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FACTORS INFLUENCING THE IMPLEMENTATION OF ENTERPRISE RESOURCE PLANNING SYSTEMS: A CASE STUDY OF KENYA MEDICAL RESEARCH INSTITUTE (KEMRI)

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION (MBA) AT STRATHMORE UNIVERSITY

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NAIROBI, KENYA

NOVEMBER 2021

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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Gilbert Kiplagat Kugun

30th September 2021

Approval

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ABSTRACT

Enterprise Resource Planning (ERP) system unifies an organization by providing a platform that allows seamless flow of processes from one department to another through an integrated system. The main goal of an ERP is to ensure that there is a central repository of information for an organization. ERP systems improves the efficiency of an organization through automated processes and workflows. Implementation of ERP systems is time consuming, involving, and an expensive affair. Previous studies have indicated that there is a high failure rate of ERP implementations and therefore organizations need to be aware of factors that can help improve the success of ERP implementation. This study aimed at analyzing factors that influence ERP implementations based on a case study at Kenya Medical Research Institute (KEMRI), using the Technology-Organization-Environment theoretical framework. This study employed descriptive survey research design. The data collection comprised semi-structure questionnaire administered as an online survey and face to face interviews. Stratified sampling targeted 318 employees who participated in the ERP implementation out of a population of 971 permanent staff. Data analysis was done through descriptive statistics to describe the distribution of the data collected. Regression and correlation analysis were used to examine the relationship between factors influencing ERP implementation and the success of ERP implementation. The significance of the regression model was tested by carrying out Analysis of Variance (ANOVA). The study revealed a positive correlation between the organizational factors (top management support, change management, project management and business process reengineering) technological factors (ICT infrastructure, Strong ERP product and technical expertise) and environmental factors (ICT Authority Involvement) and ERP implementation. The study recommended that the organizational factors, technological factors and environmental factors be well considered by the management of KEMRI as well as other related public institutions in Kenya for effective ERP implementation.

Key words: *ERP implementation, organizational factors, technological factors, environmental factors, KEMRI*

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LIST OF ABBREVIATIONS

CDC	-	Disease Control and Prevention
COVID-19	-	Coronavirus Disease 2019
ERP	-	Enterprise Resource Planning
IBM	-	International Business Machines
ICT	-	Information and Communication Technology
JICA	-	Japan International Cooperation Agency
KEMRI	-	Kenya Medical Research Institute
KWTRP	-	KEMRI's Wellcome Trust Research Programme
MRP	-	Materials Requirements Planning
NACOSTI	-	National Commission for Science, Technology and Innovation
SAP	-	Systems Applications and Products
SPSS	-	Statistical Package for Social Science
TOE	-	Technology Organization Environment
USAID	-	United States Agency for International Development
WHO	-	World Health Organization

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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The evolution of Enterprise Resource Planning (ERP) system can be traced back nearly 60 years ago in early 1960s when Inventory management control system was first invented (Arik Ragowsky, 2002). Early 1970s saw the invention of an improved version of Inventory management control system known as Materials Requirements Planning (MRP) System that focused on planning and production based on a production schedule (Mabert, et al., 2003). In 1980s, further invention led to the development of Manufacturing Resource Planning (MRP II) system that optimized the manufacturing process by ensuring synchronization of material and production requirements (Katuu, 2020).

The emergence of ERPs took place in the early 1990s that could run on multiple platforms and provided integration of business process within an organization. There was also extension of the features to include CRM and SCM (Tian & Xu, 2015). In 2000s, three tier architecture was introduced whereby the ERP was presented in presentation layer that interacted with the end user, the middle layer architecture and the database layer architecture (Laudon & Laudon, 2018). Beyond 2010,the ERP began moving towards multiple platforms and transformation to cloud based solution while embracing digital technology like artificial intelligence (Katuu, 2020).

ERP implementation is a complex affair that can either lead to failure or success. According to (Kumar & Gupta, 2012), some of the reasons for ERP implementation failure include; budget issues, coordination issues, poor ERP selection, absence of consultant, unfriendly user interface and customization issues. ERP implementation done right can lead to improved operational efficiency of an organization (Laudon & Laudon, 2018). This study therefore focuses on the factors affecting ERP implementation with a focus on Kenya Medical Research Institute (KEMRI). Key factors deemed to affect ERP implantation according to Laudon and Laudon, (2018) are Organizational, Technological and Environmental factors.

Organizational factors have been identified as some of the factors which cut across many organizations and some that are unique to certain organizational sectors. These organizational factors are those factors that are within an organization's control (Dhabi et al., 2010). When change is introduced in an organization, top management support is very critical in the adoption

of the new ways. An ERP implementation in an organization is normally regarded as a major change affecting the operations of an organization (Abdelghaffar & Azim, 2010). An ERP implementation project that has the backing of management at various levels can be positively perceived by the end users and technical staff

Technological factors mainly focus on the hardware equipment, network infrastructure and software within an organization. The success of system adoption is highly dependent on identifying the technological variables on the relationship between ERP and performance (Egdair et al., 2015). For an ERP to be implemented in an organization, there should be adequate infrastructure to support the use of the ERP for day to day operations (Dagher & Kuzic, 2011). ERP Implementation involves a complex transition from legacy systems to an integrated IT infrastructure (YMohmed AL-SABAAWI & Mohmed Al-sabaawi, 2015). According to Awa and Ojiabo (2016), ICT infrastructure is a very critical factor in the adoption of an ERP system.

Environmental factors are those outside the organization but have a great influence in the adoption of technology in the organization. According to Tornatzky and Fleisher (1990), the environmental factors include the government regulations, industry competitiveness and Industry structure. According to Yen and Sheu (2004),as much as technological factors are important, competitive strategy is also important in ERP implementation to differentiate an organization among its competitors. According to Tornatzky and Fleischer (1990), government regulation can have a detrimental effect or a beneficial effect in regards to technological innovation and adoption. The Government especially in the developing world need to establish regulations that can support ERP adoption by removing technical barriers and also have educational programs that can enhance ERP adoption (Laumer & Eckhardt, 2012).

1.1.1 Enterprise Resource Planning System

An Enterprise Resource Planning (ERP) system is an information system that is integrated and used to support business processes and resource management in an organization (Z. Hasibuan & Dantes, 2012). ERP systems connect all the departments of an organization in order to enhance seamless flow of information from one department to another (Jacobs, 2007). In addition, ERP systems provide a good platform to enforce automated controls within an organization.

ERP systems have different modules that supports different functions (Bahssas, AlBar, and Hoque 2015). In addition, the systems allow data to be collected from main business processes in finance, human resources, sales, manufacturing etc into a single central data repository (Laudon & Laudon, 2018). Examples of Enterprise resource planning systems that have been created by major software vendors in the world include SAP business suite, Microsoft Dynamics suite (majorly for small and medium size organizations) and Oracle E-business suite (Laudon & Laudon, 2018).

The main benefit of an ERP is the value created by increase in operational efficiency and availability of firmwide information for decision making by managers (Laudon & Laudon, 2018). Furthermore, and ERP leads to streamlined business processes and integration of all the departments into one unified technological platform (Sundara, et al., 2021). ERP implementation is an entire process that involves change in an organization (Laudon & Laudon, 2018). Proper identification of factors influencing implementation of ERPs in organizations is an important exercise so as to increase the chances of succeeding (Monk & Wagner, 2012). It is therefore important for organizations implementing ERP systems to be aware and have control on the factors influencing ERP implementations to increase the success rate of the implementation.

Scholars have in the recent past proposed models that help in explaining the factors that influence the adoption of innovations and systems. One such model is the Technology Organization Environment (TOE) developed by Tornatzky and Fleischer (1990). This model categorizes the factors into three main categories i.e Organizational, Technological and Environmental contexts.

Afaneh, Alhadid, and Almalahmeh (2015) categorized the factors that influence the implementation of ERP into two major categories namely Organizational and Technological factors and affirmed that they significantly impact an ERP implementation. Previous studies

have identified some of the major organizational factors to include top management support, business process re-engineering, change management and project management (Sundara, et al., 2021; Kaaria & Njuguna, 2019). In addition, the main technological factors identified previously include technological infrastructure, Strong ERP product and technical expertise (Afaneh et al. 2015).

1.1.2 Implementation of Enterprise Resource Planning System in Kenya's public sector

The implementation of Enterprise Resource Planning System has been an area of concern to public institutions in Kenya. The sectors include learning institutions, service provisions institutions, commercial public organizations, regulators among others (Njihia & Mwirigi, 2014). Kenya has experienced a conglomeration in equal measure of breakthroughs and failure of ERPs. Despite the pertinent adoption of these systems, the expected feedback in terms of profitability still grapples with diminishing hopes of market share in relation to competitive advantage (Macharia, 2019). More so, the public sector has continuously reported failing terribly as far as service delivery is concerned and the outcry of the ordinary citizen fails to surpass the selfish interest of political groups due to dereliction of their responsibilities.

The implementation of ERPs is beneficial to an organization despite the time taken and resources consumed in its implementation. The systems facilitate timeliness of resources and information which then improves business processes and efficiency (Nzuki & Okelo-Odongo, 2015). In addition, the adoption allows the security and safety of information stored. As a result, organizations achieve customer satisfaction through their expansion whereby processes are scaled up (Ogada, 2013). ERP adoption is tasked with the mandate of ensuring that an organization has high data security to facilitate various processes relating to growth. The benefit of this integration ensures that customer satisfaction is enhanced through the provision of timely responses and also facilitate that the customer received quality products and services within the stipulated time. The implementation of ERP in Kenya's public sector, however, has been marred with failures. Failure of ERP implementation was witnessed at Kenya Generating Company and communication Authority (Macharia, 2019).

1.1.3 Kenya Medical Research Institute

Public research institutes in Kenya were established in order to play a critical role in enhancing research and innovation in the country. Kenya Medical Research Institute (KEMRI) is one of the public research institutes in Kenya playing a central role in health research. KEMRI being a state corporation, was established through the Science and Technology (Amendment) Act of 1979. This act has since been amended to Science, Technology, and Innovation Act 2013. KEMRI's main mandate as a national body is to carry out health research in Kenya (KEMRI, 2019). KEMRI is a leading Public research institution dealing with human health research in Kenya. The organization has been recognized in Africa and globally for its immense contribution in the health research and currently playing a critical role in fighting the COVID 19 Pandemic (KEMRI, 2019).

KEMRI is expected to liaise and collaborate with other relevant local and foreign bodies in carrying out research and related activities. Such local bodies include National Commission for Science, Technology and Innovation (NACOSTI), Ministry of Health and the Medical Sciences Advisory Research Committee. Foreign bodies that collaborate with KEMRI include World Health Organization (WHO), Wellcome Trust, Japan International Cooperation Agency (JICA), US Centers for Disease Control and Prevention (CDC), and United States Agency for International Development (USAID) among others (KEMRI, 2017). To enable the organization to collaborate and integrate its functions effectively, KEMRI has adopted ERP systems. KEMRI's Wellcome Trust Research Programme (KWTRP) is one of the research centres in Kenya that has successfully adopted the use of technology by implementing ERP to enhance efficiency in its program operations (KEMRI, 2017). However, continuous failure of the ERP has raised concerns among policymakers and KEMRI management.

The main reason for selecting KEMRI for this study was because the organization, being a public research institute, recently (in the year 2019) implemented an ERP in order to improve productivity and efficiency of the organization (Sophia & Owuor, 2015). KEMRI faced several challenges in the implementation Enterprise Resource Planning software system which was attributed to various factors including inadequate resources to finance the implementation of the ERP, technological and environmental factors (Wandera, 2012; Kaaria & Njuguna, 2019). Secondly, this is the third time that KEMRI implemented an ERP after failing twice in

the past. The study gave insights into factors that influenced the successful implementation of the ERP. Thirdly, KEMRI is a parastatal in Kenya and therefore the results of the study gives insights on ERP implementations in Kenya especially in the public research institutes where KEMRI is a representative organization and also the public sector at large.

1.2 Problem Statement

The implementation of Enterprise Resource Planning System has been an area of concern to public institutions in Kenya. The sectors include learning institutions, service provisions institutions, commercial public organizations, regulators among others (Njihia & Mwirigi, 2014). Kenya has experienced a conglomeration in equal measure of breakthroughs and failure of ERPs. Despite the pertinent adoption of these systems, the expected feedback in terms of profitability still grapples with diminishing hopes of market share in relation to competitive advantage (Macharia, 2019). More so, the public sector has continuously reported failing terribly as far as service delivery is concerned and the outcry of the ordinary citizen fails to surpass the selfish interest of political groups due to dereliction of their responsibilities. The implementation of ERP in Kenya's public sector, however, has been marred with failures. Failure of ERP implementation was witnessed at Kenya Electricity Generating Company and Communication Authority (Macharia, 2019).

ERP Implementations face many challenges that lead to slow adoption of the system or even abandoning of the system by organizations after heavy financial investments (Kitembe, 2017). The challenges faced during the ERP systems Implementations are not only limited to the size of the organization, but also where the organization is implementing it (Dhabi et al., 2010). In the public sector, ERP implementation has become very problematic coupled with a lot of failures despite being a lucrative market for the ERP vendors due to their purchasing power (Kelemen, 2014). ERP failure continues to be a nightmare for many organizations that have implemented the systems. According to Hughes, Rana, and Simintiras (2017) 50 to 70 percent failure rates have often been reported. Most of the studies on ERP implementations have rated the failure at 67 percent (Saxena & Mcdonagh, 2019).

In developing countries, ERP uptake seems to be low with an estimate of ten to fifteen percent of the global uptake (Hawari & Heeks, 2010). Kenya, being a developing country, is experiencing some growth in the ERP uptake as organizations seek to improve their operational efficiency and

performance. There has been an increasing uptake of ERP systems in various industries in Kenya and particularly in the public sector over the last ten year (Sophia & Owuor, 2015). Despite the many advantages that come along with ERP implementation, most public sector organizations in Kenya are still struggling with the adoption of the implemented ERP system and in some extreme cases failed implementations. According to Kutswa (2011) the anticipated benefits of ERP implementation at KenGen has been slow despite being implemented within the projected timeframe and cost.

KEMRI, being a public research institute had previously tried to implement an ERP solution but did not succeed. The lack of an ERP in the institute led to a lot of inefficiencies in carrying out their core mandate in health research. Inefficiencies included delayed procurement of research resources, delayed collection of research samples from the field and reporting especially to the donors. However, it is only recently (year 2019) that the Institution implemented an ERP successfully leading to increased operational efficiency.

The previous failed ERP implementations at KEMRI led to huge financial loss and lost irrecoverable time. It is for this reason that this study sought to evaluate the factors that influenced the implementation of the ERP solution at KEMRI. This study also sought to give insights in terms of ERP implementation factors, into the public research institutes and to some extent the public sector in Kenya.

This study sought to identify and evaluate both the technological factors and organizational factors that influenced ERP implementation at Kenya Medical Research Institute (KEMRI).In addition, the study sought to find out the environmental factors that influenced the ERP implementation.

1.3 Research Objectives

The overall objective was to investigate the factors that influence the implementation of ERP System in public research institutes in Kenya with a focus on Kenya Medical research Institute (KEMRI).

1.3.1 Specific Objectives

i. To examine the organizational factors that influence ERP implementation in KEMRI
ii. To examine the technological factors that influence ERP implementation in KEMRI
iii. To examine how environmental factors influence ERP Implementation in KEMRI

1.3.2 Research Questions

i. To what extent does organizational factors influence ERP implementation in KEMRI?
ii. To what extent does technological factors influence the implementation of ERP Systems in KEMRI?
iii. To what extent does environmental factors influence the implementation of ERP Systems in KEMRI?

1.4 Scope of the Study

The study sought to investigate the factors that influence the implementation of ERP System in public research institutes in Kenya with a focus on Kenya Medical research Institute. The particular focus was on the effect of organizational factors, technological factors and environmental factors that influence ERP Implementation in KEMRI. In terms of time scope, the study only focused on the latest ERP implementation that took place in the year 2019.

1.5 Significance of the study

This study would be of significance to four main stakeholders. Firstly, this study would be of significance to public research institutes and the public sector at large in Kenya to improve their chances when it comes to Successful ERP systems Implementation. Secondly, the findings of this study would help ERP providers in public research institutes and the public sector at large in Kenya to improve on their service delivery by capitalizing on the critical success factors hence reduce the risks of ERP project failures. Thirdly, as a regulator of ICT Services in the Government of Kenya, ICT Authority would improve its standardization of ERP Implementation projects in the public sector. Lastly, the study would also add into the body of knowledge in the academia and thus be of benefit to scholars and students.

1.6 Chapter Summary

The chapter presented the background of the study comprising an introductory to enterprise resource planning and Kenya Medical Research Institute. Problem statement, research objectives, scope of the study and significance of the study were also presented in this chapter.

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CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter highlighted past studies that have been done by other researchers together with their findings and how they are related to this study.

The chapter began by first outlining the theoretical review of ERP critical success factors framework then a critical review of past studies of the factors that affect ERP implementations. Research gaps were then identified based on the critical review of the literature so that the study could address some of the existing gaps. Finally, a conceptual framework was developed based on the literature review.

2.2 Theoretical Review

Past research studies around technology evolution and adoption have led to development of theories that explain the adoption of any new technology. One of these models is the Technology Organization Environment model.

2.2.1 The Technology Organization Environment (TOE) Framework

The Technology Organization Environment (TOE) framework explains the factors that influence technology adoption and was developed by Tornatzky and Fleischer (1990). According to Baker (2011), the TOE framework explains the adoption in three different context influence adoption. These elements are the organizational context, technological context, and the environmental context.

The organizational context describes the characteristics and resources of the organization such us size and structure (Baker, 2012). It also includes the communication processes and the resources available within the organization (Laumer & Eckhardt, 2012). In this TOE framework, technological context refers to both the technologies that exists within an organization and also those that are available in the marketplace but not being used by the organization (Pan & Jang, 2008).

The environmental context explains the environment in which the organization operates in such as Industry structure and government regulation (Laumer & Eckhardt, 2012). According to Pan and Jang (2016),it is the arena in which the organization conducts its business.

TOE is illustrated in the diagram below.

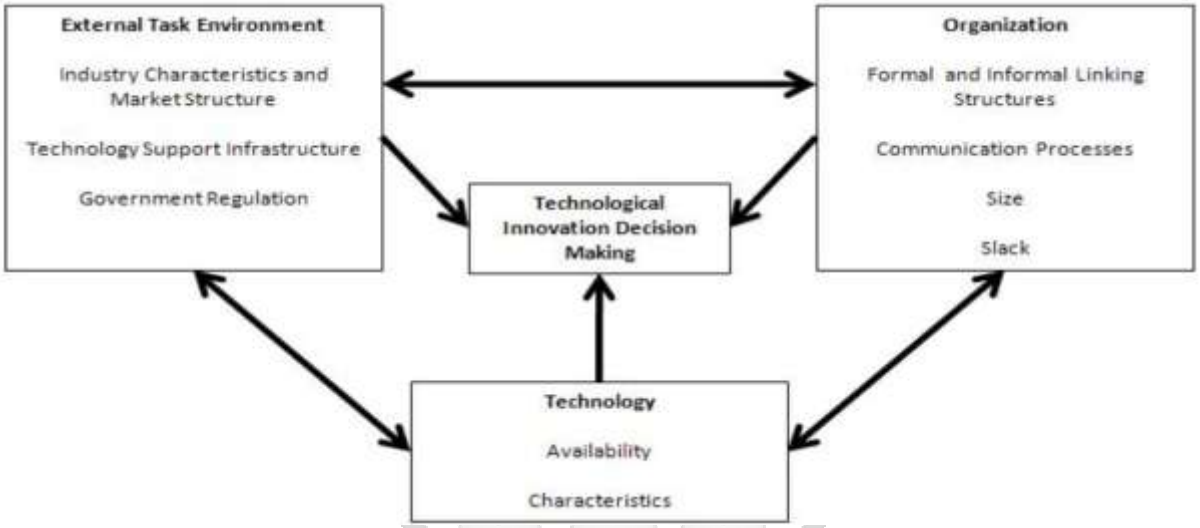

Figure 2.1: Technology Organization Environment Framework (Tornatzky and Fleischer 1990)

The TOE framework has been adopted by previous studies on ERP implementations. Eze et al. (2013) adopted the TOE framework and ascertained the technological, organizational and environmental characteristics as being quite useful in adoption of technology in government owned Universities in Nigeria. Using the TOE framework Awa and Ojiabo (2016) concluded that technological factors drive ERP adoption by SMEs as well as organizational and environmental factors. The TOE framework is as a useful tool to be used by organizations seeking to be proactive in ERP adoption (Pan & Jang, 2008).

This study adopted the TOE framework to investigate the organizational, technological and environmental factors within the framework that influenced the ERP implementation at KEMRI.

2.3 Empirical Review

Several studies had been carried out on ERP systems implementations with a major focus on factors that have affected the implementations of ERP systems all over the world. Some had focused on industries, while others had been limited the research on geographical regions and others further to specific organizations that have implemented ERP systems before. Most of these studies had identified and tested various critical success factors for the ERP

implementation. In a study carried out by Afaneh, Alhadid, and Almalahmeh (2015), it was concluded that organizational and technological factors have a significant impact on ERP implementation. This section highlighted the main organizational, technological and environmental factors that have been identified by previous research and proved to have an influence in the successful implementation of ERP in various organizations.

2.3.1 Organizational Factors Influencing ERP Implementation

Organizational factors have been identified as some of the factors which cut across many organizations and some that are unique to certain organizational sectors. These organizational factors are those factors that are within an organization's control (Dhabi et al., 2010).This section highlights organizational factors that have been identified in various studies.

When change is introduced in an organization, top management support is very critical in the adoption of the new ways. An ERP implementation in an organization is normally regarded as a major change affecting the operations of an organization (Abdelghaffar & Azim, 2010). An ERP implementation project that has the backing of management at various levels can be positively perceived by the end users and technical staff. In addition, this will also ensure that the project is allocated sufficient funding and resources for its successful completion (Laudon & Laudon, 2018). Munyoroku (2014) identified top management support as a key factor in an ERP implementation project especially in overseeing and allocation of resources to the project. A local Kenyan Study by Kaaria and Njuguna (2019) showed that for an ERP project to be successful, top management must offer complete commitment and support.

One of the key success factors in project preparation stages during an ERP implementation is top management support that plays a great role in determining the successful implementation of an ERP (Z. Hasibuan & Dantes, 2012).According to Abu-Shanab, Abu-Shehab, and Khairallah (2015), top management support is one of the critical success factors as it plays an important role in the successful implementation of an ERP. Dezdar and Ainin (2011) concluded that a crucial aspect of ERP implementation success is top management, regardless of the economic and country's standing.

Change management is critical to an organization undergoing a new change in order to help people easily adopt the change. An ERP implementation within an organization is considered a

major change since it impacts on the way of doing things. According to Iftikhar Shah et al. (2011),change management is one of the most critical factors in ERP implementation. If people are not prepared for the changes being brought about by implementation of an ERP in an organization, then resistance, denial and chaos will be unavoidable Hasibuan and Dantes (2012).Mohammad, Asefeh,Mohammad and Davarpanah (2010) argue that change management was the most important factor in developed and developing countries. The study further alluded that country-related functional requirements in developed countries was less important and fit between ERP and business/process was the least cited factor among developing nations.

Implementation of an ERP in an organization normally takes the form of a project and therefore Project management is a key contributor to the success of the project. According to Hughes, Rana, and Simintiras (2017),lack of project management has been cited by many studies as a key reason for failure of ERP projects. Selection of the project team is crucial when implementing an ERP in an organization since project management plays a key role in ERP project cycle in order to ensure proper decision making and results in a timely manner (Ara & Al-Mudimigh, 2011).Abu- Shanab, Abu-Shehab & Khairallah (2015) conducted a study to explore major key success factors that will turn the implementation of ERP systems in Jordan into a success. In this study, project team competence was identified as one of the major factors that played a major role in the successful implementation ERP Systems.

Business process re-engineering helps organizations to rethink and redesign their business processes with the aim of improving operations. Today's ERP system looks at an organizations end to end processes from sales, finance, production scheduling and so on (Magutu et al., 2010).The implementation of ERP system in an organization requires that the organization work process adopts to the best business practices for smooth operations (Iftikhar Shah et al., 2011).According to Tsai et al. (2010) companies that adopt business process re-engineering, while implementing ERP systems, will have better performance.

2.3.2 Technological Factors Influencing ERP Implementation

Technological factors mainly focus on the hardware equipment, network infrastructure and software within an organization. The success of system adoption is highly dependent on identifying the technological variables on the relationship between ERP and performance (Egdair et al., 2015).

For an ERP to be implemented in an organization, there should be adequate infrastructure to support the use of the ERP for day to day operations (Dagher & Kuzic, 2011). ERP Implementation involves a complex transition from legacy systems to an integrated IT infrastructure (YMohmed AL-SABAAWI & Mohmed Al-sabaawi, 2015). According to Awa and Ojiabo (2016), ICT infrastructure is a very critical factor in the adoption of an ERP system.

There are many off the shelf ERP products in the market worldwide that require a few customizations to fit into the organization's processes. A strong ERP product is normally selected at the product selection process (Nagy, 2014). In addition, Hasibuan and Dantes (2012) conclude that ERP product selection is the most critical key success factor in the technology selection stage. Upadhyay, Jahanyan, and Dan (2011) concluded that a proper ERP product is a critical factor if an organization is to ensure a positive outcome in the ERP implementation.(Şener & Saridoğan, 2011).

ERP Implementations require a high-level specialized skills and knowledge on the ERP product. The technical expertise can either be internal or external (Rajan & Baral, 2015). In a case where the ERP is not compatible with the older legacy software applications, external expertise is required (Nejib, 2013).Underdevelopment of technical skills impede ICT adoption (Eze et al., 2013).

2.3.3 Environmental factors influencing ERP Implementation

Environmental factors are those outside the organization but have a great influence in the adoption of technology in the organization. According to Tornatzky and Fleisher (1990), the environmental factors include the government regulations, industry competitiveness and Industry structure. According to Yen and Sheu (2004),as much as technological factors are important, competitive strategy is also important in ERP implementation to differentiate an organization among its competitors.

According to Tornatzky and Fleischer (1990), government regulation can have a detrimental effect or a beneficial effect in regards to technological innovation and adoption. The Government especially in the developing world need to establish regulations that can support ERP adoption by removing technical barriers and also have educational programs that can enhance ERP adoption (Laumer & Eckhardt, 2012).

Organizations that operate in a highly industry environment must always strive to innovate in order to be more competitive in the industry. Countries that have science-technological innovations strategies tend to be more competitive (Şener & Saridoğan, 2011).

According to Tornatzky and Fleischer (1990),organizations that operate in rapid growing industries tend to innovate faster than those that operate in declining industries. Some organizations in the declining industry innovate through efficient initiatives in order to cut costs and remain in business or even avoid investments in innovation and change to new lines of business (Baker, 2012).

2.4 Research Gap

From the literature review, most of the studies around factors influencing ERP implementations have been carried out in the developed countries and very little research in the developing and underdeveloped countries. Here in Kenya, very little research has been conducted on the factors influencing ERP implementation in the public sector. In addition, no similar study has been carried out in public research institutes in Kenya.

Secondly, ERP implementation is quite involving, time consuming and an expensive affair. Therefore, for public sector organizations to get value for money, it's important to study factors that enhance implementation so that lessons can be drawn and applied in other similar organizations.

Lastly, the government of Kenya, through ICT Authority (a regulator of ICT services) has been mandated to oversee implementation of ERP and other software solutions in government bodies (*ICT Authority*, 2021). The study sought to find out how the involvement of ICT Authority as an environmental factor that influences the implementation of ERP in the public sector in Kenya.

2.5 Conceptual Framework

Having undertaken the literature review on the factors affecting the ERP systems implementation, this study sought to evaluate the organizational (top management, project management, change management, and business process re-engineering) and technological factors (technological infrastructure, strong ERP product and technical expertise) identified in various studies. In regards to environmental factors identified in the literature review, the study

also sought to find out how government regulation, in this case ICT Authority involvement, influences implementation of ERP in public sector. The other environmental factors of customer competitiveness and industry structure were not relevant for the study since KEMRI is a government parastatal and therefore the industry structure is shaped by the government and does not have a lot of industry competitiveness pressure. The conceptual framework is as follows

Figure 2.2: Conceptual Framework

Source: Author (2021)

2.6 Operationalization of Variables

Table 2.1 showed the operationalization of the study variables and showed the measurement of each variable.

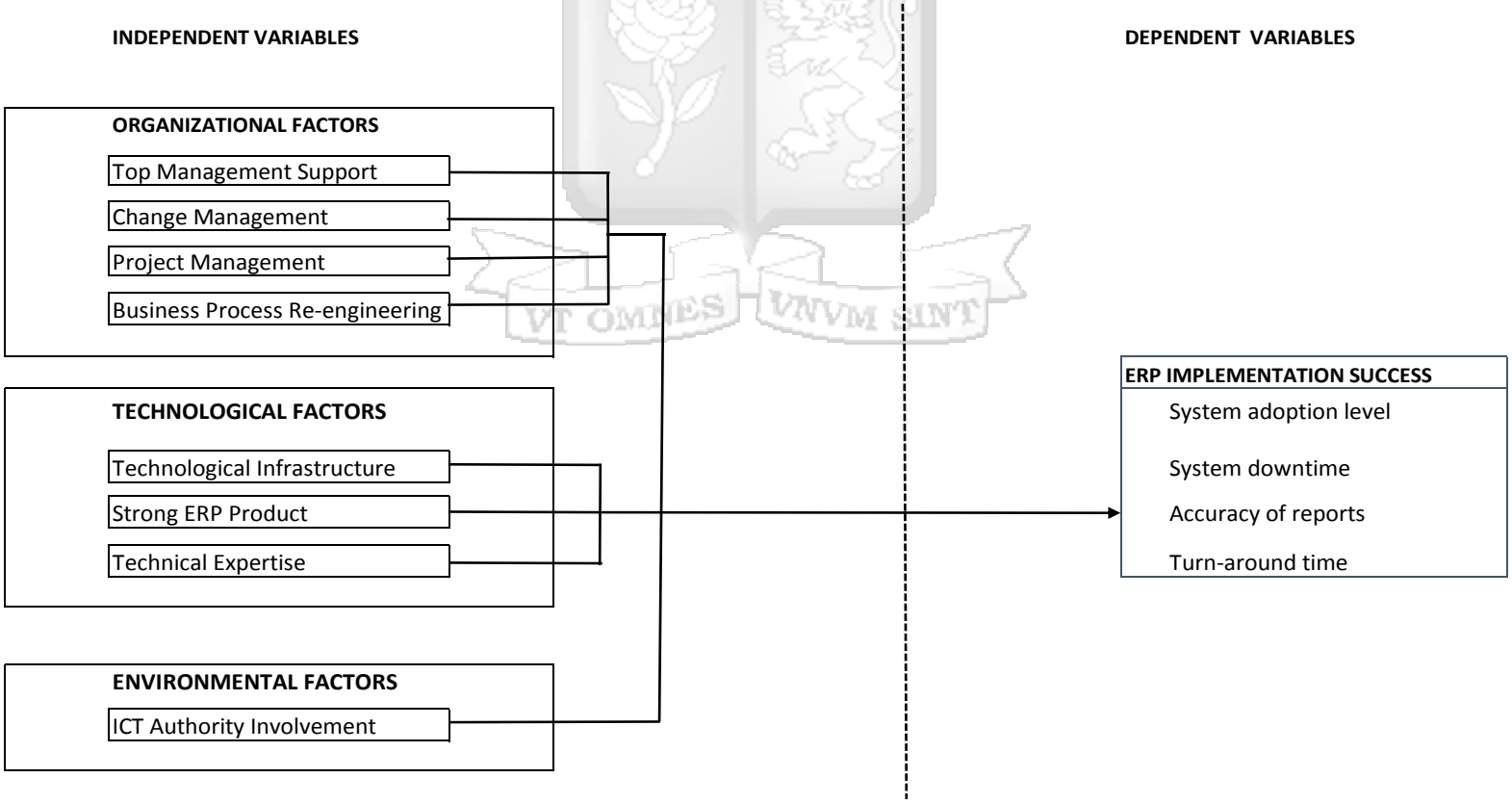

Table 2.1: Variable Operationalization

Category	Variable	Indicator	Measure	Supporting Literature
Organizational	Top Management Support	Project funding Top management involvement Clear objectives Communication	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	Munyoroku (2014),Kari and Njuguna (2019) ,(Nagy 2014),Abu-Shanab, Abu-Shehab, and Khairallah (2015)
	Change Management	Awareness User involvement Availability of change agents Clarification channels	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	Hasibuan and Dantes (2012), Iftikhar Shah et al. (2011),Hasibuan and Dantes (2012), Mohammad ,Asefeh, Mohammad & Davarpanah (2010)
	Project management	Leadership Team member composition Role of project team members Communication Collaboration	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	(Ara and Al-Mudimigh 2011), Abu-Shanab,Abu-Shehab & Khairallah (2015)
	Business Process Re-engineering	Documentation Workflows Process redesign User involvement	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	Iftikhar Shah et al. (2011), Tsai et al. (2010)

Category	Variable	Indicator	Measure	Supporting Literature
Technological	Technological infrastructure	Network Stability Existing Hardware Existing Software Availability of User computers	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	YMohmed AL-SABAAWI and Mohmed Al-sabaawi (2015)
	Strong ERP Product	Ease of use Compatibility Ability to customizable Security features	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	Nagy (2014), Upadhyay, Jahanyan, and Dan (2011)
	Technical Expertise	Process understanding System design Customization Training skills Support	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	Nejib (2013), (Eze et al., 2013).
Environmental	ICT Authority Involvement	Enforcement of standards Supervision Guidance	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	(Laumer & Eckhardt, 2012)
Implementation Success	ERP Implementation Success **(Dependent Variable)**	Adoption level System downtime Accuracy of reports Turn-around time	1=To a very little extent, 2=To a little extent, 3=To some extent, 4=To a great extent, 5=To a very great extent	

Source: Researcher (2021)

2.7 Chapter Summary

Chapter two outlined the theoretical review of the study. The main theory identified to anchor the study was the Technology Organization Environmental Framework by Tornatzky and Fleischer (1990). The chpater also presented the empirical review, reserch gaps, conceptual framework and operationalization of variables.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlined the research design to be used for carrying the study and the justification of the same. In addition, the chapter went further and discussed the population and sample, data collection method and tools, how the data analysis was carried out, the quality of the research and finally the ethical considerations for the study.

3.2 Research Philosophy

This study used positivism research philosophy. Positivism research philosophy reflects the belief that reality is stable. Positivism philosophy is based upon the highly structured methodology to enable generalization and quantifiable observations and evaluate the result with the help of statistical methods (Ryan, 2018). Positivism philosophy is commonly used in natural science and it is a critical and objective base method. It is an approach that includes the various philosophy of natural science such as philosophy of unchanging, universal law and the view of everything that occurs in the nature.

Park, Konge, and Artino, (2020) affirms that through positivism the study is concerned with facts and not impressions with the help of positivism philosophy; the study can collect all the facts and figures that are associated with the research issue through general sources (Creswell & Creswell, 2017). Through positivism the study is able to gather factual information where the study can collect all the facts and figures that are associated with the research issue through general sources. Thus, the positivism is useful in the investigation of factors that influence the implementation of ERP System in Kenya with a focus on Kenya Medical research Institute.

3.3 Research Design

Descriptive research design was used to carry out this study. Descriptive research describes how reality is (Harris, 1991).This research design was appropriate for the study since the study sought to establish the factors affecting ERP implementations in an organization setup and therefore involved gathering of opinions from the targeted population and examining the results. The research adopted a mixed research method whereby in the quantitative research method respondents were required to give their opinions by rating numerical data and later on subjected

to quantitative analysis mathematically. On the other hand in the qualitative research method respondents were interviewed and the results analyzed qualitatively. Mixed research design are suitable in enhancing the comprehensives of the study by triangulating quantitative data with qualitative data. This was a case study since the study was carried out at KEMRI, a leading public research institute in matters health in Kenya. It was a single case study focusing on ERP implementation at KEMRI.

3.4 Location of the Study

This study was carried out at KEMRI Headquarters in Nairobi and its remote locations of Kisumu, Kwale, Busia and Kilifi offices. The study only focused on the latest ERP implementation that took place the year 2019.The previous ERP implementations at KEMRI was not included in this study since more than seven years had elapsed from the time they took place and therefore making it difficult to get information from the current KEMRI staff.

KEMRI faced several challenges in the implementation Enterprise Resource Planning software system which was attributed to various factors including inadequate resources to finance the implementation of the ERP, technological and environmental factors (Wandera, 2012; Kaaria & Njuguna, 2019). Secondly, this is the third time that KEMRI implemented an ERP after failing twice in the past. The study gave insights into factors that influenced the successful implementation of the ERP. Thirdly, KEMRI is a parastatal in Kenya and therefore the results of the study gives insights on ERP implementations in Kenya especially in the public research institutes where KEMRI is a representative organization and also the public sector at large.

3.5 Population and sampling

The target population for this study were all the Permanent staff at Kenya Medical Research Institute (KEMRI). There were about 971 permanent staff members at KEMRI spread across its centers in eight Geographical locations in Kenya i.e. Nairobi, Busia, Kilifi, Kericho, Kwale, Mandera, Kirinyaga and Kisumu. According to Singh, and Masuku (2014) and Saunders, Lewis, and Thornhill (2019), adequate sample size for research should by 30% or above depending on the size of the target population. In this case therefore, a sampling ratio of 30% was used to determine the sample size for sample size for self-service users and main users while a sample

size of 50% was used to determine the sample size for Top Management, Champions and ICT officers since the three categories were more involved in the implementation than the self-service and main system users. This study used stratified sampling method to select respondents. The population was split into five strata depending on their roles played in the ERP Implementation and adoption. In addition, the study adopted a stratified random technique to pick respondents in each stratum. Interviewees were selected through purposive sampling. Table 3.1 outlines the sample size in each targeted stratum.

Table 3.1 Stratified sampling categories

Category	**Population**	**Sampling Ratio**	**Sample Size**
Top Management	25	0.5	13
Lead users - Champions	72	0.5	36
Main Users	346	0.3	104
ICT Officers	30	0.5	15
Self Service Users	498	0.3	150
Total	**971**		**318**

3.6 Data collection method

Collection of data was very instrumental in this study in order to get the relevant data for the study. In this study, semi-structured questionnaires were used to collect primary data from respondents. Because each person (respondent) is asked to respond to the same set of questions, it provides an efficient way of collecting responses from a large sample prior to quantitative analysis (Saunders et al., 2019) .

The questionnaire used both open and closed questions. Open questions tailored for gathering general information about the participant and their opinions. On the other hand, the closed questions were used to collect quantitative data regarding the opinion of the respondents. Quantitative data was collected by choosing from selected choices, on the rating from a limited set of responses on questions relating to factors that influenced the ERP Implementation at

KEMRI. The structured questionnaire was administered through an online survey via a web browser (web questionnaire).

This study also incorporated face to face interviews for a few (6 purposive sampled) of the respondents that were involved in the project steering committee and the top management. The purpose of the interview was to gather more insights on the project implementation and also the role of ICT Authority in the implementation of the ERP at KEMRI.

3.7 Data analysis

Qualitative data collected via use of interview guide was analyzed using content analysis technique. Content analysis categorizes phrases, describe the logical structure of expressions and ascertain associations, connotations, denotations, elocutionary forces and other interpretations. The procedure of information investigation starts with the classification and association of information looking for designs and basic topics. The data was analyzed thematically, presented in a narrative and prose, compared and integrated with quantitative results to draw conclusions. The coding of the key informant interviewees was in form of KII 1, KII 2, KII 3, KII 4, KII 5 and KII 6.

Interviewee	**ERP Role**
KII 1	Coordinator and Fleet module , EDMs module
KII 2	Coordinator and Lead M&E module
KII 3	Coordinator and Lead Human Resource and Payroll modules
KII 4	Coordinator – Sales and Marketing Modules
KII 5	Coordinator and Lead Supply Chain module
KII 6	ERP Implementation committee Member

The quantitative data collected was screened to identify missing information and improper responses. The quantitative data collected from the questionnaires was analyzed quantitatively by using descriptive statistics to identify the descriptive measures such as the mode, mean and median. Regression analysis – a powerful statistical method for examining relationship between two or more variable, was used to examine the influence of ERP Implementation factors on the success of ERP Implementation at KEMRI by running empirical regression models. This

involved analysis of the data using a statistical analysis software preferably IBM SPSS ™. The multiple linear regression model represented below was used.

$y_1 = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7 + \alpha_8 X_8 + \varepsilon$

In this case, α_0 is the regression constant, $\alpha_1 \ldots \alpha_8$ are regression coefficients,

y_1 = ERP Implementation Success

X_1 = Top management support

X_2 = Change management

X_3 = Project management

X_4 = Business process re-engineering

X_5 = Technological infrastructure

X_6 = Strong ERP product

X_7 = Technical Expertise

X_8 = ICT Authority involvement

ε = error term

In order to estimate the relationship between the factors influencing ERP implementation and the ERP implementation Success, Ordinary least square (OLS) regression was carried out. Furthermore, the significance of the regression model was determined by Analysis of Variance (ANOVA). In regard to the results of the face to face interview, the study employed content analysis to summarize the concepts for the interviews.

3.8 Research quality

This research sought to ensure that the findings of this study were reliable, valid and Objective.

3.8.1 Reliability

Yilmaz (2013) described reliability as being able to get consistent results from a research instrument under the same conditions and variables. This research sought to ensure that the

findings of this study are replicable and consistent when another similar research is conducted using the same research design. The study used more than one research assistant in collection and analysis of data in order to evaluate the extent in which they agree. Since KEMRI is expansive, the study had different researchers in different centers and/or departments collecting data for analysis. Cronbach's Alpha test was also used to test the reliability of the instrument.

3.8.2 Validity

Validity in research refers to how accurate the research data is (Yilmaz, 2013).The research instrument to used was consistent throughout the research period in order to ensure that the results are comparable. In addition, there was clarity in the cause and effect in order to avoid ambiguity.

3.8.3 Objectivity

In order for this research to be objective, the researcher recruited research assistants to collect and analyze data. This ensured that there are no biases that can occur due to manipulation of the results in order to achieve a particular outcome.

3.9 Ethical considerations

In the context of research, ethics refer to the standards of behavior that guide your conduct in relation to the rights of those who become the subject of your work or are affected by it (Saunders et al., 2019).Some of the ethical principles that this research upheld included ;Integrity, Voluntary Consent, Informed consent ,Confidentiality and Privacy. For the research to be carried out at KEMRI, the researcher first sought permission from the relevant authorities through Strathmore Business School. The study was only be carried out after approval.

The principle of integrity was adhered to by ensuring that the research is carried out with an open mindset, being truthful and promoting accuracy. KEMRI is a research institute and therefore the stakeholders expected that any kind of research being carried there to uphold Integrity. This research adhered to the principal of voluntary consent where respondents were not be coerced or forced into participation. Their right not to participate was respected. In addition, respondents were informed of the purpose of the research and it was upon them to make an informed decision on whether to participate or not to.

Confidentiality was very key in this study in order to protect the participant's identity. This was done by ensuring the collected information was non-attributable. In addition, the privacy of those undertaking the research was respected by ensuring that the response is undertaken where the respondents feel comfortable.

3.10 Chapter Summary

The chapter presented the research design, population and sampling methods. Data collection methods, data analysis, research quality and ethical consideration were also presented in this chapter.

CHAPTER FOUR: PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

The presentation of the findings of the analysis of data was presented in this chapter. The results were presented starting with the response rate, then the demographic characteristics of the respondents and then the descriptive statistics for the study variables. The chapter then provided the results for diagnostic tests and then the correlation and regression analysis and finally the content analysis. The discussion for each of the findings is provided and also the implications for the findings. The data was collected from 318 respondents in a general population of 971 permanent staff members sampled through stratified sampling based on the roles they play in ERP implementation. The data was obtained through the use of a questionnaire and an interview guide. Data analysis was done through descriptive, inferential and content analysis.

4.2 Response Rate

The number of questionnaires that were distributed to the respondents were 318. The respondents completely filled and returned 270 questionnaires. The response rate for the study was therefore 85%. Mugenda and Mugenda (2000) asserted that a response rate above 70% is enough for data analysis and hence the response rate for the study was deemed enough for data collection in the study. The tabulated results for response rate are as in Table 4.1.

Table 4.1: Response Rate

Questionnaires	Frequency	Percent
Returned	270	85
Unreturned	48	15
Total	**318**	**100**

4.3 Demographic Characteristics of the Respondents

The demographic characteristics that were analyzed in the study were: gender, age, level of education, duration in employment and the role played in ERP implementation

4.3.1 Gender

A summary of the gender representation in the study was provided in Figure 4.1. The gender results showed more male at 59% and only 41% females among the respondents. This could also

imply that there are more male permanent staff at KEMRI. This is a reflection of the Kenyan government gender compliance policy on employment that requires government parastatals like KEMRI adhere to the two-thirds gender-based rule on employee composition.

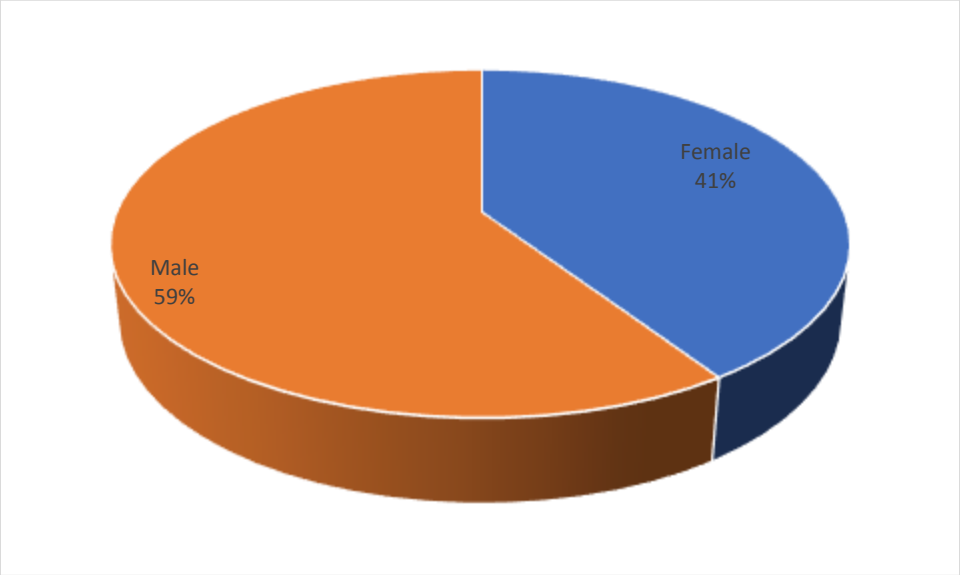

Figure 4.1: Gender of Respondents

4.3.2 Age

The age of the respondents for the study was summarized in Figure 4.1. The majority of the respondents were between the ages of 30 years to 40 years as shown by a 61.1% representation in this category. Those aged 41-50 years followed at 17.8% and those aged 21-30 years represented 13.3% while those over 50 years of age were the least at 7.8%. It thus emerged that the aged employees are less than the youth staff at KEMRI.

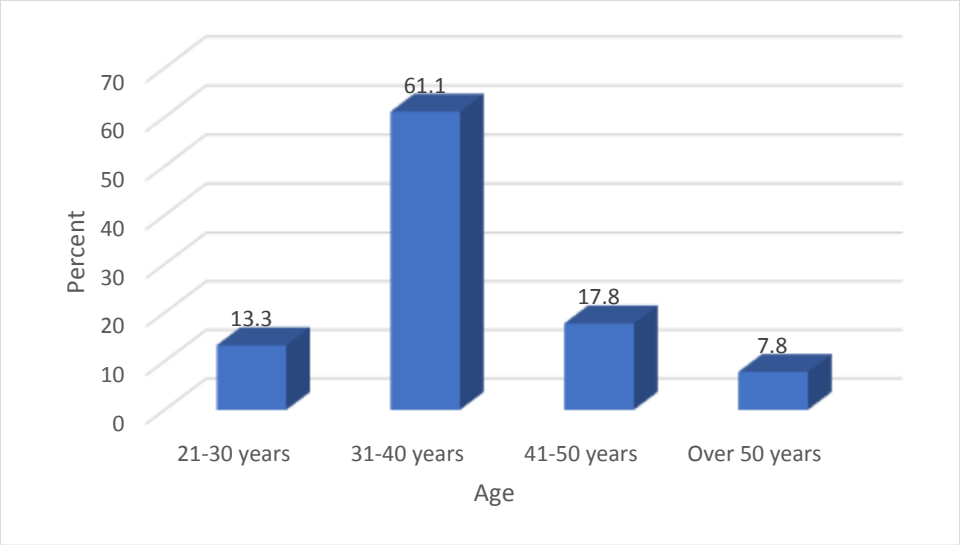

Figure 4.2: Age of Respondents

4.3.3 Highest Level of Education

The results for the highest level of education attained by the respondents were analyzed and presented in Figure 4.3. The respondents who had acquired an undergraduate degree were the majority representing 68%. Those with postgraduate degree represented 24% while those with diploma represented 7% and only 1% had an O level certificate as the highest education attained.

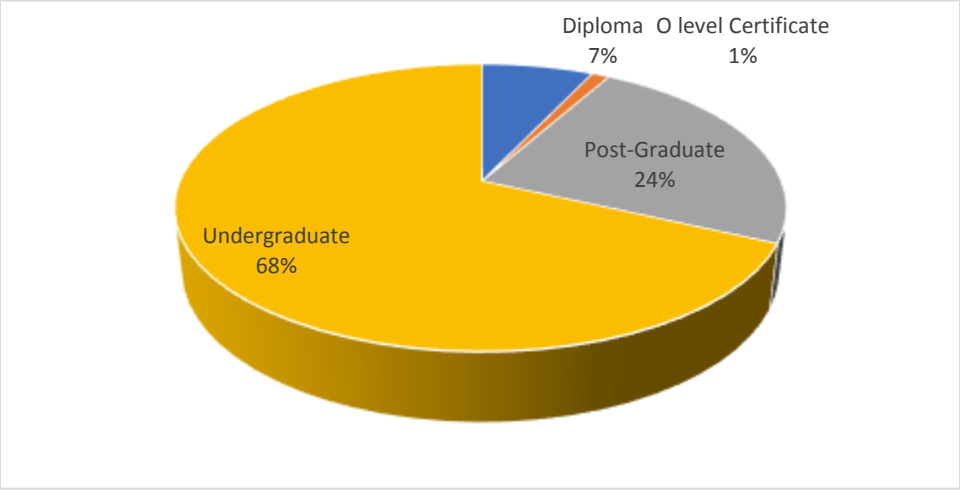

Figure 4.3: Level of Education of Respondents

4.3.4 Duration of Employment

The duration one had been employed at KEMRI was also analyzed and presented in Figure 4.4. The percentage of staff who had worked for only 3-6 years was 54.8% being the majority

followed by those who had worked for 7-10 years at 20.7%. Those who had worked for more than 10 years represented only 18.5% while those who had worked for less than 2 years were the least at 5.9%. Hence the majority of the workers had gained some experience in their jobs to guarantee valid responses for the respondents.

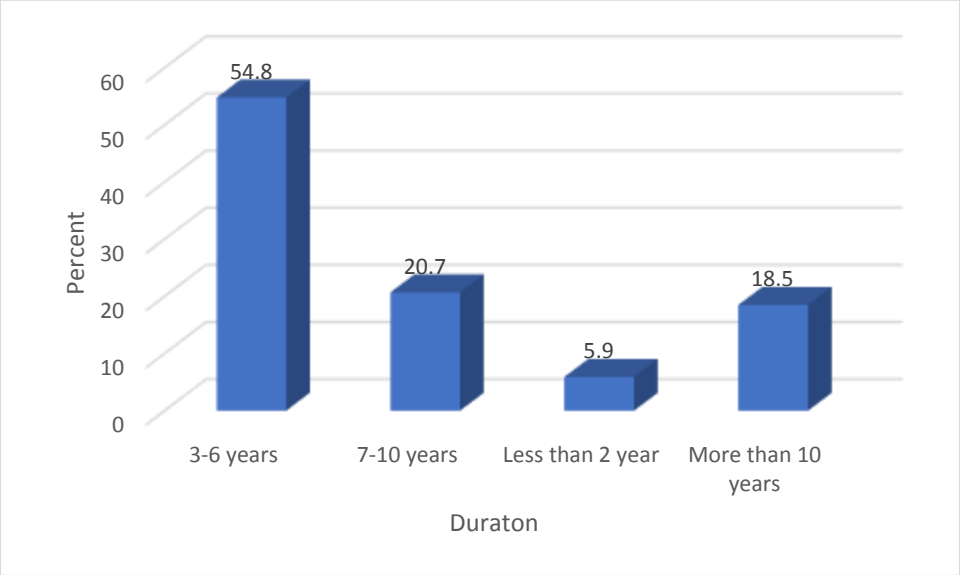

Figure 4.4: Duration of Employment

4.3.5 ERP Role

The results in Figure 4.5 show the role played by the respondents in ERP implementation. The majority of the respondents (47%) were self-service supervisors, the main system supervisors represented 31.1% while lead users represented 11.5% and ICT officers represented 6.7% while top management staff were the least at 3.7%. This implied that the respondents were able to understand the aspect of ERP implementation and hence provided valid information.

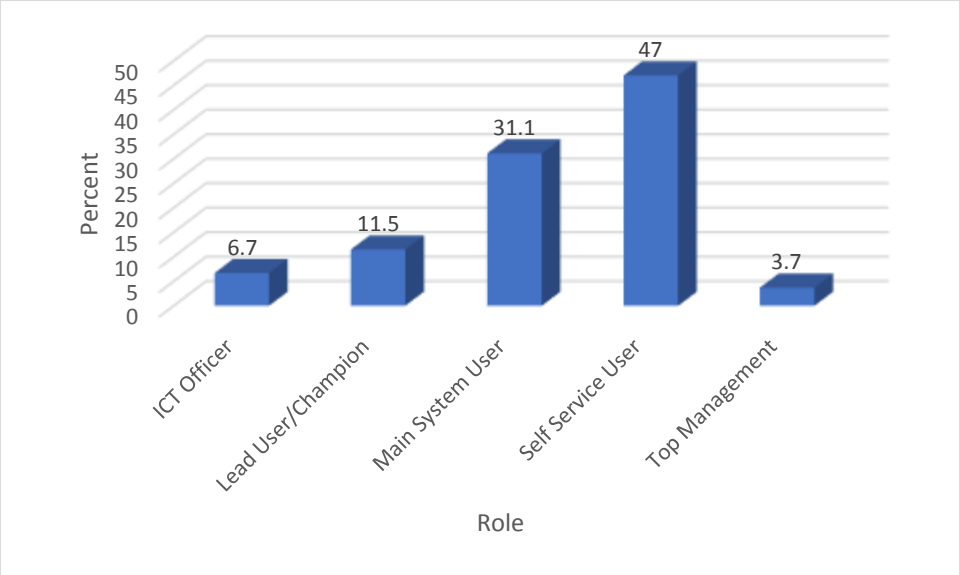

Figure 4.5: ERP Role

4.4 Descriptive Statistics

In order to summarize the data for easy reporting, descriptive statistics were used. The descriptive statistics adopted in the study were percentages and the mean. The variables and sub variables were: ERP implementation, top management support, change management, project management, business process reengineering, ICT infrastructure, Strong ERP product, technical expertise and ICT authority Involvement.

4.4.1 ERP Implementation

The descriptive statistics for the variable ERP implementation were analyzed and presented in Table 4.2.

Table 4.2: Descriptive Statistics for ERP Implementation

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
The ERP system has been embraced across all the KEMRI departments	1.10%	3.00%	26.60%	59.20%	10.10%
There is no downtime experienced while using the ERP system	3.30%	7.40%	46.30%	33.70%	9.30%
The ERP System produces timely and	1.10%	6.30%	31.10%	43.30%	18.10%

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
accurate reports for decision making					
The ERP System has improved the Turn-around time for carrying out transactions	1.50%	6.30%	27.40%	45.90%	18.90%
Mean	1.75%	5.75%	32.85%	45.53%	14.10%

Regarding ERP implementation it was noted that ERP had been embraced across all the departments in KEMRI as 59.20% of the respondents indicated to a great extent. The results also indicated that 46.3% of the respondents stated that to some extent there is no downtime experienced while using the ERP system. Further, as stated by 43.3% of the respondents the ERP System produces timely and accurate reports for decision making to a great extent. Finally, regarding ERP implementation success almost half (45.9%) of the respondents indicated that the ERP System has greatly improved the turn-around time for carrying out transactions. The overall mean for the responses also indicated that 45.53% of respondents stated that the level of ERP implementation was to a great extent a success. Therefore, the ERP was successfully implemented.

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4.4.2 Organizational Factors

The descriptive results for the sub variable top management support under organizational factors were as tabulated in Table 4.3.

Top Management Support

Table 4.3: Top Management Support

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
The ERP Project was well funded and had sufficient Resources	1.50%	3.30%	34.80%	50.00%	10.40%
The top management team was involved throughout the implementation of the project	0.00%	4.80%	28.90%	47.80%	18.50%
The top management were clear on the objectives of the ERP	0.70%	5.20%	35.90%	37.40%	20.70%
There was clear and constant communication from Top management during the ERP implementation	0.00%	7.40%	29.30%	47.40%	15.90%
Mean	**0.55%**	**5.18%**	**32.23%**	**45.65%**	**16.38%**

The results indicated that according to half (50%) of the respondents the ERP Project was well funded and had sufficient resources. The results also indicated that 47.80% of the respondents stated that the top management team was greatly involved throughout the implementation of the project. Further, as stated by 37.40% of the respondents, the top management were clear on the objectives of the ERP. Finally, regarding ERP top management support, 47.4% of the respondents indicated that the communication from Top management during the ERP implementation was clear and constant. The overall mean for the responses also indicated that 45.65% of respondents stated that the top management greatly supported ERP implementation.

Change Management

The results in Table 4.4 show the summary of the descriptive statistics for the variable change management.

Table 4.4: Descriptive Statistics for Change Management

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
I was aware of the changes taking place during the ERP implementation	1.50%	1.50%	27.40%	57.80%	11.90%
Everyone in the organization was involved during the ERP implementation	2.60%	4.50%	36.20%	38.90%	17.70%
There were change agents/champions selected from KEMRI to spearhead the change process during the ERP implementation	2.60%	6.70%	24.30%	47.90%	18.40%
There were channels through which concerns and clarifications were addressed regarding the changes being brought about by the ERP implementation	1.10%	6.70%	23.00%	50.90%	18.20%
Mean	**1.95%**	**4.85%**	**27.73%**	**48.88%**	**16.55%**

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The results indicated that according to 57.80% of the respondents, the employees had been made aware of the changes taking place during the ERP implementation. The results also indicated that 38.90% of the respondents stated that everyone in the organization was greatly involved during the ERP implementation. Further, as stated by 47.90% of the respondents there were change agents/champions selected from KEMRI to spearhead the change process during the ERP implementation. Finally, regarding change management, 50.9% of the respondents indicated that there were channels through which concerns and clarifications were addressed regarding the changes being brought about by the ERP implementation. The overall mean for the responses also indicated that almost half of the respondents (48.88%) stated that change management in ERP implementation was greatly regarded.

Project Management

The descriptive results for the sub variable project management under organizational factors were as tabulated in Table 4.5.

Table 4.5: Descriptive Statistics for Project Management

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
The project manager provided strong leadership throughout the ERP implementation period	0.00%	0.70%	31.90%	51.50%	15.90%
The project team members composition was well balanced across different departments	0.70%	4.10%	37.20%	39.80%	18.20%
The role of each project team member was well defined	1.50%	7.40%	30.70%	44.40%	15.90%
There was clear communication within the project team	1.90%	7.00%	34.80%	39.60%	16.70%
There was good collaboration within the project team	1.50%	5.90%	30.00%	39.60%	23.00%
Mean	1.12%	5.02%	32.92%	42.98%	17.94%

The results indicated that according to 51.50% of the respondents the project manager greatly provided strong leadership throughout the ERP implementation period. The results also indicated that 39.80% of the respondents stated that the project team members composition was well balanced across different departments. Further, as stated by 44.4% of the respondents the role of each project team member was well defined. Furthermore, 39.60% of the respondents stated that clear communication within the project team was good. Finally, regarding project management 39.60% of the respondents showed that collaboration within the project team was highly regarded. The overall mean for the responses also indicated that 42.98% of the respondents stated that project management in ERP implementation was greatly considered.

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Business Process Reengineering

The descriptive results for the sub variable business process reengineering under organizational factors were as tabulated in Table 4.6.

Table 4.6: Descriptive Statistics for Business Process Reengineering

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
The business processes were clearly documented	1.10%	3.70%	32.60%	52.20%	10.40%
There were clear Workflows for each process and in each department	1.10%	5.60%	32.20%	43.00%	18.10%
Some business processes were redesigned with the aim of improving efficiency	0.40%	5.60%	34.40%	36.30%	23.30%
Key employees were involved in the redesign of business processes during the ERP implementation	1.90%	7.80%	30.00%	42.20%	18.10%
Mean	1.13%	5.68%	32.30%	43.43%	17.48%

The results indicated that according to 52.2% of the respondents the business processes were clearly documented. The results also indicated that 43% of the respondents stated that workflows for each process and in each department was clearly stated. Further as stated by 36.3% of the respondents, some business processes were redesigned with the aim of improving efficiency. Finally, regarding ERP implementation success, 42.2% of the respondents revealed that key employees were involved in the redesign of business processes during the ERP implementation. The overall mean for the responses also indicated that 43.43% of the respondents stated that the level of business process reengineering in ERP implementation was great.

4.4.3 Technological Factors

ICT Infrastructure

The descriptive results for the sub variable ICT Infrastructure under technological factors were as tabulated in Table 4.7.

Table 4.7: Descriptive Statistics for ICT Infrastructure

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
The network infrastructure was stable and could support connectivity of the ERP	0.70%	6.70%	28.90%	58.90%	4.80%
The existing hardware (Desktop computers, laptops, mobile phones etc.) was compatible with the new ERP	1.90%	7.00%	41.10%	32.60%	17.40%
The existing software (Microsoft word, excel, outlook etc.) was compatible with the new ERP	1.10%	8.10%	28.90%	47.00%	14.80%
Each user was provided with an end user computer to access the ERP	4.10%	8.50%	27.40%	48.10%	11.90%
Mean	1.95%	7.58%	31.58%	46.65%	12.23%

The results indicated that according to 58.90% of the respondents the network infrastructure was greatly stable and could support connectivity of the ERP. The results also indicated that 41.1% of the respondents stated that to some extent the existing hardware (desktop computers, laptops, mobile phones etc.) was compatible with the new ERP. Further, as stated by 47% of the respondents the existing software (Microsoft word, excel, outlook etc.) was greatly compatible with the new ERP. Finally, regarding ERP implementation success, 48.10% of the respondents stated that each user was provided with an end user computer to access the ERP. The overall mean for the responses also indicated that 46.65% of respondents stated that the ICT Infrastructure were greatly considered in ERP implementation.

Strong ERP Product

The descriptive results for the sub variable ERP Product under technological factors were as tabulated in Table 4. 8.

Table 4.8: Descriptive Statistics for ERP Product

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
The ERP product is easy to use and navigate	0.70%	2.60%	28.50%	50.70%	17.40%
The ERP product is compatible with other existing software packages	1.50%	4.40%	32.60%	43.30%	18.10%
The ERP product is easy to customize and carry out enhancements	2.20%	7.00%	31.50%	37.80%	21.50%
The ERP product has adequate security features	1.10%	4.80%	22.20%	53.30%	18.50%
Mean	1.38%	4.70%	28.70%	46.28%	18.88%

The results indicated that according to 50.7% of the respondents the ERP product is easy to use and navigate. The results also indicated that 43.3% of the respondents stated that the ERP product is greatly compatible with other existing software packages. Further, as stated by 37.80% of the respondents, the ERP product is highly easy to customize and carry out enhancements. Finally, 53.3%of the respondents indicated that the ERP product has adequate security features. The overall mean for the responses also indicated that 46.28% of respondents stated that the ERP product was highly strong in ERP implementation was.

Technical Expertise

The descriptive results for the sub variable technical expertise under technological factors were as tabulated in Table 4. 9.

Table 4.9: Descriptive Statistics for Technical Expertise

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
The technical team understood the business process at KEMRI	0.40%	3.30%	29.60%	54.10%	12.60%
The technical team designed the system as per KEMRI's business processes	0.40%	4.10%	32.60%	44.40%	18.50%
The technical team customized the ERP system as per KEMRI's requirements	0.40%	5.90%	31.10%	40.70%	21.90%
The technical team had good training skills for transfer of knowledge to KEMRI staff	0.70%	3.00%	22.60%	49.60%	24.10%
The technical team provided the much needed support in the adoption of the ERP system	0.70%	2.20%	20.00%	47.80%	29.30%
Mean	0.52%	3.70%	27.18%	47.32%	21.28%

The results indicated that according to 54.1% of the respondents the technical team highly understood the business process at KEMRI. The results also indicated that 44.4% of the respondents stated that the technical team designed the system as per KEMRI's business processes. Further, as stated by 40.7% of the respondents the technical team customized the ERP system as per KEMRI's requirements. Furthermore, 49.6% of the respondents stated that the technical team had highly been trained and had skills for transfer of knowledge to KEMRI staff. Finally, regarding ERP implementation success 47.80% of the respondents indicated the technical team provided the much-needed support in the adoption of the ERP system. The overall mean for the responses also indicated that 47.32% of respondents stated that the level of technical expertise in ERP implementation was great.

4.4.4 Environmental Factors

ICT Authority involvement

The descriptive results for the sub variable ERP Product under environmental factors were as tabulated in Table 4.10.

Table 41.0: Descriptive Statistics for Environmental Factors

Statements	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
The ICT Authority provided and enforced standards on the ERP implementation at KEMRI	3.00%	4.10%	21.90%	61.10%	10.00%
The ICT Authority supervised the design, development and implementation of the ERP at KEMRI	2.60%	9.30%	27.00%	39.30%	21.90%
The ICT Authority provided guidance on the ERP implementation process	4.10%	7.40%	20.00%	46.30%	22.20%
Mean	3.23%	6.93%	22.97%	48.90%	18.03%

The results indicated that according to 61.1% of the respondents the ICT Authority provided and enforced standards on the ERP implementation at KEMRI. The results also indicated that 39.3% of the respondents stated that the ICT Authority highly supervised the design, development and implementation of the ERP at KEMRI. Finally, regarding ERP implementation success 46.3% of the respondents the ICT Authority highly provided guidance on the ERP implementation process. The overall mean for the responses also indicated that 48.90% of the respondents stated that the level of ICT Authority involvement in ERP implementation was great.

4.5 Diagnostic tests

The diagnostic tests were conducted in order to assess the assumptions of regression analysis. The diagnostics that were tested were: normality, heteroscedasticity, multicollinearity and autocorrelation.

4.5.1 Normality

For normality test kurtosis and skewness were used. Skewness values between -0.5 and 0.5 show that data is fairly symmetrical, values between -1 and -0.5 and 0.5 and 1 are moderately skewed while less than -1 or more than 1 show that the data is highly skewed. Table 4.11 show the results. For kurtosis values above 2 show that data is not normally distributed. All the variables had skewness values not less than -1 or more than 1 and kurtosis values less than 2 hence the data was normally distributed.

Table 4.11: Normality Results

Variable	Skewness Statistic	Kurtosis Statistic
ERP Implementation	0.541	1.163
Top Management Support	0.115	0.908
Change Management	0.76	1.532
Role Of Project Management	0.219	1.073
Business Process Reengineering	0.13	0.46
ICT Infrastructure	0.544	1.508
Strong ERP Product	0.532	1.856
Technical Expertise	0.294	1.218
ICT Authority Involvement	0.053	1.833

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4.5.2 Heteroscedasticity

Heteroscedasticity was tested using the Breuch-Pagan test. The null hypothesis is that the data does not suffer from Heteroscedasticity if the p-value is greater than the 0.05. From the results a p value of 1 shows that the data was homoscedastic.

Table 4.12: Heteroscedasticity Results

	Sum of Squares	df	Mean Square	F	Sig.
Regression	0	1	0	0	1.000
Residual	61.228	268	0.228		
Total	61.228	269			

4.5.3 Multicollinearity

Multicollinearity was tested by variance inflation factor. According to Field (2009) Variance Inflation Factor (VIF) values exceeding 10 and tolerance value less than 0.2 indicates Multicollinearity. According to the results under table 4.13 the VIF values for all the variables were less than 10 and the tolerance values were more than 0.2 hence the data did not suffer from multicollinearity.

Table 4.13: Multicollinearity Results

	Collinearity Statistics	
	Tolerance	**VIF**
Top Management Support	0.616	1.624
Change Management	0.571	1.751
Role Of Project Management	0.471	2.123
Business Process Reengineering	0.493	2.03
ICT Infrastructure	0.595	1.679
Strong ERP Product	0.425	2.351
Technical Expertise	0.521	1.921
ICT Authority Involvement	0.796	1.256

4.5.4 Autocorrelation

Autocorrelation was tested using Durbin-Watson test. For Durbin-Watson values in the range of 0.5 to 2.5 show absence of autocorrelation. The results under table 4.8 show a value of 1.828 hence the data did not suffer from autocorrelation.

Table 4.14: Autocorrelation Results

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.609a	0.371	0.352	0.48435	1.828

4.6 Inferential Statistics

Inferential statistics (correlation and regression analysis) were used to test the relationship between the independent variables and the dependent variable. The dependent variable was ERP implementation and the independent variables were organizational factors (top management support, change management, project management and business process reengineering) technological factors (ICT Infrastructure, strong ERP Product and technical expertise) and environmental factors (ICT authority involvement).

4.6.1 Correlation Analysis

Correlation analysis was used to assess the direction of the relationship between the independent variables and the dependent variable. Table 4.15 provides the correlation matrix for the study.

Table 4.15: Correlation Matrix

		ERP Implementation	Top Management Support	Change Management	Role Of Project Management	Business Process Reengineering	ICT Infrastructure	ERP Product	Technical Expertise
ERP Implementation	Pearson Correlation								
	Sig. (2-tailed)								
Top Management Support	Pearson Correlation	.644**							
	Sig. (2-tailed)	0.000							
Change Management	Pearson Correlation	.685**	.598**						
	Sig. (2-tailed)	0.000	0.000						
Role Of Project Management	Pearson Correlation	.630**	.521**	.593**					
	Sig. (2-tailed)	0.000	0.000	0.000					

		ERP Implementation	Top Management Support	Change Management	Role Of Project Management	Business Process Reengineering	ICT Infrastructure	ERP Product	Technical Expertise
Business Process Reengineering	Pearson Correlation	.686**	.596**	.685**	.645**				
	Sig. (2-tailed)	0.00	0.00	0.00	0.00				
ICT Infrastructure	Pearson Correlation	.740**	.642**	.702**	.618**	.676**			
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000			
Strong ERP Product	Pearson Correlation	.727**	.639**	.701**	.594**	.704**	.813**		
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000		
Technical Expertise	Pearson Correlation	.520**	.300**	.498**	.512**	.511**	.517**	.524**	
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
ICT Authority Involvement	Pearson Correlation	.241**	.245**	.286**	.319**	.288**	.316**	.271**	.303**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Correlation analysis revealed a positive correlation between top management support and ERP implementation (r=0.644 p=0.000), change management and ERP implementation (r=685 p=0.000), project management and ERP implementation (r=0.630 p=0.000) and business process engineering and ERP implementation (r=0.686 p=0.000). The results also showed that the correlation is positive between ICT infrastructure and ERP implementation (r=0.740 p=0.000), ERP product and ERP implementation (r=0.727 p=0.000) and technical team expertise and ERP implementation (r=0.520 p=0.000). Finally the correlation between ICT authority and ERP implementation was also found to be positive but weak (r=0.241 p=0.000).

4.6.2 Regression Analysis

Table 4.16: Model Fitness

R	R Square	Adjusted R Square	Std. Error of the Estimate
.821a	0.674	0.664	0.33995

The R square was found to be 0.674. This revealed that the variables top management support, change management, project management, business process reengineering, ICT infrastructure, Strong ERP product, technical expertise and ICT authority involvement explain 67.4% of the variations in the variable ERP implementation. In an interview, the interviewees' were asked to indicate the main drivers of the ERP system at KEMRI. From the interviewees' responses, it was noted that there were various reasons as to why the organization opted to adopt and ERP system. The reasons that led to the organization implementing an ERP system were: The need for automation of processes within the organizations; To promote /facilitate integration of the functions in the various departments within the organization such that such that HR, finance and procurement would be able to work seamlessly; To ensure information management and security for massive data handled by the various departments in the organization; To ensure transparency and flexibility of the operations in the various departments. All of the interview respondents felt that the need for automation of work processes was the main reason the ERP system was implemented. The organization wanted to have paperless business processes and ensure efficiency within the operations. They also wanted to increase the turnaround time for various processes in their day to day activities. They all indicated their desires to churn out reports with ease. Below is an example of the responses that support the above explanation as majority of the respondents responded in the same line.

> *"…yeah you know once you broaden the automation, it can suit the sub-activities: One is the increasing efficiency within the operations, number 2 is closing up loopholes that would probably have given opportunities for operations and so on. Number 3 is that, we talk about enhancing data accuracy and retrieval but by just saying Automation, it covers all…" (*Interviewee)

Three of the respondents also indicated that the requirement for management of key organizational information which include reduction in bureaucracies involved in dealing with

financial approvals, the need for data safety and security, flexibility in accessing as well as making decisions from data . This was as shown in the following quote

> *"…… it is available and everybody can be able to see about history of actions that you do in either applications or authorizing something…… the flexibility wherever you are, right now, when I'm in Canada, I'm in Japan, I can be able to approve for certain things….."* *(*Interviewee).

Responses from interviews indicated a myriad of challenges faced in implementation of the ERP system. Majority of the challenges had however already been identified by the study team in the questionnaire. Five out of six interviewees reported that the organization experienced delays in the implementation of the ERP leading to a situation where some processes had already been automated while others were still manual. The time frame during which all processed should have been automated was overstepped. Various reasons were put forward to explain the delays and these are discussed herein. It can therefore be seen that the need for automation of organization functions led to the implementation of ERP in the organization. The remaining 32.6% could be explained by other factors not studied in this study. The model was therefore found to be fit in explaining the study phenomena.

Table 4.17: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	62.454	8	7.807	67.554	0.000
Residual	30.162	261	0.116		
Total	92.617	269			

The model was also found to be significant in explaining the study phenomena since the p value for ANOVA was 0.000<0.05.

Table 4.18: Coefficients of Regression

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.315	0.099		3.173	0.002
Top Management Support	0.158	0.045	0.176	3.484	0.001
Change Management	0.114	0.051	0.127	2.243	0.026
Project Management	0.114	0.047	0.124	2.427	0.016

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Business Process Reengineering	0.116	0.053	0.125	2.169	0.031
ICT Infrastructure	0.205	0.06	0.228	3.4	0.001
Strong ERP Product	0.123	0.06	0.139	2.058	0.041
Technical Expertise	0.093	0.041	0.102	2.237	0.026
ICT Authority involvement	0.109	0.027	0.117	2.146	0.012

The regression model was therefore affirmed as:

$y_1 = 0.315 + 0.158\,X_1 + 0.114\,X_2 + 0.114\,X_3 + 0.116\,X_4 + 0.205X_5 + 0.123\,X_6 + 0.093\,X_7 + 0.109\,X_8$

In this case,

y_1 = ERP Implementation Success

X_1 = Top management support

X_2 = Change management

X_3 = Project management

X_4 = Business process re-engineering

X_5 = Technological infrastructure

X_6 = String ERP product

X_7 = Technical Expertise

X_8 = ICT Authority involvement

The regression coefficients results showed that top management support relates positively and statistically significant with ERP implementation (β=0.158 p=0.001). The results imply that one unit increase in top management support results to 0.158 increases in ERP implementation. Management support entails leadership, decision making and funding of ERP systems. In an interview, the respondents all felt that the top managers in the organization played a major role in ensuring the successful deployment of the ERP system. This is through allocation of enough resources to the system and communicating the need to have the system fully implemented as well as continuous follow-up of system development and utilization within the various departments. This can be summarized in the following quote.

*"First of all, I will attribute it to the management support, you know the management has really been very very keen in supporting and ensuring that this particular project succeeds and by management I mean from the management here and in the extend of the board and I think even in terms of resource allocation we have done fairly well in allocating resources (*Interviewee).

According to the respondents, the ERP consultants or vendors as they were commonly referred to, contributed to the success of the ERP system. During the set up and even post implementation stage, they were present to offer support to the staff. They also had a good comprehensive knowledge and skills in the ERP and therefore provided a clear direction to the organization.

The manner in which the organization introduced the change of having staff take up a new ERP system that was quite different from their former manual way of handling processes played a role in ensuring the ERP was successful. Staff were duly informed of the changes. The following quote as provided as a response by one of the interviewees is used to illustrate the above

*"…… willingness of staff to move to the next level, if at all you keep them informed and if you provide them with clear expectations of what they expect, and make them aware of what is happening, then they'll be better, they'll be more excited about working in the system and if at all, you can be able to limit their fears that this system is not going to come and change your life……they want to experience something new…" (*Interviewee).

The presence of sufficient hardware -including computers was a major factor for success of the ERP system. The organization had – in the recent times – invested in computers to facilitate ERP implementation. Staff had access to computers where they would be able to login into the system whenever they were required to initiate certain processes that had been integrated in the ERP system.

Staff in the ICT department had been duly trained in various processes and that made it easier for them to support the staff to take up the system. There was also an indication that the creation of ERP champions and super users made the projects roll out successful, because they assisted greatly in solving functional problems at departmental level. This concurred with Munyoroku

(2014) who identified top management support as a key factor in an ERP implementation project especially in overseeing and allocation of resources to the project and also Kaaria and Njuguna (2019) who showed that for an ERP project to be successful, top management must offer complete commitment and support.

The regression coefficients results also showed that change management relates positively and statistically significant with ERP implementation (β=0.114 p=0.026). The results imply that one unit change in change management results to 0.114 increases in ERP implementation. Change management is vital in the implementation of ERP due to dynamic environment that require organization that is adaptive to new changes. Results were in line with those by Iftikhar Shah et al. (2011) who found that change management is one of the most critical factors in ERP implementation.

Further the regression coefficients results also showed that project management relates positively and statistically significant with ERP implementation (β=0.114 p=0.016). Furthermore, it was revealed that business process reengineering relates positively and statistically significant with ERP implementation (β=0.116 p=0.031). The results imply that project management and business process reengineering are significant factors that influence ERP implementation. This was in accordance to Tsai et al. (2010) who found that companies that adopt business process re-engineering, while implementing ERP systems, will have better performance.

Moreover, the regression coefficients results showed that ICT Infrastructure relates positively and statistically significant with ERP implementation (β=0.205 p=0.001). ICT infrastructure is critical necessity in integrating various subsystems of the ERP system. More so the regression coefficients results showed that Strong ERP product relates positively and statistically significant with ERP implementation (β=0.123 p=0.041). The product identification and integration in ERP systems are related to successful implementation of ERP. Results were in line with Upadhyay, Jahanyan, and Dan (2011) who concluded that a proper ERP product is a critical factor if an organization is to ensure a positive outcome in the ERP implementation.

The results further revealed that technical expertise relates positively and statistically significant with ERP implementation (β=0.093 p=0.026). The results imply that one unit increase in technical expertise results to 0.093 increases in ERP implementation. Technical expertise is required for successful implementation of ERP. Technical expertise entail installation,

maintenance and debugging. Findings agreed with those by Abu- Shanab, Abu-Shehab & Khairallah (2015) who found that project team competence is one of the major factors that played a major role in the successful implementation ERP Systems. Finally, results showed that ICT authority involvement relates positively and statistically significant with ERP implementation (β=0.109 p=0.012). The results imply that one unit increase in ICT authority results to ERP implementation by 0.109 units. In an interview session, qualitative interview responses indicated that very few staff (2 out of 6) are aware of the existence of the ICT authority and were therefore not familiar with the role ICT authority plays in the implementation of ERP. This was as illustrated in the following quote

"…….*no, I understand what we do in KEMRI, I understand what we do in universities but the actual impact of ICT authority to my day to day life, I'm not so much...I just see them. I see that. I think you guys have to get involved but from us the users from this other side, Our interaction with ICT authority I think is much more limited, so I don't know much because even sessions with the ICT authority I have not been able to get involved yet…"* ((Interviewee)

The two respondents were aware that the ICT authority was part of the process to ensure that the organization abided with the government directives. They also indicated that the ICT authority played a role in influencing the procurement of technological hardware i.e. the computers and ensured that the system was compatible with those of other government systems. The following quoted response by one of the interviewees represent the views by the majority.

> *"…..the good thing is that the impact of the ICT authorities that we walked with them throughout the process, and this being a government agency, we really needed to ensure that in whatever we do, we are able to abide or align ourselves to the government systems. ……. So basically, they were here to help us to get us through that, especially in the processes. Number two, they helped us in, especially in the compatibility of systems that would be able to give us reports, like the audit reports, and all that, finally, also they helped us in guiding the acquisition, in the acquisition process, in the verification process. And finally, on implementation"* ((Interviewee).

There was a general feeling that the computer hardware procured by the support of the ICT authority did not meet the expected standards and were considered part of the reason for the downtimes of the ERP system. This is illustrated in the quotes below:

"ICT authority? Are you talking about the ICT department in this institute?.....Yes, other than giving us low grade computers, I didn't have a feeling of the impact of the ICT Authority" ((Interviewee).

"We are advised on that….. they are the ones who gave us the specifications. Yeah, and the computers are actually probably one of the causes of the slow implementation of the ERP……You see on their specification, if there is need for you to reach them, tell them that it was an injustice to the organization. (Interviewee)

It is therefore evident that the ICT authority was not greatly involved in the implementation of ERP as most of the interviewees could not trace the role they played.

4.8 Chapter Summary

The chapter provided a presentation of the study findings and the interpretations. The chapter first presented results for the response rate and then the demographic characteristics. The descriptive statistics regarding the study variables were also analyzed and reported. The results for the diagnostics were also presented followed by the correlation and regression analysis results. Finally, the content analysis for the interview responses were reported in the chapter.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter presents the discussion of the study findings the conclusion as well as the recommendations. This was done in line with the study findings and the objectives of the study. The limitations of the study as well as the recommendations for further research are also discussed in the chapter.

5.2 Discussion

The discussion presented here follows the themes of the study objectives. The study objectives were: To examine how organizational, technological and environmental factors influence ERP implementation in KEMRI.

5.2.1 Organizational Factors

The first objective of the study was to examine the organizational factors that influence ERP implementation in KEMRI. The sub-variables representing organizational factors were: top management support, change management, project management and business process reengineering. Results revealed that top management support played a role in ERP implementation to a high extent. It was also revealed that change management played a role in the ERP implementation success to a high extent. To a high extent project management also supported ERP implementation. Finally, ERP implementation was to a high extent supported by business process reengineering as the business processes were clearly documented which were redesigned using key employees to improve efficiency and had clear Workflows. The study also revealed a positive relationship between the organizational factors (top management support, change management, project management and business process reengineering) and ERP implementation success. This was in agreement with Laudon & Laudon (2018) who found that when change is introduced in an organization, top management support is very critical in the adoption of the new ways which ensures that the project is allocated sufficient funding and resources for its successful completion. Results were also in line with those by Iftikhar Shah et al. (2011) who found that change management is one of the most critical factors in ERP implementation. The findings were also in agreement with Hughes, Rana, and Simintiras (2017)

who noted that Project management is a key contributor to the success of the project. Findings also concurred with Iftikhar Shah et al., (2011) who stated that the implementation of ERP system in an organization requires that the organization work process adopts to the best business practices for smooth operations.

5.2.2 Technological Factors

The second objective of the study was to examine the technological factors that influence ERP implementation in KEMRI. The results revealed that to a high extent the sub-variable ICT infrastructure played a role in ERP implementation. ERP product also contributed to successful ERP implementation to a high extent through its ease of use, compatibility with other existing software packages, ease of customizing and enhancements and adequate security features. Technical expertise of the team was also a contributor in ERP implementation success to a high extent as the technical team: understood the business process; designed the system as per KEMRI's business processes; customized the ERP system as per KEMRI's requirements; had good training skills for transfer of knowledge to KEMRI staff and; provided the much needed support in the adoption of the ERP system. Inferential results revealed a positive relationship between technological factors (ICT infrastructure, strong ERP product and technical expertise) and ERP implementation success. This concurred with Mohmed Al-Sabaawi & Mohmed Al-sabaawi (2015) who asserted that for an ERP to be implemented in an organization, there should be adequate infrastructure to support the use of the ERP for day to day operations and Awa and Ojiabo (2016), who noted that ICT infrastructure is a very critical factor in the adoption of an ERP system. The findings also agreed with the findings by Nagy (2014) who found that a strong ERP product is normally selected at the product selection process and Hasibuan and Dantes (2012) who concluded that ERP product selection is the most critical key success factor in the technology selection stage. This was also in line with Nejib (2013) who found that ERP Implementations require a high-level specialized skills and knowledge on the ERP product.

5.2.3 Environmental Factors

The final objective of the study was to examine how environmental factors influence ERP Implementation in KEMRI. The variable environmental factors was measured through ICT authority. Results revealed that to a high extent the ICT Authority provided and enforced standards on the ERP implementation, supervised the design, development and implementation

of the ERP at KEMRI and provided guidance on the ERP implementation process. The results also revealed that the variable environmental factors has a positive correlation with ERP implementation. It was also revealed that the relationship between ICT Authority and ERP implementation was statistically significant and positive. This was in line with Tornatzky and Fleisher (1990), who identified government regulations is one of the environmental factors include that affect innovation adoption.

5.3 Conclusion

Based on the analysis conducted and the findings thereof it was concluded that organizational factors top management support, change management, project management and business process reengineering are a great positive influencers of ERP implementation success. Top management provide support for ERP implementation by allocating sufficient funds and resources for the implementation. They also achieve support by clearly communicating and providing direction regarding the implementation. Change management and project management as well as business process reengineering are ways through which organizational management influence ERP implementation.

The study also concluded that technological factors such as ICT infrastructure, strong ERP product and technical expertise influence the implementation of ERP in a positive and significant way. Having a stable network infrastructure and an ERP system that is compatible with the existing hardware and software with new ERP and providing end users with access to ERP leads to successful ERP implementation. An ERP product that is easy to use and that complements with other existing software and has customization features and enough security features also leads to successful ERP implementation. Moreover, Technical expertise of the team is also important in ERP implementation.

The study further concluded that environmental factors have a positive and significant influence on ERP implementation. Existence of ICT Authority that provide and enforce standards on the ERP implementation and also supervise the design of ERP and develop ERP to great extent influence ERP implementation in a positive manner. However, it was concluded that the ICT Authority did not fully play their role in the ERP implementation.

5.4 Policy Recommendations

The following were the policy recommendations based on the findings for each objective.

5.4.1 Organizational Factors

The study found a positive effect of organizational factors on ERP implementation. Therefore, the management of public research institutions and other public organizations in Kenya, as well as the regulatory body overseeing their operations, are recommended to ensure a strong top management that oversees the implementation of the ERP. This could be enhanced by coming up with proper polices and guidelines for the role of top management in such projects. The management should also set standards in the organization that encourages support for change. Further, a strong project management team with the right capabilities to guide in the implementation should be a priority in the implementation of such projects as ERP. The management should also see to it that the business process reengineering is done regularly which will encourage the adoption and implementation of ERP.

5.4.2 Technological Factors

Regarding technological factors the study recommends that the management of public research institutions and other public organizations in Kenya, as well as the regulatory body overseeing their operations, should ensure a strong and stable ICT infrastructure that complements well with the new system that is adopted. They should further ensure that the ERP product they design is compatible with the existing software system and s also easy to use in order to encourage the employees to adopt t. The technical team should also be trained regularly to ensure that their skills are up to date with the evolving technology.

5.4.3 Environmental Factors

The study also found a positive influence of environmental factors (ICT Authority Involvement) on ERP implementation. Therefore, the management of public research institutions and other public organizations in Kenya, as well as the regulatory body overseeing their operations, should collaborate well with the ICT authority who would offer support for implementation of such systems as ERP as they are able to provide the standards to follow. The management should

ensure that they follow the standard provided by the governments ICT authority when implementing such projects as ERP.

5.5 Limitations of the Study

The study suffered a number of limitations which are discussed herein. The study faced the limitation of some of the respondents being reluctant in providing the required information due to fear of intimidation form their seniors. However, the respondents were assured that the information they provide will not be disclosed to any third party and also the respondents were not required to indicate any identification in the questionnaires. The study also faced a limitation of reaching out to the respondents due to COVID-19 restrictions and therefore some interviews had to be conducted as phone interviews rather than face to face. Online questionnaires took time to be filled due to coordination of different respondents working remotely.

5.6 Recommendations for Further Study

The study was conducted in order to determine the factors that influence ERP implementation using a case of Kenya Medical Research Institute. The factors that were assessed were; organizational factors (top management support, change management, project management and business process reengineering), technological factors (ICT infrastructure, ERP product technical expertise) and environmental factors (ICT Authority involvement). Other researchers who wish to conduct their studies in the line could consider adopting the study in other organizations that are not government owned such as private institutions or non-governmental organizations in order to see if the same results apply in these organizations in Kenya. Other researchers could investigate the effect of other factors such as employees' involvement, scope management, risk management, monitoring and evaluation and project planning. Other methodologies such as use of secondary data and analysis and cross-sectional designs could be adopted.

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APPENDICES

Appendix I: Introduction Letter

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Cell: +254 703 414/6/7, Twitter: @SBSKenya
Email: info@sbs.ac.ke or visit www.sbs.strathmore.edu

Strathmore UNIVERSITY
BUSINESS SCHOOL

9th December 2020

The Director General.
Kenya Medical Research Institute (KEMRI)
Nairobi, Kenya

Dear Sir/ Madam.

RE: FACILITATION OF RESEARCH – GILBERT KIPLAGAT KUGUN

This is to introduce Gilbert Kugun who is a Master of Business Administration student at Strathmore University Business School, admission number MBA/122886/19. As part of our MBA Program, Gilbert is expected to do applied research and undertake a project. This is in partial fulfilment of the requirements of the MBA course. To this effect, he would like to request for appropriate data from your organization.

Gilbert is undertaking a research paper on **"Analysis of Factors Influencing the Implementation of Enterprise Resource Planning Systems: A Case Study of Kenya Medical Research Institute (KEMRI)".** The information obtained from your organization shall be treated confidentially and shall be used for academic purposes only.

Our MBA seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

Caroline Tiara.
Manager – Graduate Programs.

Strathmore Business School is a Proud member of:
Association of African Business Schools AABS
EFMD
AACSB

Appendix II: Questionnaire

The aim of this questionnaire is to collect information on the factors that influenced Enterprise Resource Planning (ERP) System implementation in KEMRI. This information is being sought solely for academic purposes and will be treated with strict confidentiality. Kindly respond by writing a brief statement as the answer to the questions.

SECTION A: GENERAL INFORMATION

1. What is your gender?

   Male ( )

   Female ( )

2. What is your age bracket?

   Below 20 years ( )

   21-30 years ( )

   31-40 years ( )

   41-50 years ( )

   Over 50 years ( )

3. What is your highest level of education?

   O level Certificate ( )

   Diploma ( )

   Undergraduate ( )

   Post-Graduate ( )

4. How long have you worked in KEMRI?

Less than 2 year ( )

3-6 years ( )

7 -10 years ( )

More than 10 years ( )

5. What role did you play in the ERP Implementation and adoption?

Top Management ( )

Lead User/Champion ( )

Main System User ( )

ICT Officer ( )

Self Service User ( )

SECTION B: GENERAL EVALUATION OF ERP IMPLEMENTATION

6. The following statements represent the level of success of a system implementation. Indicate the extent to which you rate each of the statements below regarding success level of the ERP Implementation at KEMRI. Please tick (√) appropriately

[1] To a very little extent [2] to a little extent [3] To some extent [4] To a great extent [5] To a very great extent

ERP Success	**1**	**2**	**3**	**4**	**5**
The ERP system has been embraced across all the KEMRI departments					
There is no downtime experienced while using the ERP system					
The ERP System produces timely and accurate reports for decision making					
The ERP System has improved the Turn-around time for carrying out transactions					

7. How would you rate success of the ERP implementation at KEMRI?

   Excellent ( )

   Good ( )

   Average ( )

   Poor ( )

   Very Poor ( )

SECTION C: ORGANIZATIONAL FACTORS INFLUENCING ERP IMPLEMENTATION

8. The following statements relate to top management support in the ERP Implementation at KEMRI. Please tick (√) appropriately

[1] To a very little extent [2] to a little extent [3] To some extent [4] To a great extent [5] To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
The ERP Project was well funded and had sufficient Resources					
The top management team was involved throughout the implementation of the project					
The top management were clear on the objectives of the ERP					
There was clear and constant communication from Top management during the ERP implementation					

9. How would you rate level of support from top management towards ERP implementation?

   Excellent ( )

   Good ( )

   Average ( )

Poor ( )

Very Poor ( )

10. The following statements relate to change management (the process, tools and techniques used to manage the people side during the ERP Implementation at KEMRI). Please tick (√) appropriately

[1] To a very little extent [2] To a little extent [3] To some extent [4] To a great extent [5] To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
I was aware of the changes taking place during the ERP implementation					
Everyone in the organization was involved during the ERP implementation					
There were change agents/champions selected from KEMRI to spearhead the change process during the ERP implementation					
There were channels through which concerns and clarifications were addressed regarding the changes being brought about by the ERP implementation					

11. How would you rate the impact of change management towards the ERP implementation?

Excellent ( )

Good ( )

Average ( )

Poor ( )

Very Poor ( )

12. The following statements relate to the role of project management in the ERP Implementation at KEMRI. Please tick (√) appropriately

[1] To a very little extent [2] To a little extent [3] To some extent [4] To a great extent [5] To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
The project manager provided strong leadership throughout the ERP implementation period					
The project team members composition was well balanced across different departments					
The role of each project team member was well defined					
There was clear communication within the project team					
There was good collaboration within the project team					

13. How would you rate the overall project management during the ERP implementation?

Excellent ( )

Good ( )

Average ( )

Poor ( )

Very Poor ( )

14. The following statements relate to business process re-engineering (analysis and design of workflows and business processes in order to improve productivity and efficiency) during the ERP implementation at KEMRI). Please tick (√) appropriately

[1] To a very little extent [2] To a little extent [3] To some extent [4] To a great extent [5] To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
The business processes were clearly documented					
There were clear Workflows for each process and in each department					
Some business processes were redesigned with the aim of improving efficiency					
Key employees were involved in the redesign of business processes during the ERP implementation					

15. How would you rate business process re-engineering during the ERP implementation?

Excellent ( )

Good ( )

Average ( )

Poor ( )

Very Poor ( )

16. In your opinion, what other organizational factor(s) do you think may have influenced the implementation of the ERP at KEMRI? Please give reasons for your answer.

SECTION D: TECHNOLOGICAL FACTORS INFLUENCING ERP IMPLEMENTATION

17. The following statements relate to ICT infrastructure at KEMRI during the implementation of the ERP Implementation at KEMRI.

Please tick (√) appropriately

[1] To a very little extent [2] To a little extent [3] To some extent [4] To a great extent [5] To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
The network infrastructure was stable and could support connectivity of the ERP					
The existing hardware (Desktop computers, laptops, mobile phones etc.) was compatible with the new ERP					
The existing software (Microsoft word, excel, outlook etc.) was compatible with the new ERP					

Each user was provided with an end user computer to access the ERP					

18. How would you rate the extent of ICT Infrastructure readiness during the ERP implementation?

    Excellent ( )

    Good ( )

    Average ( )

    Poor ( )

    Very Poor ( )

19. The following statements relate to the ERP Product (**Microsoft Dynamics 365**) implemented at KEMRI.

    Please tick (√) appropriately

    [1] To a very little extent [2] To a little extent [3] To some extent [4] To a great extent [5] To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
The ERP product is easy to use and navigate					
The ERP product is compatible with other existing software packages					
The ERP product is easy to customize and carry out enhancements					
The ERP product has adequate security features					

20. How would you rate the ERP Product deployed at KEMRI?

Excellent ( )

Good ( )

Average ( )

Poor ( )

Very Poor ( )

21. The following statements relate to the Technical expertise of the technical team that implemented the ERP at KEMRI.

Please tick (√) appropriately

[1] To a very little extent [2] To a little extent [3] To some extent [4] To a great extent [5] To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
The technical team understood the business process at KEMRI					
The technical team designed the system as per KEMRI's business processes					
The technical team customized the ERP system as per KEMRI's requirements					
The technical team had good training skills for transfer of knowledge to KEMRI staff					
The technical team provided the much needed support in the adoption of the ERP system					

22. How would you rate the level of Technical Expertise of the technical team involved?

Excellent	( )
Good	( )
Average	( )
Poor	( )
Very Poor	( )

23. In your opinion, what other technological factor(s) do you believe think influenced the implementation of the ERP at KEMRI? Please give reasons for your answer.

SECTION E: ENVIRONMENTAL FACTORS INFLUENCING ERP IMPLEMENTATION

24. The following statements relate to the ICT Authority (a state corporation mandated to enforce ICT standards in the Kenyan Government Agencies and Corporations) Involvement in the ERP implementation at KEMRI.

Please tick (√) appropriately

[1] To a very little extent [2] To a little extent [3] To some extent [4] To a great extent [5] To a very great extent

ICT Authority Involvement statements	**1**	**2**	**3**	**4**	**5**
The ICT Authority provided and enforced standards on the ERP implementation at KEMRI					
The ICT Authority supervised the design, development and implementation of the ERP at KEMRI					
The ICT Authority provided guidance on the ERP implementation process					

25. How would you rate the impact of ICT Authority Involvement in the ERP implementation?

Excellent	( )
Good	( )
Average	( )
Poor	( )
Very Poor	( )

26. In your opinion, how can ICT Authority improve their enforcement of ICT services in the Kenyan government corporations?

The END.

Appendix III: Interview Questions

INTERVIEW QUESTIONS

1. What was your role in the implementation of the ERP at KEMRI?

   ---

2. What were the objectives of the ERP implementation at KEMRI?

   ---

3. To what extent would you say the objectives were realized on a scale from 1 to 5? Please explain your rating

Least Extend				Great Extend
1	2	3	4	5

   ---

4. In your opinion, what are the factors that contributed to the successful implementation of the ERP in KEMRI?

   ---

5. What are some of the challenges you experienced during the implementation of the ERP in KEMRI?

---

6. In your opinion, what are were the solutions to the challenges experienced during the implementation of the ERP in KEMRI?

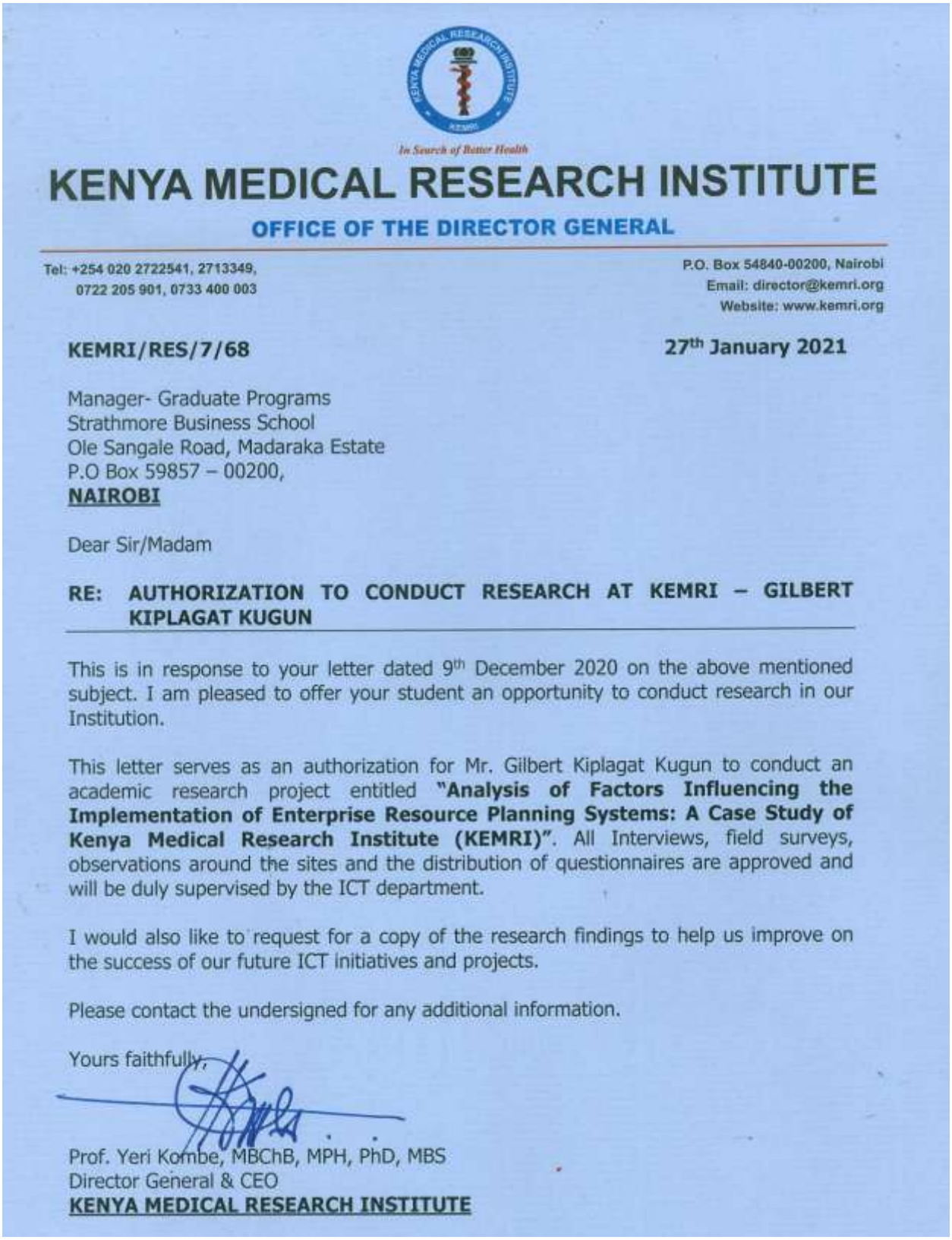
---

7. In your opinion, what was the impact of ICT Authority involvement in the ERP project implementation?

---

8. In what way do you think ICT Authority can improve in their mandate as a regulator of ICT Services in the Kenyan Government?

Appendix IV: KEMRI Research Authorization Letter



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KEMRI/RES/7/68 **27th January 2021**

Manager- Graduate Programs
Strathmore Business School
Ole Sangale Road, Madaraka Estate
P.O Box 59857 – 00200,
NAIROBI

Dear Sir/Madam

RE: AUTHORIZATION TO CONDUCT RESEARCH AT KEMRI – GILBERT KIPLAGAT KUGUN

This is in response to your letter dated 9th December 2020 on the above mentioned subject. I am pleased to offer your student an opportunity to conduct research in our Institution.

This letter serves as an authorization for Mr. Gilbert Kiplagat Kugun to conduct an academic research project entitled **"Analysis of Factors Influencing the Implementation of Enterprise Resource Planning Systems: A Case Study of Kenya Medical Research Institute (KEMRI)"**. All Interviews, field surveys, observations around the sites and the distribution of questionnaires are approved and will be duly supervised by the ICT department.

I would also like to request for a copy of the research findings to help us improve on the success of our future ICT initiatives and projects.

Please contact the undersigned for any additional information.

Yours faithfully,

Prof. Yeri Kombe, MBChB, MPH, PhD, MBS
Director General & CEO
KENYA MEDICAL RESEARCH INSTITUTE

Appendix V: IERC Approval Letter

Strathmore UNIVERSITY

4th June 2021

Mr Kugun, Gilbert
gilbert.kugun@strathmore.edu

Dear Mr Kugun,

RE: Analysis of Factors Influencing the Implementation of Enterprise Resource Planning Systems: A Case Study of Kenya Medical Research Institute (KEMRI)

This is to inform you that SU-IERC has reviewed and **approved** your above **SU-master's** research proposal. Your application reference number is **SU-IERC0982/21.** The approval period is **4th June 2021 to 3rd June 2022.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 48 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 48 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and also obtain other clearances needed

Yours sincerely,

for: Dr Virginia Gichuru,
Secretary; SU-IERC

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE (SU-IERC)
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Appendix VI: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **660547**

Date of Issue: **17/June/2021**

RESEARCH LICENSE

This is to Certify that Mr.. Gilbert Kiplagat Kugun of Strathmore University, has been licensed to conduct research in Nairobi on the topic: Factors Influencing the Implementation of Enterprise Resource Planning Systems: A Case Study of Kenya Medical Research Institute (KEMRI) for the period ending : 17/June/2022.

License No: **NACOSTI/P/21/11157**

660547

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Appendix VII: Plagiarism Report

Curiginal

Document Information

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Submitted	2021-10-01 20:25:00
Submitted by	
Submitter email	Gilbert.kugun@strathmore.edu
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