efficiency in data accuracy but it differed because of the nature of the organization involved.

4.4 The Challenges Encountered in Using ERP for the Provision Of Security for Examination Data in Universities.

To determine the hurdles encountered in the use of ERP in the provision of safety mechanism examination data in universities in western region of Kenya, the respondents were asked to establish the hurdles encountered in using ERP and the respondents competency in using ERP. The null hypothesis that there is no significant difference between the hurdles encountered in using ERP and its implementationfor the provision of seurity of data in the management of academic affairs in universities was also tested.

4.4.1 The Implementation of ERP and the Challenges Facing Examination Processes in Universities

The respondents in the universities that had implemented ERP were to indicate whether

universities had examination challenge that propelled them to implement the ERP. The findings are shown in table 4. 10.

Table 4.10: The Perception of the DVC & Registrar on the Implementation of ERP and the Challenges Facing Examination Processes in Universities

Challenges	C %	NC %	MEAN	SD	X^2	df	sig
Leakage of exams	3(18.8)	13(81.3)	1.81	0 .403	9.905	2	0.002
Erroneous marks	9(56.3)	7(43.8)	1.44	0 .512	1.778	1	0.185
Missing marks	12(75)	4(25)	1.25	0 .447	0.762	2	0.383
Wrong degrees	4(25)	12(75)	1.25	0.447 .	0.762	1	0.383
Wrong honour	4(25)	12(75)	1.25	0.447	0.762	1	0.383
Impersonation	4(25)	12(75)	1.00	0.000	1.371	1	0.242

Key: C= Challenge NC= Not Challenge, Source: Field data, 2016

Finding deduced from table 4.10 showed that impersonation, wrong degrees and honours were minor challenges facing examination processes in universities. This was indicated by 12(75%) of the respondents. However missing marks and erroneous marks appeared to be the major challenges facing the examination processes in universities. This was shown by 12(75%) and 9(56.3%) of the responses given by DVCs and Registrars, To establish the relationship, on the DVCs and Registrars perception the hypothesis that there is no significant difference between the hurdles encountered in using ERP and its implementation for the provision of security of

data in the management of academic affairs in universities tested. The findings in table indicate that the DVCs and Registrars agreed that universities had challenges facing academic data management. The null hypothesis was rejected as p>0.05. For the characteristics whose association was significant, the extent of relationship was low except in examination leakages. The Deans and CODs perception on the challenges facing examination processes in universities was sought and the findings are summarized in table 4.11

Table 4.11: The Perception of the Dean & CODs on the Implementation of ERP and the Challenges Examination Data Processes in Universities

Challenges	C %	NC %	mean	SD	X^2	df	sig
Leakage of exams	34(33.3)	68(66.7)	1.56	0.499	15.087	1	0.000
Erroneous marks	66(64.7)	36(35.3)	1.28	0.453	4.889	1	0.027
Missing marks	56(54.9)	46(45.1)	1.02	0.155	0.616	1	0.433
Wrong degrees	24(23.5)	78(76.5)	1.17	0.378	1.064	1	0.303
Wrong honour	16(15.7)	86(84.3)	1.07	0.248	1.894	1	0.169
Impersonation	40(39.2)	62(60.8)	1.53	0.503	8.769	1	0.003

Key: C= Challenge NC= Not Challenge, Source: Field data, 2016

Findings deduced from table 4.11 showed that erroneous and missing marks were the major challenges facing examination processes in universities. This was shown by 66(64.7%) and 56(54.9%) of the responses by Deans and CODs respectively whereas wrong degrees and

honours were minor challenges facing examination processes in universities. This was also shown by 24(23.5%) and 16(15.7%) of the respondents. The Deans and CODs perception on using ERP to resolve examination data challenges presented in table showed that, there was significant relationship between the use of ERP and resolving of examination data problems with p>0.05. Hence the null hypothesis was rejected. For the characteristics whose association was significant, the extent of relationship was low. Further the perception of lecturers was sought on the hurdles facing examination processes and the findings are summarized in table 4.12

Table 4.12: The Perception of The Lecturers on The Implementation of ERP and the Challenges Facing of Examination Data Processes in Universities

challenges	C %	NC %	mean	SD	X^2	df	sig
Leakage of exams	96(32 .3)	201(67.7)	1.51	0.592	53.688	2	0.000
Erroneous marks	129(43.4)	168(56.6)	1.18	0.498	12.558	2	0.002
Missing marks	207(69.5)	90(30.5)	1.54	0.500	9.165	1	0.002
Wrong degrees	20(6.7)	277(93.3)	1.19	0.394	9.385	1	0.000
Wrong honour	15(5.1)	282(94.9)	1.17	0.381	14.911	1	0.000
Impersonation	126(42.2)	171(57.8)	1.76	0.426	21.266	1	0.000

Key: C= Challenge NC= Not Challenge, Source: Field data, 2016

Findings from table 4.12 showed that 207(69.5%) of the respondents indicated that missing

marks was one of the major challenges facing examination processes in universities while wron degrees and honors were some of the minor problems facing examination processes in universitieswith a response of 6.7% and 5.1% respectively. The findings as shown in Table 4.15 show that the null hypothesis not rejected for all the factors ($p<0.05$). For the characteristics whose association was significant, the extent of relationship was low) except for missing marks.. For the leakages of examinations whose association was significant, the extent of relationship was low. Therefore the calculations in the table indicated that there was no significant relationship in the perception of lecturers on all the challenges that affect examination processes in universities. This therefore means that the null hypothesis that there is no significant relationship between lectures perception on challenges that affect examination processes in universities was not rejected. For the examination leakage whose association was significant, the extent of relationship was low.

Further the information gathered from interviews with the IT personnel confirmed that before the integration of ERP, universities faced several examination challenges that propelled them to integrate the systems. The previous management information systems were perceived not to be efficient because they could not capture data of the large number of students and therefore lecturers were burdened. The universities were more than willing to integrate ERP to resolve the challenges facing the examination processes. This implies that the major challenges facing university examination processes were missing and erronous marks. This could be attributed to large numbers of students in the universities whose data is not quickly captured by the academic staff. The students keep on correcting their marks and clarifying their degrees now and then as per the observations made.

The findings of the current study indicated that public univerites faced hurdles in the provision

of security to examination processes. This agreed with the report of Mbirithi (2013) which revealed that public universities faced a series of examination challenges that tended to compromise the quality of education. Universities under study had inadequate ICT infrastructure. The current sudy dealt with the implementation of ERP as a solution to the hurdles while the reviewed study sought to investigate the nature and magnitude of the challenges. That included insufficient fund that in turn affected research, teaching and learning. The findings of the current study differed with the reviewed study in which missing marks was a major challenge. The curriculum was not adequately implemented due to inadequate teaching and learning resources. These challenges had implications on the quality of education offered in the selected universities in Kenya. The study further revealed that the management of examinations had faults. There was late submission of examinations and marks by staff, loss of data and examination leakages due to computer crashes and leakages from secretaries and lecturers. There were high rates of cheating due to high numbers of students and low numbers of invigilators. All this led to loss of quality education in university education. However it differed with the current study which focused on the implementation of ERP to resolve the challenges facing examination processes in universities.

4.4.2 Respondents' Competency in Using ERP for Examination Data in Universities

The respondents were to establish the extent of their competency in using ERP to enhance examination data accuracy. The findings on DVC and registers competency are shown in table 4.13.

Table 4.13: Descriptive Statistics on DVCs and Registrars Perception On The Competency of Using ERP for Examination Data

Competency on examination data	Extent of competency on examination data in %							
	C %	FC%	NC %	Mean	SD	X^2	df	sig
Exam administration	12.5	75.0	12.5	1.38	0.719	0.762	2	0.683
Mark recording	12.5	75.0	12.5	1.38	0.719	0.762	2	0.683
Result analysis	18.8	68.8	12.4	1.94	0.574	1.039	2	0.595
Result release	37.5	50.0	12.5	1.75	0.683	3.810	2	0.149

Source: Field data, 2016, Key –C-Competent FC –Fairly Competent NC- Not Competent SD-Standard deviation

The findings in table 4.13 indicate that 12.5% of the respondents were competent in the using ERP in examination administration and marks recording respectively and 75% were fairly competent in using ERP for examination administration and marks recording respectively and only 12.4% were not competent in using ERP in result analysis. On result analysis and releasing of results 68.8% and 50% of the DVCs and Registrars were fairly competent in using ERP. The mean and standard deviation for individual factor were also close. This indicated that the respondents had same perception over the competency in ERP use. However, it is important to note that the standard deviation of more than one indicates that the scores were not close to one

another but were spread in the four scores between one and four. Result analysis and result release were rated high with mean of one.

Analysis of the chi- square showed that there was significant difference in the perception of respondents on the competency of using ERP in enhancing data accuracy on the five rated factors as the chi-squre values were greater than the critical value of 0.05 therefore the null hypothesis was rejected. The study found out that most of top level managers were competent in ERP use in the management of academic affairs. This could be attributed to the increased ICTs in management of institutions and inservicing in using ERP. The study established that the top level academic managers in most of the universities had embraced the use of ERP in managing their academic affairs. The responses of the Deans and CODs on the competency in using ERP are shown in table 4.14

Table 4.14: Descriptive Statistics on Deans and CODs Perception on the Competency of Using ERP on Examination Data

Competency in	Extent of competency on examination data in % ERP							
	C %	FC %	NC%	Mean	SD	X^2	df	sig
Exam administration	25.0	64.6	10.4	1.46	0.679	71.593	2	0.000
Mark recording	29.2	62.5	8.3	1.46	0.648	97.364	2	0.000
Result analysis	31.3	58.3	10.4	1.76	0.614	86.335	2	0.000
Result release	36.2	55.3	8.5	1.72	0.612	84.625	2	0.000

Source: Field data, Key – C-Competent FC –Fairly Competent NC- Not Competent SD-

Standard deviation

The responses provided by the Deans and CODs in table 4.19indicated that their perception was high (1.00) on all the characteristics. The standard deviation is also less than one. This equally implied that there was low deviation in responses. The findings provided indicated that 25% of the Deans and CODs were competent in using ERP in examination administration and 29.2% of the respondents were competent in marks recording and 58.3% and 55.3% were fairly competent in result analysis and result release respectively. A very low response of 8.5% indicated that they were incompetent in using ERP. The perception of lecturers on the competency of ERP use was sought and the findings are summarized in table 4.15.

Table 4.15: Descriptive Statistics on Lecturers Perception on the Competency of Using ERP on Examination Data

Competency	Extent of Competency of examination data in %							
examination data	C	FC	NC	Mean	SD	X^2	df	sig
Exam administration	35.9	43.8	20.3	1.86	0.770	22.832	1	0.000
Mark recording	46.2	38.5	15.3	1.71	0.761	31.655	1	0.000
Result analysis	27.7	56.9	15.4	1.86	0.684	24.149	1	0.000
Result release	22.6	59.7	17.7	1.97	0.673	31.008	1	0.000

Source: Field data, 2016 , Key – C-Competent FC –Fairly Competent NC- Not Competent SD-Standard deviation

The Lecturers response as indicated in table 4.15 showed that 46.2% of the respondents were competent in using ERP in marks recording and 35.9% were competent in using ERP in examination administration in universities. Only 59.7% of them were fairly competent in result release 59.7% and 56.9% of them in result analysis. The findings indicate low responses of 15.3% of them indicated incompetency in marks recording and 15.4% of them in result analysis. The mean and standard deviation for individual factors are also close. The standard deviation of less than one indicated that the scores were close to one another but were spread in the four scores between one and four. Examination administration, result release, result analysis and marks recording were rated high with mean of between 1.71 and 1.97 respectively. The implication of this is that the Lecturers were on average competent in using ERP for the examination processes. This could be attributed to the in-servicing of the Lecturers in the use of ERP systems. Interviews with the IT personnel showed that universities were in the process of internally training the academic staff on using ERP in data management.

The findings of the current study showed that most of the respondents were fairly competent in the use of ERP in managing examination processes. This was an observation that concurred with Kajuna (2009) which indicated that most ot the respondents in the study were fairly competent in the use of ICT in teaching and learning. The current study differed with Kajuna (2009) which revealed that lack of enough knowledge and competency in other respondents was a challenge in ICT use. The respondents did not use technology in teaching because they did not have knowledge of computers. The illiteracy made technology integration ineffective. The current technology was said to be changing very fast and that teachers were overwhelmed because they did not have time to train in the advanced technology. Some teachers also indicated that most students especially first years entered the university completely computer illiterate so it was

difficult to use technology to teach them meaning they were not competent to use the technology.

The current study also differed with Otieno (2010) which revealed that all the company leaders were not qualified to use the company computers. They had only trained on the beginning of windows and DOS and the training was internal especially in the finance department and that ERP systems were perceived as being difficult and had a lot of complexities to understand and use. The complexity of the systems discouraged its adoption and led to greater difficulty in its implementation and further usage. The difference was in the nature of systems and the organization involved. The current study dealt with the university academic system.

4.5 The Role of ERP and Data Management in Academic Affairs in Universities

The study was to establish the role of ERP in data management in academic affairs in universities in western region of Kenya. The respondents were to investigate the role of ERP, extent of using ERP to access student's data and its efficiency. The null hypothesis that there is no statistically significant difference in accessing of data in the management of academic affairs in public universites in western region of Kenya as aresult of using ERP was tested.

4.5.1 Respondents Perception on the extent of Using ERP to Access Students' Data

The respondents were asked to establish the extent of using ERP in accessing students data and the findings are shown in table 4.16

Table 4.16: Descriptive Statistics on DVCs and Registrars Perception on the extent of Using ERP to Access Students Data

Access of	Extent of ERP use to access students' data in %									
Students data	VH	H	M	L	NAA	Mean	SD	X^2	df	sig
Admission details	50.0	37.5	12.5	0.0	0.0	1.63	0.719	0.762	2	0.683
Finance	37.5	25.0	12.5	12.5	12.5	2.38	1.455	1.778	2	0.411
Progress report	43.8	37.4	18.8	0.0	0.0	1.75	0.775	0.760	2	0.683
Exam results	50.0	31.2	18.8	0.0	0.0	1.69	0.793	0.762	2	0.683

Source:Field data, 2016, Key - VH-Very high, H-High, M-Moderate, NAA-Not at all SD-Standard deviation

The findings in table 4.16 indicated that 50% of the respondents showed very high extent on ease access of data on admission details and examination results of students respectively. 43.8 % of the respondents ranked very high in accessing data on the progress reports of students. The other response on access of data had moderate scores and therefore had little negative effect on accessing of students data in universities, 12.5 % of the responses were not able to access students' data on finance. The mean and standard deviation for individual factor were also close. This indicated that the respondents had same perception over the access of students' data using ERP. However, it is important to note that the standard deviation of more than one indicated that the scores were not close to one another but were spread in the five scores between one and five. Finance was rated high with mean of 2.8 while the rest were rated moderate with mean of one.

The findings in table indicate that there was significant relationship in DVCs and Registrars' perception on the use of ERP to access students data in universities as p>0.05 in accessing of all the students data. The hypothesis was rejected. For the characteristics whose association was significant, the extent of relationship was low. Further the findings on the Deans and CODs perception on the extent of using ERP to access students' data are presented in table 17.

Table 4.17: Descriptive Statistics on Deans and CODs Perception on the extent of Access of Students' Data

Access of	Extent of ERP use to access students' data in %									
Students data	VH	H	M	L	NAA	Mean	SD	X^2	df	sig
Admission details	43.8	35.4	14.6	6.2	0.0	1.83	0.902	4.917	2	0.086
Finance	41.7	29.2	20.8	8.3	0.0	1.96	0.983	18.260	2	0.000
Progress report	27.1	35.4	31.3	6.2	0.0	2.17	0.902	34.377	2	0.000
Exam results	29.8	48.9	17.0	4.3	0.0	1.96	0.802	45.000	2	0.000

Source: Field data, 2016 N=102, Key - VH-Very high, H-High, M-Moderate, NAA-Not at all SD-Standard deviation

The responses provided by the study in table indicated that their perception was high (2.00) on all the characteristics. The standard deviation is also less than one. This equally implies that there was low deviation in responses. The findings provided by Deans and CODs on examination results were rated high with 48.9% of the respondents agreeing while on Admission details it was rated very high with 43.8% agreeing that ERP enabled easy access of data. Access

of data on fees payment was also rated very high which is indicated by 41.7% of the responses while Progress report was rated moderate which is indicated by 31.3% and 20.8% of the responses respectively. The Deans and CODs represent the main academic management units in universities and accessing of data on students is crucial in enhanacing progress of students, this is made easier and faster when ERP is use. The Deans and CODs perception on the use of ERP to access students' data had varied outcomes as shown in the table. The Chi-square was used to establish the variation in responses as expressed by Deans and CODs. For all the factors, the null hypothesis there was no significant difference between the use of ERP and the access of students data was not rejected as $p<0.05$. For the characteristics whose association was significant, the extent of relationship was high. The perception of the Lecturers on the extent of easy access of students' data was sought and the findings are presented in table 4.18.

Table 4.18: Descriptive Statistics On Lecturers' Perception on the extent of Accessing of Students Data

Access of	Extent of ERP use to access students' data in %									
Students data	VH	H	M	L	NAA	Mean	SD	X^2	df	sig
Admission details	35.4	29.2	23.1	9.2	3.1	2.15	1.102	36.464	2	0.000
Finance	17.2	34.4	35.9	9.4	3.1	2.47	0.986	3.762	2	0.152
Progress report	22.6	30.6	37.1	9.7	0.0	2.34	0.935	14.486	2	0.001
Exam results	26.2	33.8	30.8	9.2	0.0	2.23	0.943	14.423	2	0.001

Source: Field data, 2016 N=297 , Key - VH-Very high, H-High, M-Moderate, NAA-Not at all

Responding to the extent of lecturers perception on the easy access of students data , 35.4% of the respondents indicated very high extent on accessing data on admission details , 34.4% of the respondents indicated high extent in accessing students data on finance and 33.8% of the respondents indicated high extent in accessing examination results and 30.6% of the respondents indicated high extent on the access of progress reports of students and 37.1% of the respondents indicated moderate extent of accessing data on progress reports for the students hence four types of students' data were at least easily accessed by the Lecturers. The responses provided by the lecturers indicate that their perception was high (2.00) on all the characteristics. The standard deviation was also less than one. This equally implied that there was total agreement when responses were made. There is only one factor where the standard deviation was more than one. These responses may have differed on admission details whose mandate falls under the office of the registrar academic. Standard deviation may be more than one because the lecturers are basically supposed to lecture mostly as opposed to admission of students. The findings in the table indicated that there was no relationship between the implementation of ERP and accesing of students data Lecturers did not agree that use of ERP could be used to access students data ($p<0.05$) except for financial use in which $p>0.05$ in universities. The hypothesis that there is no significant relationship between use of ERP and access of students data was not rejected except for financial use where $p>0.05$. For the characteristics whose association was significant, the extent of relationship was low except for the access of admission data.

4.5.5 Responses from academic staff after using ERP

The attitude of academic staff towards the use of ERP in accessing students' data is important in improving the quality of academics in universities. Table 4.18 presents the response of the academic staff after using ERP in the management of academic affairs

Table 4.19: Responses after Using ERP

Responses	DVC & Registrar %		Dean & CODs %		LECTURERS%	
Positive	10	62.5	74	72.2	153	51.5
Neutral	4	25.0	4	3.9	12	4.0
Negative	2	12.5	24	23.5	132	44.4
Total	16	100	102	100	297	100

Source:Field data, 2016

The findings in tables 4.18 indicated that 10(62.5%) of the DVCs and Registrars, 74 (72.2%) of the Deans and CODs and 153(51.5%) of the Lecturers showed positive responses on the effectiveness of using ERP. However 2(12.5%), 24(23.5%) and 132(44.4%) of respondents respectively were negative in their responses on the effectiveness of using ERP. However most of the respondents were therefore positive in using ERP to improve the quality of academics however a small number were not in agreement and others remained neutral. This could either be attributed to the absence of in-serving on the implemented ERP systems or the lack of integration in academic affairs all together.

4.5.1 The DVCs and Registrars Perception on Role of ERP in Securing Examination Data in the Management of Academic Affairs in Universities

Security of examination data in universities is one of the delicate subjects to deliberate. However those who are charged to secure examination have to ensure its safety by maintaining

standardized, consistent, confidential and centralized data. Table 4.20 shows the role of ERP in securing examination data in universities as reported by DVC & Registrar. .

Table 4.20: The Implementation of ERP and the Provision of Security for Examination Data in the Management of Academic Affairs in Universities

Roles of ERP	S %	NS %	mean	SD	X^2	df	sig
Standardization	14(87.5)	2(12.5)	1.13	0.342	0.327	1	0.568
Consistent data	14(87.5)	2(12.5)	1.13	0.342	0.327	1	0.568
Confidentiality	12(75)	4(25)	1.13	0.342	0.372	1	0.568
Centralization	13(81.2)	3(18.8)	1.00	0.000	0.572	1	0.468

Key: S=Secured NS= Not Secured, Source: Field data, 2016

Findings from the table showed that 14(87.5%) of the DVCs and Registrars agreed that ERP standardized and maintains consistent data, However 2(12.5%) of the respondents disagreed that ERP standardizes and maintains consistent data. This could be due to the lack of the implementation of ERP in the academic affairs in some of the universities studied. However the findings in the study indicate that majority of the respondents agreed that ERP standardizes, centralizes, maintains consistent and confidential data. The findings in table also indicated that the perception of the DVCs and Registrars showed that there was a relationship between the implementation of ERP and the provision of safety mechanism on examination data in the management of academic affairs in universities therefore the null hypothesis was rejected. Further the the Deans and CODs were to establish whether the implementation of ERP provided

safety mechanisms for examination data their perceptions are presented in table 4.2`.

Table 4.21: The Implementation of ERP and Provision of Security for Examination Data in the Management of Academic Affairs in Universities

Roles of ERP	S %	NS %	mean	SD	X^2	df	Sig
Standardization	92(90.2)	10(9.8)	1.24	0.428	0.356	1	0.551
Consistent Data	86(84.3)	16(15.7)	1.04	0.201	1.162	1	0.281
Confidentiality	86(84.3)	16(15.7)	1.07	0.248	1.894	1	0.169
Centralization	78(76.4)	24(23.6)	1.04	0.207	0.468	1	0.180

Key: S=Secured NS= Not Secured, Source: Field data, 2016

Findings from table indicated that 92(90.2%) and 86(84.3%) of the Deans and CODs agreed the ERP standardized and maintained consistent and confidential data respectively. However 10(9.8%), 16(15.7%) of the respondents and 16(19.8%) of them indicated that ERP did not secure data by standardizing and maintaining consistent data. This could be due to the lack of the implementation of ERP in academic affairs in some of the universities under study or incompetency on the part of the users. The findings in the study inducated that majority of the academic staff agreed that ERP standardized, centralized and maintained consistent and confidential data. The perception of the Deans and CODs that there is no significant difference between the role of ERP and provision of safety mechanism on examination data in academic affairs management was rejected as $p>0.05$. For the characteristics whose association was significant, the extent of relationship was low The lecturers views were also sought on the

provision of safety mechanisms on examination data and the findings are presented in table 4.22.

Table 4.22: The Implementation of ERP and Provision of Security for Examination Data in the Management of Academic Affairs in Universities

Roles of ERP	S %	NS %	Mean	SD	X^2	df	Sig
Standardization	129(43.4)	168(56.6)	1.14	0.348	6.552	1	0.010
Consistent Data	165(55.6)	132(44.4)	1.03	0.174	5.810	1	0.016
Confidentiality	189(63.6)	108(36.4)	1.06	0.244	0.012	1	0.914
Centralization	192(64.6)	105(34.4)	1.02	0.134	0.260	1	0.120

Key: S=Secured NS= Not Secured , Source:Field data, 2016

Findings from the table showed that 192(64.6%) and 189(63.6%) of the lecturers agreed that ERP standardized and centralized data. However 108(36.4%) of the respondents disagreed that ERP standardized and maintained consistent data. This could be due to minimal implementation of ERP in academic affairs in some of the universities under study. The findings in the study indicated that averagely the respondents agreed that ERP standardized centralized and maintained consistent and confidential data. The findings in table indicated that there was a significant difference in the role of ERP and the provision of safety mechanism of examination data in the management of academic affairs in universities except for Standardization and Consistent Data.The null hypothesis rejected as $p>0.05$ for confidentiality and centralization of data in academic affairs. For the characteristics whose association was significant, the extent of relationship was low. This could be attributed to engagement of lecturers in inservicing on ERP

system. The interviews showed that ERP inservicing had reached the level of Deans and CODs and the lecturers. Most of the interviewed IT personnel indicated that the universities strategic vision was to improve operational efficiencies and exchange information to maintain a competitive edge and quality of education offered and therefore automating the examination processes using ERP made work easier and more secured.

The findings of the current study on the role of ERP agreed with Pollock (2005). The similarity was in the application of ERP that brought together unrelated functions under the umbrella of one system. The difference was that it focused on the contribution of ERP in re-shaping universities and not providing security o examination data. The findings of this study were similar with those of that were reported by Penver (2012) that functionalities of oracle gave complete security to data that allowed the encryption of data and protected both the data in the operational database and the data from backups as it transits the network. Oracle Advanced Security doesn't need any additional configuration at the application level and provides a transparent encryption of all sensible system data it integrates management of encryption keys, transparent encryption of sensitive columns and transparent encryption of the entire table space and hardware security module integration.

The findings of the current study also agreed with those of Wang (2011) that focused on ERP systems and their centralized data storage and object reuse in large organizations. The study revealed that an illustrated ERP infrastructure and components on 12 application modules of SAP were used to centralized data in the USA and that ERP had astrong linear relationship with data centralization. It also indicated that twelve application modules were organized into the four categories in SAP. ERP systems functionality and organizations were able to integrate all functional units, standardize and manage information sharing within their entire departments and

then extended it to suppliers and customers in order for suppliers to expedite the delivery of necessary raw materials and also in order for customers to place an order faster and smoother.

The findings of the current study agreed with those of Carton (2000) which had the attributes of centralization and standardization at the core of the implementation of ERP. However the current study dealt with the role of ERP in providing data security in public universities while the reviewed study covered centralization of data in corporate organizations in German. Some of the respondents in the current study also said that ERP ensured confidentiality and consistency of data. This agreed with the findings of Holmstrom (2002) which revealed that ERP played an infrastuctural role of ensuring confidential and consistent data. The findings of the current study showed that the role of ERP in the provision of of security to data was in data confidentiality and consistency. This observation concurred with white paper (2000) which reported that ERP provided confidential and consistent data. Similarly Rico (2000) showed that universities of Wisconsin-superiorand Massachussetts and Wisconsin technical college adopted and integrated ERP to replace the legacy systems to ensure data standardization as a way of increasing operation efficiency in the university environment.

The findings of the current study on ERP use to access data agreed to some extent with those Rico (2000). The similarity was in large and voluminous data on admission and programmes offered of large number of students to be accessed propelled the universities to implement ERP in academic affairs to enable easy access of students' data. The difference was in the location and environment where the universities were found. The current study dealt with public universities in Kenya while the reviewed study covered universities in the USA.

Again the findings of the current study showed that majority of the respondents perceived that

ERP implementation enabled access of students' data to a larger extent. Similarly Hitt (2002) revealed that ERP implementation in California state university that had 23 compuses served 400000 students in accessing data on admission, finance and students records. Again Saide (2010) showed that universities in Kenya that had integrated ERP systems were able to capture and access data on students' finance and examinations because the systems had less human error.

Study findings on the responses after applying ERP in the current study indicated that majority of the respondents were positive in the use of ERP. This observation concurred with Finger (2001) which showed a positive perception towards the integration of ERP systems in management. The respondents realized that ERP was a powerful instrument when integrated in management of the ICT industry and telecommunication industry in S.A. the current study showed that the use of ERP had minimal negative responses. This observation also concurred with Otieno (2000) in which companies that had integrated ERP were completely positive with the upgrading of ERP systems that had increased income and services.

Again the findings of the current study on the responses after using ERP were similar to those reported by Kajuna (2009) indicated that despite the impediments that affected the effectiveness of ICTs in the university of Dar es salaam the respondents were positive in their attitude and they made effort to realize the implementation of ICTs. Also the findings concurred with Otieno (2000) who established that the various companies in Kenya that had integrated ERP were completely positive due to the upgrading that increased incomes and services.

4.6 The Application of ERP and Timely Management of Data in Academic Affairs in Universities

Respondents from the universities that had implemented ERP were asked to establish the application of ERP for the timely flow of information across departmental units in the management of academic affairs in universities in western region of Kenya. They were to indentify areas where ERP had been applied and the improvement witnessed with ERP application. The null hypothesis that there is no statisticallysignificantdifference between the timely information management of data as areult of the application of ERP tested.

4.6.1 The Application of ERP in Areas of Academic Affairs for Timely Data Management in Academic Affairs' Management

The respondents were asked to identify areas in academic affairs where ERP was applied for timely information flow. The findings on the responses of the DVCs and Registrars are summarized in table 4.23

Table 4.23: ERP Application and Timely Data Management in Various Departments for the Management of Academic Affairs

Applications	A %	NA %	Mean	SD	X^2	df	sig
Department	9(56.2)	7(43.8)	1.44	0.512	1.778	1	0.182
Admission	12(75.5)	4(25.5)	1.25	0.447	0.762	1	0.383
Time Tabling	12(75.5)	4(25.5)	1.25	0.447	0.762	1	0.383
Lesson Attendance	6(37.5)	10(62.5)	1.62	0.500	1.371	1	0.242
Examination	9(56.2)	7(43.8)	1.00	0.000	0.527	1	0.468
Teaching	9(56.2)	7(43.8)	1.00	0.000	1.778	1	0.182

Key: A= Applied NA= Not Applied, Source:Field data, 2016

Findings from the table indicated that areas of application of ERP for timely data management showed that 12(75.5%) of the respondents indicated that ERP had been applied in admission and timetabling and only 4(25.5%) had not applied had not applied in admission and timetabling respectively while 7(43.8%) of the respondents had not applied it in examination and teaching. However most of the respondents in the universities studied where ERP had been implemented had applied it in various academic activities. The DVCs and Registrars had different outcomes as presented in table where the Chi-square was used to establish the differences in the responses. For all the factors, the hypothesis that there was no statistically significant difference between timely management of data and the application of ERP was rejected as $p>0.05$ in all the areas of

ERP application. This showed that all the areas where ERP was applied or could be applied had higher possibilities of improvement in the management of academic affairs. For the characteristics whose association was significant, the extent of relationship was high.The Deans and CODs were asked to indicate areas where ERP had been applied and the findings are summarized in table 4.24

Table 4.24: ERP Application and Timely Data Management in Departments for the Management of Academic Affairs

Application of ERP	A %	NA%	Mean	SD	X^2	df	sig
Department	32(31.4)	70(68.6)	1.60	0.493	9.295	1	0.002
Admission	84(82.4)	18(17.6)	1.05	0.209	1.145	1	0.285
Time Tabling	80(78.4)	22(21.6)	1.11	0.316	1.894	1	0.169
Lesson Attendance	48(47.1)	54(52.9)	1.48	0.502	2.514	1	0.113
Examination	78(76.5)	24(23.5)	1.02	0.157	0.637	1	0.425
Teaching	66(64.7)	36(35.3)	1.11	0.313	3.127	1	0.077

Key: A= Applied NA= Not Applied Source:Field data, 2016

From table it was established that 84(82.4%) of the respondents had applied ERP in admission, 80(78.4%) of them had applied in timetabling and 78(76.5%) had applied in examinations while 18(17.6%) of the respondents indicated that it had not been applied in admission and 70(68.6%) had not applied in various departments. This could be attributed to the fact that some universities

had implemented ERP in the management of academic affairs while others had not. However the respondents in the universities studied where ERP had been implemented in academic affairs, indicated that it had been applied for the various academic activities.

The CODs and Deans perception on the application of ERP for timely information flow had varied outcomes as presented in Table 4.30 therefore the Chi-square was used to establish the variation in their responses. For all the areas of application of ERP, the null hypothesis that there is no significant differencebe tween timely data management and the the application of ERP was rejected as $p>0.05$ except for course coverage where $p<0.05$ hence not rejected. This showed that all the Deans and CODs had similar response on all the areas of ERP application. For the characteristics whose association was significant, the extent of relationship was low. Further the Lecturers were asked to indicate areas where ERP had been applied and the finding are summarized in table 4.25:

Table 4.25 : ERP Application and Timely Data Management in Academic Affairs

Application of ERP	A %	NA %	Mean	SD	X^2	df	sig
Department	268(88.9)	33(11.1)	1.82	0.388	11.622	1	0.001
Admission	168(56.6)	129(43.4)	1.15	0.358	0.369	1	0.543
Time tabling	153(51.5)	144(48.5)	1.16	0.371	0.981	1	0.322
Lesson attendance	120(40.4)	177(59.6)	1.33	0.473	18.931	1	0.000
Examination	153(51.5)	144(48.5)	1.04	0.191	2.944	1	0.086
Online teaching	150(50.5)	147(49.5)	1.04	0.191	3.304	1	0.069

Key: A= Applied NA= Not Applied Source:Field data, 2016

From table 4.25 it was established that 268(88.9%) of the Lectures had greatly applied ERP in course coverage and 153(51.5%) had applied in timetabling. Conversely 177(59.6%) of respondents had not applied ERP to lesson attendance while 33(11.1%) of them had not applied in departments. This could be attributed to the fact that some universities had implemented ERP in the management of academic affairs while others had not. However the respondents in the universities studied where ERP had been implemented had averagely applied it for the various academic activities.

The Lecturers' perception of the areas of application of ERP for timely management of data presented in the table had varied results. The Chi-square was used to establish the differences in responses as expressed by the lecturers for the areas of application of ERP. The findings

indicated that there was no statisticallysignificant relationship between the areas of application such as course coverage and lesson attendances as $p<0.05$ while other had significant difference as $p>0.05$. This showed that most of the Lecturers response on the other areas of application of ERP had some improvements. Hypothesis that there is no significant relationship between the application of ERP and the timely flow of information was therefore not rejected but rejected in others respectively. For the characteristics whose association was significant, the extent of relationship was low.

4.6.2 The Perception of DVCs and Registrars on ERP Application Of ERP for Timely Data Management and Improvements Enhanced in Academic Affairs

The respondents in universities that had applied ERP in various areas of academics were asked to indicate the improvements that had been enhanced with the application of ERP and the findings are summarized in table 4.26.

Table 4.26: Improvements Enhanced in Departments and Schools/Faculties as a Result of the Application of ERP

Improvements	I %	NI %	Mean	SD	X^2	df	sig
Internal communication	12(75.0)	4(25.0)	1.25	0.447	0.762	1	0.383
External communication	3(18.8)	13(81.2)	1.81	0.403	0.527	1	0.468
Internal coordination	12(75.0)	4(25.0)	1.25	0.447	0.762	1	0.383
External coordination	3(18.8)	13(81.2)	1.81	0.403	0.527	1	0.468
Information update	9(56.2)	7(43.8)	1.00	0.000	0.327	1	0.568
Consistent data	9(56.2)	7(43.8)	1.00	0.000	1.778	1	0.182
Secure storage of data	9(56.2)	7(43.8)	1.00	0.000	0.527	1	0.468

Key: I = Improvement NI = No Improvement Source:Field data, 2016

From table 12(75%) the respondents indicated that there was greatest improvement in internal communication and coordination and least improvement was noticed in external communication and coordination. The study therefore established that there were greater improvement in virtually all the areas of academics but externally there were minimal improvements. This could be attributed to disconnect amongst universities that even used different ERP systems. However on the overall the findings indicated great improvements in timely flow of information. However 81.2% of DVCs and Registrars did not notice improvements in eternal communication and coordination. The findings as indicated in table showed that the DVCs and Registrars had noted

improvement in the use of ERP in its application for the timely flow of ($p>0.05$). The hypothesis that there is no statistically significant difference between timely management of data and the application of ERP was rejected therefore there were improvements in areas of academic affairs where ERP was applied. For the characteristics whose association was significant, the extent of relationship was low. The Deans and CODs views were sought to indicate the improvements enhanced with the application of ERP and the findings are summarized in table 4.27

Table 4.27: Improvements Enhanced in Departments ind Schools/Facultiesas a Result of the Application of ERP

Improvements	I %	NI %	Mean	SD	X^2	df	sig
Internal communication	76(74.5)	26(25.5)	1.12	0.322	3.203	1	0.073
External communication	30(29.4)	72(70.6)	1.58	0.496	0.060	1	0.807
Internal coordination	78(76.5)	24(23.5)	1.09	0.292	2.493	1	0.114
External coordination	26(25.5)	76(74.5)	1.61	0.492	1.422	1	0.233
Information update	84(82.4)	18(17.6)	1.00	0.000	1.444	1	0.230
Consistent data	84(82.4)	18(17.6)	1.02	0.152	0.577	1	0.448
Secure storage of data	72(70.6)	30(29.4)	1.16	0.371	12.204	1	0.000

Key: I = Improvement NI = No Improvement Source:Field data, 2016

Findings from the table showed that there was great improvement in universities that had applied ERP. This was shown by 84(82.4%) of the respondents who indicated improvements in

information updates and consistent data flow. Improvement was also noted in internal communication and coordinationin which 78(76.5%) and 76(74.5%) of the respondentsindicated improvements respectively. However minimal improvement was also noticed in external communication and coordination. This was shown by 30(29.4%) and 26(25.5%) of the respondents who showed no improvements. Further 18(17.6%) of the respondents indicated no improvement in imformation update and consistent data respectively. Variation in responses led to the testing of the null hypothesis and the findings indicated that there was a statistically significant difference between timely management of data and the application of ERP as $p>0.05$. therefore the hypothesis was rejected except for secure storage of data whose $p<0.05$. The findings indicated great improvement in internal communication, external communication, internal coordination external coordination information update and consistent data. For the characteristics whose association was significant, the extent of relationship was low. Futher the views of the lecturers on enhanced improvements with the application of ERP were sought and the findings are summarized in table 4.28.

Table 4.28: Improvements Enhanced in Departments and Schools/Faculties as Result of the Application of ERP

Improvements	I %	NI%	Mean	SD	X^2	df	sig
Internal communication	174(58.6)	123(41.4)	1.11	0.315	0.747	1	0.387
External communication	105(55.6)	192(44.4)	1.44	0.498	51.200	1	0.000
Internal coordination	168(56.6)	129(43.4)	1.10	0.296	76.550	1	0.000
External coordination	87(29.3)	210(70.7)	1.49	0.501	2.500	1	0.114
Information update	156(52.5)	141(47.5)	1.02	0.136	1.444	1	0.230
Consistent data	153(51.5)	144(48.5)	1.04	0.191	2.944	1	0.086
Secure storage of data	237 (79.8)	56(20.2)	1.15	0.359	13.348	1	0.000

Key: I = Improvement NI = No Improvement Source:Field data, 2016

Findings from table 4.28 indicated that 237(79.8%), 174(58.6%) and 168(56.6%) of the respondents from the universities indicated that there was improvement in secure storage of data, internal communication and coordination respectively. However 210(70.7%) of the respondents indicated that there was no improvement in external coordination. This implied that on the overall universities that had integrated ERP in academic management experienced improvements in timely management of data. This also indicated that universities had not connected externally The findings on the Lecturers shown in table also indicated that averagely there was agreement that there was improvement in the application of ERP in the areas they

were applied to hence the tested hypothesis was rejected for internal communication, internal coordination, information update and consistent data as $p>0.05$. For the characteristics whose association was significant, the extent of relationship was low.

The finding of the current study concurred with those of Rudy (2010) which indicated that Enterprise Resource Planning (ERP) Systems had the potential to streamline Information flow processes. The respondents of the current study indicated the ERP had been applied in most of the academic areas to some extent agreeing with those of Rudy (2010). The similarity was in the application to streamline information flow in a large aerospace and defence company in accounting, finance and procument. The difference was because of the nature of of the area of application of ERP and the organization involved. The current study showed that ERP was majorly applied in departments, admission and time tabling. This concurred with the observation of Makokha (2013) which indicated that application of ERP in Kenyan universities was done in human resource students' affairs and finance and computer sciences. The difference was in the nature and the area of application that was involved. In the current study the application of ERP was for the purposes of manging academic affairs unlike the findings of Vajargah (2010) who focused on the application of ICTs in higher education in the case of Shahid Beheshti University in Tehran in Iran for the purposes of teaching and learning to enrich the curriculum through quick information flow.

The findings of the current study concurred to some extent with those of Sabau, (2009) which established that ERP system provided benefits for universities in terms of business and technical point of views in terms of improved internal communications; reduced or eliminated manual processes; enhanced strategic decision making and planning capabilities; established a self-service environment for employees; improved self-service environment for students and faculty;

enable higher availability of administrative systems; support sophisticated data analyses for use in decision-making; and reduced dependence on paper. The difference was that the current study was concerned with the application of ERP to academic affairs but the reviewed study covered the whole university management systems. The similarity of the reviewed study with the current study was on improvements in the internal management of academic affairs and minnmal improvement in external communication and co-ordination.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of the research findings, conclusions, recommendations and suggestions for further research. The study purposed to determine the efficiency of Enterprise Resource planning System Integration in the Management of Academic Affairs in Universities o f Western Region of Kenya. The objectives of this study were to determine the efficiency of the implementation of ERP in enhancing data accuracy for examination data processes, establish the hurdles encountered and role of ERP of accessing students' data in the provision of security for examination data and and establish the application of ERP and timely data management in managing academic affairs in universities in western region of Kenya. From the objectives themes were formulated for this chapter.

5.2 Summary of Research findings

This section provides the summary of the demographic variables and major findings whose themes were developed from the objectives.

5.2.1 Demographic data of respondents

From the study it was established that most of the DVCs and Registrars were males at 75% and 87.5% respectively, the Deans and CODs were at 80%and 77.4% males and the Lecturers were 58.4% males. All the DVCs, Deans and CODs were PhD holders. Most of the Registrars were PhD holders at 62.5% while Lecturers that were PhD holders were at 56.9%. In terms of

experience most of the DVCs were at 5-10 years, registrars 6-10 years Deans and CODs at 6-10 years and most of the Lecturers were at 0-5 years of experience. Most of the DVCs, Registrars, Deans and CODs were above 46 years of age except for the Lecturers where most of them were 41-45 years of age. Most of the universities involved in the study were established between 1-5 years and the most common course offered was education which had a large number of students.

5.2.2 Implementation of ERP and Enhancement of Data Accuracy in Examinations.

The study found out that 75% of the respondents in most of the universities had implemented ERP in the management of academic affairs, this was propelled by the increased number of universities, enrollments and programmes offered. The implementation of ERP was determined by the top level management of the universities, of the 75% DVCs and registrars indicated that ERP had ben implemented into the universities, 76. 5% of the Deans and CODs indicated that ERPhad been implemented in various areas of academics in their school and departments while 23.5% of them had not implemented ERP. At least 242(81.5%) of the Lecturers showed that ERPhad been implemented in academics while 55(11.5%) showed that it had not implemented ERP in academic.the highest level of implementation was in teaching and examinations. The study also revealed that majority of the respondents had integrated ERP in academics, 75.8% of the respondents indicated that ERP had been integrated into all the areas of management in academic affairs but 24.2% had not integrated in academic affairs. Different types of ERP had been integrated, the responses showed that 25% indicated that universities had implemented either dtata oracles, single ERP package, Navision or ABNO UNISOL in the management of academic affairs. However the type of ERP integrated did not have different influence on enhancement of data accuracy. Data accuracy was enhanced in academic affairs, this was indicated by 75% of the responded who showed that examination administration and marks

recording experienced very high extent of data accuracy while 12.5% showed that there was low extent of data accuracy. The findings also showed that there was sigincant difference between data accuracy and the implementation of ERP.

5.2.3 Challenges Encountered with the Use of ERP for the Provision of Security for Data in Universities

The findings indicated that prior to the implementation of ERP universities experienced the challenges in academic affairs, 69.5% indicated that missing marks and erroneous marks were some of the major challenges facing academic affairs while 75% showed that impersonation, awarding of wrong of degrees and classes of honours were minor challenge facing academic affairs.with the impelentation of ERP 58.3% indicated that the respondents were fairly competent in using ERP in marking recording and result release while 46.2% were competent in using ERP in handling almost all the examination data . On average therefore universities academic staff members were fairly competent in using ERP in the examination processes while 12.4% were not competent in using ERP to handle large sets of data. The use of ERP to prvide data securty was hampered by incompetencies in using the systems in academic processes.

5.2.4 ERP Use and Access of Students' Data in the Management of Academic Affairs

The study found out that 50% of the responded indicated that there was very high extent in data access on students admission, finance, progress reports and examination results while using ERP in academic affairs while 4.3% showed that there was low extent in accessing students' data in academic affairs on on admission, finance, and progress report and examination results. Further 72.2% indicated positivity on the role of ERP to access students' data while12.5% showed negativity on the role of ERP. With the provision of security, 90.2% indicated that ERP

standardized data and 87.5% showe d that ERP provided, consistent, confidential and centralized data in the management of academic affairs in universities while 18.8% of DVCs and Registrars , 23.6% of Deans and CODs and 44.4% of Lecturers indicated that data was not consistent and centralized while using ERP in academic affairs. The implementation of ERP influenced the safety of examination data in universities although some of the respondents did not agree with it.

5.2.5 Application of ERP and Improvements Attained in Data Management

The findings indicated that 88.9% of the respondents had applied ERP in various areas of academics especially in human resource, examination and timetabling while 21.6% had not applied to academic affairs in on line teaching, lesson attendance and course coverage. The study revealed that 75% 0f the respondents experienced great improvements in internal communication and coordination, information update and secure data storage. 81.2% experienced no improvements in external communication and coordination. The study proved that timely manaagemnt of data was attained with the application of ERP in areas of academic affairs like course coverage, HRM, time tabling, lesson attendance, examination and teaching.

5.3 Conclusion

Following the themes developed from the objectives of the study the following conclusions were made from the findings of the study as presented in chapter four.

5.3.2 Implementation of ERP and Enhancement of Data Accuracy

Findings on implementation and integration of ERPrevealed that universities had implemented

ERP in the management of academic affair processes. That was propelled by increased number of universities, enrollment and programmesoffered but 23.5% indicated that it had not been implemented. This led to the conclusion that most of the universities that had implemented and integrated ERP experienced enhanced data accuracy in academic affairs. Again universities hadf integrated diferent types of ERPin managing academic affairs. It was concluded that universities were interested in a type of ERP for the enhancement of data accuracy. The study indicated that implementation and integration of ERP had significant influence on data accuracy. It was concluded that accuracy of data in academic affairs was enhanced with the integration of ERP. It was also concluded that universities that had not implemented ERP in academic affairs experienced inaccuracies in managing voluminous data to some extent. Such universities did not realize the gains of implementing ERP.

5.3.3 Challenges Encountered by Univesirties in Using ERP for the Provision of Security for Examination Data

Findings indicated that prior to the implementastion of ERP universities experienced challenges in academic affairs that were related to missing marks and erroneous marks. This was due to the fact that data was stored on paper and on computers that were scattered in several offices. This led to the conclusion that implementing ERP provided solutions to the challenges facing examination processes such as missing marks and erroneous marks. The study also revealed that most of the respondents were fairly competent in using ERP in admissions and marks recording. This led to the conclusion that those who were incompetent in using ERP in result analysis release and marks recording posed a challenge by hampering the progressive use of ERP in academic affairs processes.

3.4 The role of ERP in Accessing Data in the Management of Academic Affairs

The universities that had implemented and integrated ERP in academic affairs posted very high extent in accessing students' data on admission, finance, progress report and examination results. This led to the conclusion that implementing and integratingERP in academic affairs inunivesirtes provided easier access of students' data and this translated into efficiency in the management of academic affairs in universities. Again the study found out that integrating ERP in managing academic affairs wass received positively by the respondents who perceived the role of ERP as having great impact on data access in various areas of academic affairs. The study also revealed a positive relationship between thw access of students' data and the role of ERP. It was concluded that universities that had integrated ERP embraced the role of technology in management. Again it was concluded that those who showed negativity towards ERP integration hampered its successful use and application in managing academic affairs. Again the study revealed that ERP centralized and standardized data and provided consisitent and confidential data. The study concluded that that integrating ERP had high rating on providing security for data in academic affairs. it was also concluded that dismal integration resulted into lower rating in scurty provision to data inunivesites academic affairs.

5.3.5 Application of ERP for Timely Management of Data

The study found out that ERP was applied in various areas of academic affairs such as human resource, examination, timetabling and admission. Minimal application was in online teaching, lesson attendance and course coverage. Universities that had applied ERP experienced great improvements in internal communication and coordination but minmal improvement was experienced in external communication and coordination. Also the stuy revealed that timely

management of data was affected by the application of ERP. The study concluded that universities that had applied ERP in various areas of academics witnessesd tremendous improvements in timely management of data in academic affairs processes. It was also concluded that external communication and coordination experienced minmal improvement due to the different operational nature of the universities.

5.4 Recommendations

From the conclusions drawn from the thems under the major objectives of the study the following recommendations were made.

5.4.1 Implementation of ERP and Enhancement of Data Accuracy

(i) Universities are encouraged to implement ERP systems in the management of academic affairs to realize enhanced data accuracy.

(ii) Implementation of ERP should be done in all levels of university management and not only academic affairs to ease coordination of university actitvities.

(iii) The commission for university education should encourage universities that had not implemented ERP in managing academic affairs to do so in order to enhance data accuracy.

(iv) Universities should engage more in embracing ERP systems which could modernize universities in realizing the full potential of technological use

5.4.2 Challenges Encountered by Universities in Using ERP for the Provision of Security for Examination Data

(i) The university academic staff members should be encouraged to embrace in service traings to facilitate competencies in using ERP systems in handling massive data.

(ii) Universities should be encouraged to resolve some of the examination challenges through the implementation of ERP that can handle voluminous data inorder to minimize errors.

5.4.3 The Role of ERP in accessing Data in the Management of Academic Affairs

(i) The university academic staff members are encouraged to embrace the use of ERP systems to manage data security.

(ii) The university academic staff members are encouraged to embrace the use of ERP for easier accessing of datain academic management.

(iii) The university's academic staff should be encouraged to positively perceive ERP in managing academic affairs inorder to maximize the benefits of the ERP systems.

5.4.4 Application of ERP for Timely Management of Data

(i) Universities are encouraged to apply ERP technology in both academics and non academic areas for timely data management.

(ii) The university academic management is encouraged to sensitize all the academic staff in applying ERP in their areas of specialization

(iii) The Commission for University Education should be encouraged to institute a policy that

encourage the application like ERP in managing academic affairs in universities to ensure timely management of data.

(iv) More priority and emphasis should be placed on teacher training in computer knowledge and skills, creation of technology plans at different levels and divisions, creation of technology committee to oversee all aspects of the use of technology

5.5 Suggestions for Further Research

On the basis of the findings of this study, the following suggestion were made for further research:

(i) Since there were universities that had not integrated ERP in academic affairs there was need to conduct research inorder to establish factors hindering the implementation of ERP.

(ii) There should be further research to investigate how other management sections of the university perceived the integration of ERP.

(iii) There should be a study carried out on ERP integration and its efficiency in other universities in other region in the country.

(iv) There should be further research on the effects of ERP integration on management practices in universities in the region.

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APPENDICES

APPENDIX (I): QUESTIONNAIRE TO THE UNIVERSITY DVC / REGISTRAR ACADEMICS)

DEAR SIR/MADAM

I am a student at MasindeMuliro University Science and Technology conducting a research on the Integration of Enterprise Resource Planning System **(**ERP) in management of academic affairs in universities in western region of Kenya, ERP system is an information technology organized to accomplish an information processing task.Therefore am seeking information on the topic and I appeal to you for your cooperation towards the fulfillment of this goal. Reponses to each of the following questions is essential to the survey. Please be assured that the information you give will be treated as confidential.

INSTRUCTIONS:

Do not write your name,

Fill in the space provided and tick where APPROPRIATE.

SECTION A: PERSONAL INFORMATION

1. Indicate your sex

1. Female..... ( )

2. Male..... ( )

2. Show your highest academic qualification

1. B.ed..... ( )

2. Masters..... ( )

3. PhD..... ( )

4. Others (specify)..... ( )

3. Indicate your area of specialization

.....

4. Indicate your age in years

1. 25 and below..... ( )

2. 26 – 30..... ( )

3. 31 – 35..... ( )

4. 36 – 40..... ( )

5. 41 – 45..... ( )

6. 46 – 50..... ( )

7. 51 – 55..... ( )

8. 56 and above..... ( )

5. Indicate the number of years you have worked in this university

1. 5 and below..... ( )

2. 6 – 10..... ( )

3. 11 – 15..... ( )

4. 16 – 20..... ( )

5. 21 – 25..... ( )

6. 26 and above.....( )

B) Implementation of ERP and enhancement of data Accuracy in Examination Processes

6. Write the name of the university----------

7. Indicate the type of university

Private ☐ Public ☐

8Indicate when the university established

1-5 years ☐ 5-10years ☐ 10-15rears ☐ 15-20years ☐ 20 and above ☐

9. Indicate the courses offered in the university. Tick where appropriate

S/N	**Courses Offered**	
1.	Education	
2.	Engineering	
3.	Agriculture	
4.	Law	
5.	Medicine	
6.	Health Science	
7.	Disaster Management	
8.	Others	

10. a) Does the university use ERP? YES/NO if YESShow is it being used? ----------

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b) if NO is the university having any plan of implementing the use of ERP? YES/NO. If YES which areas does the university intend to use ERP?

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11. Have you integratedthe use of ERP system in themanagement of academic affairs in the University? YES or NO if YES, Please tick the type ERP package integrated.

S/N	ERP Package	
1.	System application and products in data processing(SAP)	
2.	Database Oracle	
3.	Baan	
4.	J.DEdwards enterprise one	
5.	Ebizframe	
6.	Orion	
7.	PeopleSoft	
8.	Navision	
9.	Other/Multiple	
10.	Single ERP Package	
11.	Best-of-Breed from different packages	
12.	Single ERP with other systems	
13.	Multiple ERP with other systems	
14.	ABN UNISOL	
15	Others(Specify)	

12. To what extent has the implementation of ERP ensured the accuracy of the following examination processes.

S/N	Examination Process	Extent				
		very high	high	moderate	low	not at all
1.	Exam administration					
2.	Marks recording					
3.	Result analysis					
4.	Result release					
5.	Storage of results					
6.	Others (specify)					

C. THE HURDLES ENCOUNTERED BY UNIVERSITIES IN THE USE OF ERP FOR THE PROVISION OF DATA SECURITY

13. The following are some of the challenges facing the determination of the accuracy of examination processes indicate the ones facing your University

S/N	Examination challenges	YES	NO
1.	Leakage of examinations		
2.	Erroneous marks		
3.	Missing marks		
4.	Others(specify please)		

14. Indicate whether the use of ERP has resolved the following data problems

S/N	CHALLENGES	Yes	No
1.	Missing marks		
2.	Wrong allocation of degrees		
3.	Wrong allocation of classes of honour		
4.	Impersonation of graduands		
5	Others (please specify)		

15. Indicate whether the staff is competent in the use of ERP in determining data accuracy

S/N	Students Data	Competent	Fairly competent	Not competent
1.	Exam administration			
2.	Marks recording			
3.	Result analysis			
4.	Result release			
5.	Others (please specify)			

C. THE ROLE OF ERP IN ACCESSING DATA IN UNIVERSITIES

16. Please tick the appropriate roles thatjustified the efficiency of the integration of the ERP system in managing academic affairs.

S/N	Reasons for integrating ERP	
1.	Standardization of processes	
2.	Maintenance of consistent data	
3.	Confidentiality of data	
4.	Meeting ISO requirements	
5.	Others(please specify)	

17. To what extent has the use of ERP led to easy access of the following students' data?

S/N	Student Data	Extent				
		Very High	High	Moderate	Low	Not At All
1.	Admission Details					
2.	Fees payment					
3.	Progress report					
4.	Examination results					
5.	Others (specify)					

18. What were stakeholders' responses after using ERP? (Positive, Neutral, Negative)

E. THE APPLICATION OF ERP AND TIMELY MANAGEMENT OF DATA IN ACADEMIC AFFAIRS OF UNIVERSITIES

19. Indicate some of the areas where ERP can be or is applied for the timely information flow across the management system.

S/N	Areas where ERP can be applied	YES	NO
1.	Course coverage		
2.	Human resource management		
3.	Allocation of lessons/timetabling		
4.	Lesson attendance		
5.	Examination		
6	On-line teaching		
7	Others(please specify)		

20. Indicate are some of the improvements of using ERP as applied for the timely information flow across departmental sub units.

S/N	Improvement with ERP applications	YES	NO
1.	Internal communication		
2.	External communication		
3.	Internal coordination		
4.	External coordination		
5.	Information update		
6.	Consistent data		
7.	Secure storage		
8.	Others(please specify)		

APPENDEX (II) QUESTIONNAIRE TO THE UNIVERSITY CHAIRS OF DEPARTMENT/DEANS

DEAR SIR/MADAM

I am a student at MasindeMuliro University Science and Technology conducting a research on the Integration ofEnterprise Resource Planning System (ERP) in management of academic affairs in universities in western region of Kenya,ERP system is an information technology organized to accomplish an information processing task, therefore am seeking information on the topic and I appeal to you for your cooperation towards the fulfillment of this goal. Reponses to each of the following questions is essential to the survey. Please be assured that the information you give will be treated as confidential.

INSTRUCTIONS:

Do not write your name,

Fill in the space provided and tick where APPROPRIATE.

SECTION A: PERSONAL INFORMATION

1. Indicate your sex

1. Female..... ( )

2. Male..... ( )

2. Show your highest academic qualification

1. B.Ed..... ( )

2. Masters..... ( )

3. Ph.D..... ( )

4. Others (specify)..... ( )

3. Indicate your faculty/school

.....

4. Indicate your age in years

1. 25 and below..... ( )

2. 26 – 30..... ( )

3. 31 – 35..... ( )

4. 36 – 40..... ( )

5. 41 – 45..... ( )

6. 46 – 50..... ( )

7. 51 – 55..... ( )

8. 56 and above..... ( )

5. Indicate the number of years you have worked in this university

1. 5 and below..... ( )

2. 6 – 10..... ( )

3. 11 – 15..... ( )

4. 16 – 20..... ( )

5. 21 – 25..... ( )

6. 26 and above.....( )

B) THE IMPLEMENTATION ERP IN MANAGING THE ACCURACY EXAMINATION PROCESSES IN UNIVERSITIES

6. Write the name of the following

School/faculty----------

Department----------

8. Write e the sub-units in the department/school in the table below

S/N	Sub- units
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

10.a) Does the university use ERP? YES/NO if YESShow is it being used? ----------

b) if NO is the university having any plan of implementing the use of ERP? YES/NO.If YES which areas does the university intend to use ERP?

---

11. Have you integrated use of ERP in faculty/departmentalfor the management of academic affairs? YES or NO if YES indicate the type of ERP integrated

Please tick the type of ERP package

S/N	ERP Package	
1.	System application and products in data processing(SAP)	
2.	Database Oracle	
3.	Baan	
4.	J.DEdwards enterprise one	
5.	Ebizframe	
6.	Orion	
7.	PeopleSoft	
8.	Navision	
9.	Other/Multiple	
10.	Single ERP Package	
11.	Best-of-Breed from different packages	
12.	Single ERP with other systems	
13.	Multiple ERP with other systems	
14.	Others(Specify)	

13. To what extent has the use of ERP ensured accuracy of the following examination processes

.S/ N	Examination Process	Extent				
		very high	High	moderate	Low	not at all
1.	Exam administration					
2.	Marks recording					
3.	Result analysis					
4.	Result release					
5.	Others (specify)					

C.THE HURDLES ENCOUNTERED BY UNIVERSITIES IN THE USE OF ERP FOR THE PROVISION OF DATA SECURITY

14. Indicate whether the staff is competent in the use of ERP in determining examination data accuracy

S/N	Examination Process	Competent	Fairly competent	Not competent
1.	Exam administration			
2.	Marks recording			
3.	Result analysis			
4.	Result release			
5.	Others (specify)			

THE

12. The following are some of the challenges facing the determination of the accuracy of examination processes indicate the ones facing your University

S/N	Examination challenges	YES	NO
1.	Leakage of examinations		
2.	Erroneous marks		
3.	Missing marks		
4.	Others(specify please)		

16. Indicate whether the use of ERP has resolved the following graduation data problems in your school/department

S/N	Graduation data problems	Yes	No
1.	Missing marks		
2.	Wrong allocation of degrees		
3.	Wrong allocation of classes of honour		
4.	Impersonation of graduands		
5.	Others (please specify)		

D. THE ROLE OF ERP IN ACCESSING DATA IN UNIVERSITIES

17. To what extent has the use of ERP lead to easy access of the following students' data in your school/department?

S/N	Student Data	Extent				
		Very High	**High**	**Moderate**	**Low**	**Not At All**
1.	Admission Details					
2.	Fees payment					
3.	Progress report					
4.	Examination results					
5.	Others (specify					

18. Please tick the appropriate roles thatjustified the efficiency of the integration of the ERP system in managing academic affairs.

S/N	Reasons for integrating ERP	
1.	Standardization of processes	
2.	Maintenance of consistent data	
3.	Confidentiality of data	
4.	Meeting ISO requirements	
5.	Others(please specify)	

19. Indicate the departmental/ school staff responses after using ERP (Positive, Neutral, Negative) ----------

E. THE APPLICATION OF ERP AND TIMELY MANAGEMENT OF DATA IN ACADEMIC AFFAIRS OF UNIVERSITIES

20. Indicate some of the areas where ERP can be or is applied for the timely information flow across the management system.

S/N	Areas where ERP can be applied	YES	NO
1.	Course coverage		
2.	Human resource management		
3.	Allocation of lessons/timetabling		
4.	Lesson attendance		
5.	Examination		
6.	On-line teaching		
7.	Others(please specify)		

21. Indicate are some of the improvements of using ERP as applied for the timely information flow across departmental sub units.

S/N	Improvement with ERP applications	YES	NO
1.	Internal communication		
2.	External communication		
3.	Internal coordination		
4.	External coordination		
5.	Information update		
6.	Consistent data		
7.	Secure storage		
8	others (please specify)		

APPENDIX (III): QUESTIONNAIRE TO THE UNIVERSITY LECTURERS

DEAR SIR/MADAM

I am a student at Masinde Muliro University Science and Technology conducting a research on the efficiency of the Integration ofEnterprise Resource Planning System (ERP) in management of academic affairs in universities in western region of Kenya, ERP system is an information technology organized to accomplish an information processing task, therefore am seeking information on the topic and I appeal to you for your cooperation towards the fulfillment of this goal. Reponses to each of the following questions is essential to the survey. Please be assured that the information you give will be treated as confidential.

INSTRUCTIONS:

Do not write your name,

Fill in the space provided and tick where APPROPRIATE.

SECTION A: PERSONAL INFORMATION

1. Indicate your sex

1. Female..... ( )

2. Male..... ( )

2. Show your highest academic qualification

1. B.Ed..... ( )

2. Masters..... ( )

3. Ph.D..... ( )

4. Others (specify).....( )

3. Indicate your area of specialization

.....

4. Indicate your age in years

1. 25 and below..... ( )

2. 26 – 30..... ( )

3. 31 – 35..... ( )

4. 36 – 40..... ( )

5. 41 – 45..... ( )

6. 46 – 50..... ( )

7. 51 – 55..... ( )

8. 56 and above..... ( )

5. Indicate the number of years you have worked in this university

1. 5 and below..... ( )

2. 6 – 10..... ( )

3. 11 – 15..... ( )

4. 16 – 20..... ( )

5. 21 – 25..... ( )

6. 26 and above..... ( )

B) THE IMPLEMENTATION OF ERP IN MANAGING THE ACCURACY OF EXAMINATION PROCESSES IN UNIVERSITIES

6. Indicate the course you teach

7.a) Does the university use ERP? YES/NO if YEShow is it being used? ----------

b) if NO is the university having any plan of implementing the use of ERP? YES/NO.If YES which areas does the university intend to use ERP?----------

8. Have you integrated use of ERP in the management of your course? YES or NO if YES indicate the type of ERP integrated

Please tick the type of ERP package

S/N	**ERP Package**	
1.	System application and products in data processing(SAP)	
2.	Database Oracle	
3.	Baan	
4.	J.DEdwards enterprise one	
5.	Ebizframe	
6.	Orion	
7.	PeopleSoft	
8.	Navision	
9.	Other/Multiple	
10.	Single ERP Package	
11.	Best-of-Breed from different packages	
12.	Single ERP with other systems	
13.	Multiple ERP with other systems	
14.	Others(Specify)	

C. THE HURDLES ENCOUNTERED BY UNIVERSITIES IN THE USE OF ERP FOR THE PROVISION OF DATA SECURITY

9. To what extent has the use of ERP ensured accuracy of the following examination processes

.S/N	Examination Process	Extent				
		very high	high	Moderate	Low	not at all
1.	Exam administration					
2.	Marks recording					
3.	Result analysis					
4.	Result release					
5.	Others (specify)					

10. Indicate whether you are competent in the use of ERP in determining examination data accuracy

S/N	Examination Process	Competent	Fairly competent	Not competent
1.	Exam administration			
2.	Marks recording			
3.	Result analysis			
4.	Result release			
5.	Others (specify)			

11. The following are some of the challenges facing the determination of the accuracy of examination processes indicate the ones facing your University

S/N	Examination challenges	YES	NO
1.	Leakage of examinations		
2.	Erroneous marks		
3.	Missing marks		
4.	Others(specify please)		

12. Indicate whether the use of ERP has resolved the following data problems

S/N	CHALLENGES	Yes	No
1.	Missing marks		
2.	Wrong allocation of degrees		
3.	Wrong allocation of classes of honour		
4.	Impersonation of graduands		
5.	Others (please specify)		

D. THE ROLE OF ERP IN ACCESSING DATA IN UNIVERSITIES

13. Please tick the appropriate roles thatjustified the efficiency of the integration of the ERP system in managing academic affairs.

S/N	Reasons for integrating ERP	
1.	Standardization of processes	
2.	Maintenance of consistent data	
3.	Confidentiality of data	
4.	Meeting ISO requirements	
5.	Others(please specify)	

14. To what extent has the use of ERP lead to easy access of the following students' data?

S/N	Student Data	Extent				
		Very High	High	Moderate	Low	Not At All
1.	Admission Details					
2.	Fees payment					
3.	Progress report					
4.	Examination results					
5.	Others (specify					

15. What is your response after using ERP? (Positive, Neutral, Negative)----------

E. THE APPLICATION OF ERP AND TIMELY MANAGEMENT OF ACADEMIC AFFAIRS OF UNIVERSITIES

16. Indicate some of the areas where ERP can be or is applied for the timely information flow across the management system.

S/N	Areas where ERP can be applied	YES	NO
1.	Course coverage		
2.	Human resource management		
3.	Allocation of lessons		
4.	Lesson attendance		
5.	Examination		
6	On-line teaching		
7	Others(please specify)		

17. Indicate are some of the improvements of using ERP as applied for the timely information flow across departmental sub units.

S/N	Improvement with ERP applications	YES	NO
1.	Internal communication		
2.	External communication		
3.	Internal coordination		
4.	External coordination		
5.	Information update		
6.	Consistent data		
7.	Secure storage		
8.	Others (please specify)		

APPENDIX (IV): INTERVIEW SCHEDULE FOR THE UNIVERSITY INFORMATION TECHNOLOGY TECHNICIAN

1. What is your position in this university?
2. How long have you worked in this university?
3. What is the university position on integrating technology in its management system?
4. Has the university integrated Enterprise Resource Planning System **(**ERP) in its management system fully?
5. Did you consider upgrading your IT infrastructure to allow ERP to fit in?
6. Are there policies pertaining the use of ERP in the management of academic affairs?
7. Before integrating ERP in the management of academic affairs how was the university managing its academic affairs?
8. Were the systems that were being used efficient?
9. What were the problems that were experienced in examination data management before the introduction of ERP?
10. Does the use of ERP ensure data standardization, consistency and confidentiality of examination data?
11. Does the use of ERP ensure timely flow of information across all management sections of the university?
12. Does the use of ERP ensure accuracy in examination processes?
13. Does the use of ERP ensure easier access of students' data?
14. How fast does the use of ERP ensure quick information flow?
15. Do you offer training to the university staff on the use of ERP?

16. In your opinion has the inclusion of ERP improved the management of academic affairs?

APPENDIX (V): DOCUMENT ANALYSIS GUIDE

S/N	Document	Analyzed	Not Analyzed	Action
1.	IT infrastructure records			
2.	Performance of the legacy systems records			
3.	Policy documents on the implementation of ERP			
4.	Policy on ERP literacy			
5.	Policy on academic affairs management			
6.	Policy document on technology integration			

APPENDIX (VI): RESEARCH AUTHORIZATION

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. NACOSTI/P/16/28568/12758

Date: 31st August, 2016

Berita Singoro
Masinde Muliro University of
Science and Technology
P.O. Box 190-50100
KAKAMEGA.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Enterprise resource planning system integration and its efficiency in the management of academic affairs,"*** I am pleased to inform you that you have been authorized to undertake research in **Bungoma County** for the period ending **26th August, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Bungoma County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Bungoma County.

The County Director of Education
Bungoma County.

APPENDIX (VII): RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MS. BERITA - SINGORO
of MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY, 165-50200 Bungoma,has been permitted to conduct research in *Bungoma County*

on the topic: *ENTERPRISE RESOURCE PLANNING SYSTEM INTEGRATION AND ITS EFFICIENCY IN THE MANAGEMENT OF ACADEMIC AFFAIRS.*

for the period ending:
26th August,2017

Permit No : NACOSTI/P/16/28568/12758
Date Of Issue : 31st August,2016
Fee Recieved :Ksh 2000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officer will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one (1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

HARAMBEE

REPUBLIC OF KENYA

NACOSTI

National Commission for Science, Technology and Innovation

RESEACH CLEARANCE PERMIT

Serial No.A 10789

CONDITIONS: see back page