INFLUENCE OF END USER CHARACTERISTICS ON ADOPTION OF NEW TECHNOLOGIES AMONG UTILITY FIRMS; A CASE OF KENYA POWER AND LIGHTING COMPANY, NAKURU, KENYA

BY

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DECLARATION

This research project report is my original work and has not been presented for a degree in any other University or any other award**.**

Signature …….. **Date ……..**

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REG: L50/83057/2015

This research project report has been submitted for examination with my approval as the University Supervisor.

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DEDICATION

This work is dedicated to my wife, Gladys Wangui Njoroge, and children June Mweru, Elsie Wanjiru and Nicole Muthoni for encouraging me to complete this research project report.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS & ABBREVIATIONS

DMS	Distribution Management System
EAP&L	East African Power and Lighting Company
GIS	Geographical Information System
ICT	Information and Communication Technology
IT	Information Technology
ITMS	Integrated Tax Management System
Ken Gen	Kenya Electricity Generating Company
KETRACO	Kenya Electricity Transmission Company
NACOSTI	National Commission for Science, Technology and Innovation
SPSS	Statistical Packages for Social Sciences
UTAUT	Unified Theory of Acceptance and Use of Technology

ABSTRACT

The Kenya Power and Lighting Company (KPLC) plays a critical role in the economic development of the country through supply of electricity for both domestic and corporate customers. In order to execute its mandate efficiently, the company has embraced new technologies such as a modern robust and integrated Distribution Management System (DMS) as well as different types of sensors on feeders, transformers and distribution substations. Other measures include smart metering of transformers and feeders to enable energy balancing amongst a host of diverse new technologies in its operations. Adoption of technology expected to reduce power losses, operational cost savings, lowered peak demand, new or increased revenue streams, improved long-term growth prospects and improved customer satisfaction. Despite, the potential benefits of new technologies usage within KPLC, there is evidence showing low adoption levels of diverse introduced technologies at KPLC. Examples in this context include poor adoption levels of live line handling technology, as well as cable joining and termination technology amongst others. This study therefore seeks to examine influence of end user characteristics on adoption of new technologies at Kenya Power and Lighting Company in Nakuru. The theoretical framework of the study was based on the Unified Theory of Acceptance and Use of Technology (UTAUT). The descriptive research design was used for the study as the phenomena characteristics were examined on the ground without any manipulation of variables. The target population is the 274 Kenya Power and Lighting Company staff in Nakuru. The sample size of 73 for the study was calculated using the Nassiuma's formula. The stratified random sampling was used as the sampling procedure. A structured questionnaire was used in this study. The validity of the study was undertaken using the content validity. The reliability of the study was examined using the internal reliability using cronbach alpha coefficient. This regression model indicates that a unit increase in End User Skills Matrix while other factors are kept constant would result in a 0.051 decrease in adoption levels of new technology. Similarly, a unit increase in end user demographic characteristics would result in a 0.047 decrease in adoption levels of new technology with the other variables kept constant. This indicates that both End User Skills Matrix and end user demographic characteristics cannot positively influence the adoption levels of new technology individually. A unit increase in end user attitudes would result in a 0.203 increase in adoption levels of new technology with the other metrics kept constant while a unit increase in work flow management would result in a 0.645 increase in adoption levels of new technology with the other metrics kept constant. This implies that both end user attitudes and work flow management individually influence the adoption levels of new technology positively. The study concluded that the skills matrix of end user, end user attitudes, and work flow management had significant influence on adoption of new technologies at Kenya Power and Lighting Company. The study also found that there was no significant influence of end user demographic characteristics in relations to the adoption of the new technologies. Amongst the aspects that were found to be influential to the adoption of new technologies at KPLC included problem solving skills, education levels, a perception of necessity of new technologies, and management aspects due to the high means they scored in their respective categories.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Across the globe, there are diverse factors leading to the need for new technologies amongst utility firms such as water and sewerage firms, as well as energy firms. These factors include an increasing population, urbanization effects, an increasing middle class, industrialization effects, and increase in development across diverse countries (Apulu, Latham, & Moreton, 2011). Within the energy sector, there are different technologies that have been adopted across the world based on their specific needs.

In the United States of America, the New York Power Authority., (2014) noted that there is need to embrace technologies in energy sector with a view of achieving diverse objectives. In this context, the New York Power Authority 2014-2019 strategic vision cites the objectives for new technologies adoption as clean generation of electricity, meet the needs of energy driven economy, creation of a stronger and resilient electricity grids, and strengthening environmental protection.

On the other hand, the New York Independent System Operator which is concerned with operations of New York's bulk electricity grid, noted the need for technology in order to counter emerging threats as well better contain the old ones (Jones, 2015). Amongst the needs for new technology adoption include the need to evolve and strengthen the physical and cyber security mechanism to protect the grid from ever-changing threats.

Saibu (2016) undertook a study on Macro determinants of renewable electricity technology adoption in Nigeria. The study identified the need that led to a need to adopt renewable energy technologies as increase in energy consumption levels, and fossil related fuel carbon dioxide emission. In the context of the carbon dioxide emissions, the fossil related fuel carbon dioxide emission stood at 86.40 million metric tons in 2012 making it amongst the highest carbon dioxide emitting countries in Africa (Saibu, 2016).

On the other hand, in terms of electricity energy consumption, the electricity consumptions levels had increased to 23.11 billion kilowatt-hours by 2011 and continue to rise due to industrialization levels of the country. Similar to Nigeria, South Africa is facing the challenge of high carbon dioxide emission leading to adoption of new technologies in cleaner energy generation.

In Uganda, Electricity Regulatory Authority., (2015) notes that the Government of Uganda seeks to improve technology use in energy sector with the view of improving efficiency. In its strategic plan for 2014/15-2023/24 financial years, the Electricity Regulatory Authority underscores the need for the adoption of emergent technologies in the industry in order to achieve efficiency. However, there are diverse challenges that face energy sector in utilization of new technologies. According to Uganda Electricity Transmission Company., (2014), its service provision has been undermined by the difficulties in adopting new technologies. These difficulties have been attributed to fast evolving technologies, inadequate training of staff, high staff turnovers, and existing organizational structure (Uganda Electricity Transmission Company., 2014).

There are several factors that influence the adoption of new technologies in utility firms. According to Kukafka, Johnson, Linfante, & Allegrante, (2003), there are three groups of factors that affect the adoption of new technologies in utility firms; organizational level factors, group level factors and individual level factors. The organizational level factors include aspects relating to the organization that affect the individual users of new technologies within the organization (Buabeng-Andoh, 2012). These factors may include organizational structure, organizational culture, policies and procedures of workflow amongst other factors. The group level factors include aspects such as professional values and culture. On the other hand, the individual level factors include aspects that touch on the individual user attributes that impact on their use of new technologies such as attitudes, user satisfaction, and user involvement amongst other factors (Graziano, 2014).

In Kenya, the Kenya Power and Lighting Company (KPLC) is involved in transmission, distribution and retail of electricity connection. The Kenya Power and Lighting Company was formed in 1922 as the East African Power and Lighting Company (EAP&L) (Oginda, 2013). EAP&L rebranded to KPLC in 1983 involved in both the generation and supply of electricity. Changes in the energy sector in 1997 and 2008 led to the formation of Kenya Electricity Generating Company(Ken Gen) and Kenya Electricity Transmission Company (KETRACO) respectively (Aketch, 2015). The company is divided into twelve major divisions; network management, Information and Communication Technology, Supply Chain Management, Customer Service, Business Strategy, Infrastructural Development, and Internal Audit. Others are Street Lighting, Connectivity, Finance, Human Resource and Management, and Company Secretary, Legal & Corporate Affairs.

The Kenya Power and Lighting Company (KPLC) plays a critical role in the economic development of the country through supply of electricity for both domestic and corporate customers (Kenya Power and Lighting Company., 2017). In this context, the energy sector is listed as one of the ten pillars of the country's Vision 2030 pillars in which more electricity connection, and efficiency in electricity consumption amongst other aspects need be achieved (Vision 2030 Secretariat, 2017). The country is also facing an increasing electricity demand at the moment from a peak demand of 899 MW in 2004/2015 to 1,585 MW in 2015/2016 year with an increase of customer base from 735, 144 to 4, 890, 373 in the same period. In its operations, KPLC faces challenges such as challenges in reliability of power supply to diverse customer base and other network changes. The company therefore targets in its 2016/17-2020/21 network strategic plan to adapt diverse new technology in its supply of electricity (Kenya Power and Lighting Company., 2015b). These measures include Installation of a modern robust and integrated Distribution Management System (DMS) as well as different types of sensors on feeders, transformers and distribution substations. Other measures include smart metering of transformers and feeders to enable energy balancing amongst a host of diverse new technologies in its operations (Kenya Power and Lighting Company., 2015b).

1.2 Statement of the Problem

The adoption of new technologies is of integral importance to KPLC in the operations and performance of the company. In this context, the company's Five Year Corporate Strategic Plan 2016/17-2020/21 notes that; "Introduction of new technologies provides

many potential benefits to the company. Typical objectives that will be served by new technologies will include reducing power losses, operational cost savings, lowered peak demand, new or increased revenue streams, improved long-term growth prospects and improved customer satisfaction"(Kenya Power and Lighting Company., 2015a p.21). The adoption of new technologies is also critical in ensuring that KPLC reduces losses associated with distribution of electricity. These losses are characterized as technical and system electricity losses that occur when the electricity is dissipated by the equipment and conductors in the distribution lines.

Despite, the potential benefits of new technologies usage within KPLC, there is evidence showing low adoption levels of diverse introduced technologies at KPLC. For example, the 2014/2015 KPLC training calendar indicates low adoption levels in relations to live line handling technology, as well as cable joining and termination technology amongst others. This study therefore seeks to examine influence of end user characteristics on adoption of new technologies at Kenya Power and Lighting Company in Nakuru. The study also sought to fill in gaps in the literature review. Amongst the studies that have examined adoption of new technologies include Al-Smadi (2012) study on factors of adoption of electronic banking while Baariu (2015) examined factors affecting adoption mobile payments, and Krysa (2010) on factors leading to adoption of computers in schools. These studies don't focus on utility firms which is the focus of this study.

1.3 Purpose of the Study

The purpose of the study is to examine the influence of end user characteristics on adoption of new technologies among utility firms with a special reference to Kenya Power and Lighting Company, Nakuru, Kenya.

1.4 Research Objectives

The objectives of the study included;

1. To examine the influence of End User Skills Matrix on adoption of new technologies at Kenya Power and Lighting Company, Kenya
2. To examine the influence of end user demographic characteristics on adoption of new technologies at Kenya Power and Lighting Company, Kenya
3. To establish the influence of end user attitudes on adoption of new technologies at Kenya Power and Lighting Company, Kenya
4. To establish the influence of workflow management on adoption of new technologies at Kenya Power and Lighting Company, Kenya

1.5 Research Questions

The study was guided by the following research questions;

1. What is the influence of End User Skills Matrix on adoption of new technologies at Kenya Power and Lighting Company, Kenya?
2. How do end user demographic characteristics influence adoption of new technologies at Kenya Power and Lighting Company, Kenya?

3. What is the influence of end user attitudes on adoption of new technologies at Kenya Power and Lighting Company, Kenya?
4. How does workflow management influence adoption of new technologies at Kenya Power and Lighting Company, Kenya?

1.6 Research Hypotheses

The study was based on the following alternate hypotheses;

1. **H_{a1}:** Skills matrix of end user has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya
2. **H_{a2}:** Demographics characteristics of end users have significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya
3. **H_{a3}:** The attitudes of end users have significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya
4. **H_{a4}:** The workflow management has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya

1.7 Significance of the Study

This study was of significance to the KPLC management, utility firms' management, new technology manufacturers in the energy sector, and researchers in the subject matter. The study explored the factors that lead to the adoption of new technologies at the KPLC. The knowledge of these factors and the way in which they affect the adoption of new technologies were of critical importance to KPLC management and human resource office in putting up measures to address the contributing factors. These measures could be incorporated in the training and development courses as well as workflow

management. The utility firms' management benefited from this study through an understanding of contributing factors to the adoption of diverse technologies. This was of critical importance to the management of these firms in formulating policies that work in their organization in relations to the adoption of new technologies introduced in their organization. Finally, the study was useful to the researchers of the adoption of new technologies in diverse organizations. This is because the study expanded the pool of knowledge available in relations to the role of End User Skills Matrix, end user demographic characteristics, end user attitudes, and workflow management aspects on adoption of new technologies.

1.8 Assumptions of the Study

There were certain assumptions that the study had including an assumption that the management of KPLC staff would consent to the undertaking of the study in their organization and that the respondents would cooperate in the undertaking of the study and be truthful in answering the set questions.

1.9 Limitations of the Study

The study was limited in one major way. The study focused on a single organization that is Kenya Power and Lighting Company (KPLC) which could have limited the study had the organization failed to give authorization for data collection. The researcher mitigated this by explaining to KPLC management on the importance of the study to their human resource management which enabled them to give the required authorization to undertake the study. The study respondents had reservations on discussing their employer. The researcher mitigated the respondents' apprehension by issuing them with a consent statement which advised them of confidentiality and anonymity of their responses. The

consent statement also advised them that a formal authorization was obtained from their employer.

1.10 Delimitations of the Study

Geographically, the study was limited to Nakuru branch located within Nakuru Central Business District due to the budget and time constraints. Contextually, the study was limited in scope to end User Skills Matrix, end user demographic characteristics, end user attitudes, and workflow management aspects as factors affecting adoption of new technologies at KPLC. Any other factors that may influence adoption of new technologies were not examined. This is also a research for an academic purpose and as such the study was limited in respect to time by the academic calendar of the University of Nairobi where the study was being undertaken from. Finally, the study was self-funded and as such limited to a budget consideration of Ksh. 159, 038.

1.11 Significant Terms Used in the Study

Adoption of New technologies;	Active usage of new technologies deployed at KPLC
Attitudes;	Subjective perceptions about the ease of use and usefulness of the new technologies
End user Demographic Characteristics;	Characteristics about the KPLC employees' relating to age, gender, education levels, and experience levels in the organization
End User Skills Matrix;	The range of skills at the disposal of KPLC employees
End User;	The KPLC employee who utilizes a given technology at KPLC
Perceived Ease of Use;	User's perception of the degree to which a new technology is critical in the improvement of the user's performance on a given task
Perceived Usefulness;	User's perception of amount of effort needed to adopt the new technology

Utility Firm; A company that supply services such as water and electricity

Work Flow Management; The management of work movement from one level to another

1.12 Organization of the Study

The study was organized in five chapters that is chapter one, two, three, four and five. Chapter one discussed introduction to the study with the following sub components; background to the study, statement of the problem, objectives of the study, significance of the study, limitations and delimitations of the study, and definition of significant terms used in the study.

Chapter two of the study examined the literature review of the study that is empirical literature review, theoretical framework, conceptual framework, and summary of reviewed literature.

Chapter three of the study examined research methodology with the following subsections; research design, target population, sampling procedure, data collection instruments, pilot study, data collection procedures, data analysis procedures, ethical considerations and operationalization of variables.

Chapter four examines the data analysis, presentation, interpretation and discussion. In this context, the data was analyzed using both the descriptive and inferential statistics. The data was presented in tables. Chapter five involved the summary of findings, conclusions, recommendations and suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examines the empirical literature of the study, the theoretical framework of the study, the conceptual framework of the study, and summary of the reviewed literature.

2.2 Skills Matrix of End User and Adoption of New Technologies

The skills matrix of the end user plays a significant and critical role in the adoption of new technologies in any organization. Amongst these skills include technical skills, problem solving skills, proficiency in internet usage, basic computer trouble shooting skills, and ability to use self-help menus (Kamarulzaman & Azmi, 2010; Kinanga, 2013; Mehar & Mittal, 2016; Tshitenge, 2011).

In the context of the role of technical skills in the adoption of new technologies, the possession of technical skills such as Information Technology (IT) skills enables the end users to better adopt to new technologies. This is because these users reduces the efforts needed to use new technology as well as being better capable to handle arising challenges while using the new technology. The users are also more confident on their capability to use the new technologies and therefore having a positive attitude that overly boosts the adoption rate of new technologies (Mucheru, 2013).The problem solving skills are critical in the end user being able to adequately adopt new technologies. The ability of the user to solve basic challenges during their usage of the new technologies is critical in them being able to change their attitude towards the new technology (Njihia & Magutu,

2012). The change of attitude enables a perceived ease of use of the new technology. This is because the users are able to get small wins or successes that eventually lead to full integration and use of the new technology.

The proficiency in internet usage, basic computer trouble shooting skills, as well as ability to use self-help menus on the technology platform are critical components in new technologies usage. Most of the technologies within the context of the office use are often internet or web based and therefore basic internet usage are often critical in enabling ease of use. For example, Mandola (2013) in the examination of the adoption of Integrated Tax Management System (ITMS) in Kenya found a correlation between an individual's proficiency in internet usage and adoption of (ITMS) amongst target users of the system. On the other hand, Muhangi (2012) in a study on the examination of the online filing in Uganda found that ability to use the self-help menus on a web based technology was critical in ensuring that improving adoption levels. In this context, Muhangi (2012) notes that the self-help menus empower the user hence reduce perceived ease of use.

The ability of a user to have internet skills and computer trouble shooting skills is critical for the adoption of new technologies. This is because diverse technologies within the organizations are often information technology based and some are web based systems. Therefore a user's skill matrix on internet skills and computer usage plays a significant role in the adoption of these new technologies. In this context, Gwaro (2016)undertook a study of influence of online tax filing on tax compliance among small and medium enterprises in Nakuru town, Kenya. Amongst the aspects that the study examined in

terms of influences of online taxes include internet skills, basic computer trouble shooting skills, and ability to use self-help menus on itax platform. The study used a Likert scale of strongly disagree (1), disagree (2), uncertain (3), agree (4), and strongly agree (5) to evaluate these aspects influence on online tax filing adoption levels. The study found that internet skills, basic computer trouble shooting skills, and ability to use self-help menus on itax platform had an influence on online filing due to means of 4.12, 3.51, and 3.73 respectively.

2.3 Demographic Characteristics and Adoption of New Technologies

The demographic characteristics play a critical role in the adoption of new technologies. In this context, the early adopters of technological innovations are typically younger in age, having higher incomes, better educated, and having higher social status and occupation (Baariu, 2015). Age is a key demographic characteristic that influences the adoption of new technologies across diverse firms. The younger people in an organization are likely to have a higher perceived ease of use that leads to their increased adoption of new technologies. Abdelbary (2011) in a study on factors affecting adoption of biometric technology by five-star Egyptian hotel employees found significant differences in ease of use by age ($F(3, 718) = 2.676$, $p < .05$). The users in within the 18-28 age bracket had a higher mean score compared to those relatively older (Abdelbary, 2011)

The education levels in a firm have a significant impact on the adoption of new technologies. This is because the education levels is often correlated with a higher exposure rate to computer usage leading to development of internet skills and computer

trouble shooting skills which are critical in the adoption of new technologies. The education levels are associated with high cognitive skills that aids in adoption of new technologies. Abdelbary (2011) in a study on factors affecting adoption of biometric technology by five-star Egyptian hotel employees found significant influence of education perceived ease of use. The study used a Likert scale of strongly disagree (1), disagree (2), uncertain (3), agree (4), and strongly agree (5) to evaluate education levels impact on perceived ease of use. The study found that Egyptian hotel employees with some high school, some college, and college and post graduate education levels had means of 3.4733, 3.8470, 4.0208, and 4.0488 respectively in relations to ease of use of new biometric technology. The study concluded that there was significant differences in ease of use by education level $F(3, 718) = 14.428$, $p < .05$). Mulwa (2015) in a study on factors influencing adoption of ICT in service delivery by Kitui County Governments found that education levels had an impact on the adoption levels of ICT. In this context, 10%, 10%, and 80% of the respondents indicated that level of education assisted in adoption of new technology to a moderate extent, great extent and very great extent respectively.

The gender of the end user has an impact on the adoption of new technologies. This is because men tend to be more technically oriented and may have an easier time adopting to new technologies due to better attitudes towards the new technologies. For example, Gachukia (2012) in a study on influence of demographics on adoption of social media noted gender differences in the adoption of new technologies. The study noted that men's adoption of new technology was strongly influenced by their perception of usefulness

while women were strongly influenced by their perceptions of ease of use. Additionally the study notes that more males than females are likely to adopt to new technologies faster. Amongst the major issue that led to the slower adoption of new technologies was that females displayed more negative attitude towards computer based technology.

The job role of the end user is a critical component in the determination of whether the end user of the new technologies easily adopts the technology. Certain job roles such as those in the technical fields often give these job holders an advantage over their peers in non-technical oriented roles when it comes to adoption of new technologies(Gachukia, 2012).

The experience levels of the users of new technology have a significant influence on the adoption of new technologies. Users who have been exposed to similar technologies in the past have a higher chance of having a positive attitude towards adoption of new technologies (Qatawneh, 2015). On the other hand, Alzighaibi, Mohammadian, & Talukder (2016) indicates that experience in Information Technology (IT) often influence the adoption of new technologies as most technologies are IT based.

2.4 Attitudes of End Users and Adoption of New Technologies

The attitudes of end users affect the adoption of new technologies amongst different sectors. The perceived usefulness and perceived ease of use are some of the major factors affecting the attitudes of the end users and ultimately impacting on their ability to use the new technologies. The perceived usefulness has been defined as the user's perception of the degree to which a new technology is critical in the improvement of the user's

performance on a given task (Phan & Daim, 2011). On the other hand, the PEOU has been defined as user's perception of amount of effort needed to adopt the new technology

There has been mixed results and academic debate on which factor between perceived ease of use and perceived usefulness is a primary determinant of behavioral intention to use a new technology. Azmi & Bee (2011) in an examination on the acceptance of the e filling system by Malaysian taxpayers found that both PEOU and PU had significant positive effects on behavioral intention. The study also that PU was a more powerful predictor of behavioral intention compared to PEOU due to a regression coefficient of 0.40 compared to that of 0.38 of the latter. Therefore, a unit increase of PU led to a 0.40 increase in behavioral intention to use new technology while a unit increase of PEOU led to a 0.38 increase in behavioral intention.

Olouch, Abaja, Mwangi, & Githeko (2015) study on adoption of mobile banking technology examined the role of PU and PEOU on adoption of mobile banking. The study found that PU had a significant influence on the adoption of mobile banking technology. The study found a correlation coefficient of 0.715 between PU and adoption of mobile banking implying that PU has positive and significant effect on adoption of mobile banking. The study however found that there was no statistically significant relationship between PEOU and adoption of mobile banking technology. Finally, the study found that there was significant statistical relationship between perceived security risk and the adoption of mobile banking technology. Al-smadi (2012) in a study on the factors affecting adoption of electronic banking examined the interrelationship between

PU and PEOU in regards to electronic banking. The study found that there was a positive and significant relationship between PEOU and PU suggesting that the easier the electronic banking service the more useful it becomes.

The aspect of perceived security is intertwined with the perception of risk that may be prevalent in the use of new technology. According to Kamarulzaman & Azmi (2010), perceived risks refers to the financial, new technology performance, social, psychological, physical or time risks that may be prevalent in the usage of the new technology. The financial risk or security aspects relates to whether the user of the new technology will suffer any financial loss (Qatawneh, 2015). The new technology performance risks relate to the issue on whether the new technology will perform as expected. Social risk is considered to be the perceptions of significant others towards the products or services (Bultum, 2014). Convenience risk stands for the additive problematic inconveniences that the consumer will encounter when they purchase the products or services.

The perception towards change influences the adoption of new technology in the context that change brings disruptions in established policies, and ways of doing things. In the context of technology, change essentially having to learn new skills, adopting to a new process map in the execution of tasks, and develop new coping mechanisms with the demands of the new technologies (Bitengo, 2015). A positive towards change enables to the end user to be more receptive to learning the skills of new technology hence reducing perceived ease of use. Finally, the perception towards new technology, whether positive

or negative, has a great influence on the adoption of new technologies (Watiri, 2013). The end users with positive perception towards the use of new technology adopt the new technology faster.

2.5 Workflow Management and Adoption of New Technologies

The management of an institution plays a significant and critical role in their employees' adoption of new technologies through the support they offer such as resources, training aspects, and supervision amongst others. In this context, Alzighaibi et al., (2016) in the examination of adoption of Geographical Information System (GIS) in Saudi Arabia found that managerial support had an impact on the relationship with employees' perceptions of GIS.

The presence of a support system is a critical component in the adoption of new technologies in a given firm. Krysa (2010) noted that having a support system especially in the technical aspects of the new technology is a significant factor in the adoption of new technologies. The presence of the support system enables end users to get technical help whenever there are challenges in the usage of the technology as well giving of tips that makes working with the new technology easy.

The competence of peers in the use of new technology aids in the learning on the usage of new technology. This is because peers create a pool of a group of people that an individual user consults in times of difficulties in use of new technology (Olouch et al., 2015). This enables social learning aspects. In the absence of competence amongst peers

then individual users may face more challenges in learning and adoption of new technologies.

Finally, the cross functional competencies implies that workers are versatile in their skills matrix leading to scenario where individual users may have skills with similar family of technologies or a supportive skill to running the technology (Hamid, 2013). These skills may involve Information and Technology Skills, and trouble shooting skills amongst others (Bultum, 2014). In instances where the user has knowledge or experience in another related family of technologies then the user may apply those skills in this particular new technology.

2.6 Theoretical Framework

The study is based on the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT conceptualized by Venkatesh in 2003 and was derived from the important concepts of various existing models. UTAUT borrows from concepts of theory of reasoned action, technology acceptance model, motivational model, theory of planned behavior, and TAM amongst others (Krysa, 2010). UTAUT has four major factors that influence the ability to adopt new technologies including performance expectancy, effort expectancy, social influence, and facilitating conditions (Kinanga, 2013). The performance expectancy refers to the degree in which the user believes that the new technology will assist in job performance. The effort expectancy relates to the ease associated with using the new technology while social influence relates to the individual user perception of importance placed on his use of the new technology by the peers. Finally, the facilitating conditions relates to the presence of a support system to aid the

new users in adoption of new technologies. The study is applicable to this study in the context that it demonstrates the relationship between demographic factors and adoption of new technologies. This is in tandem with the objectives of this study.

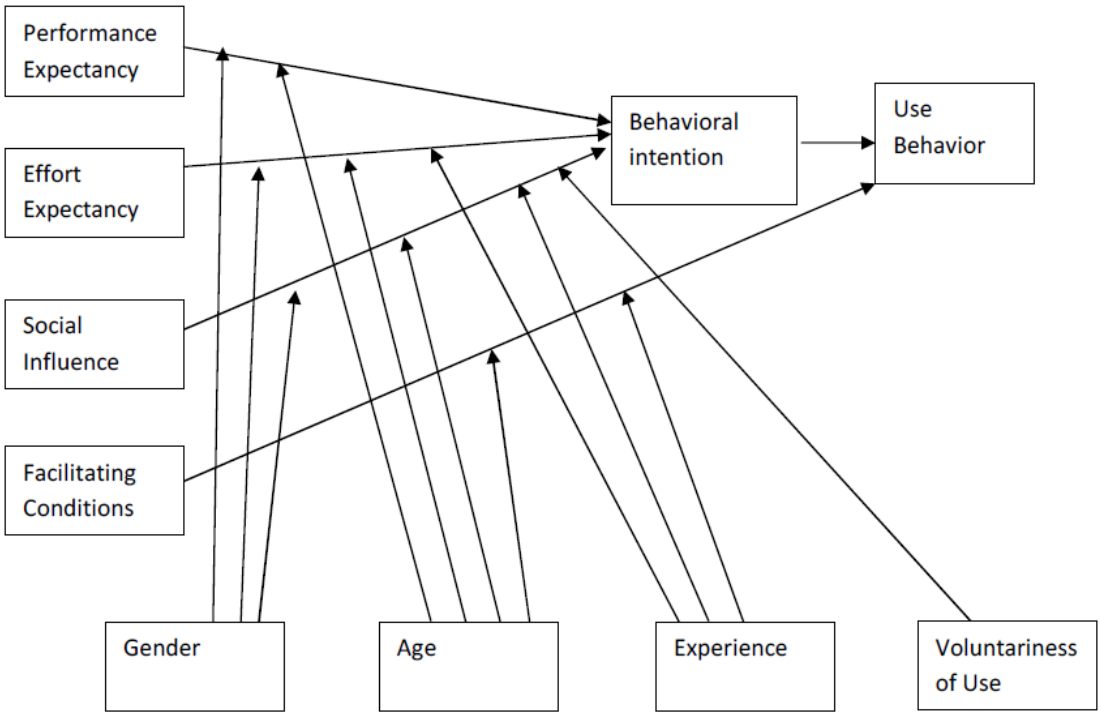

Figure 2.1: Unified Theory of Acceptance and Use of Technology (UTAUT)

Source: Kinanga (2013)

2.7 Conceptual Framework

The conceptual framework examines interrelationship between the independent variables and dependent variables.

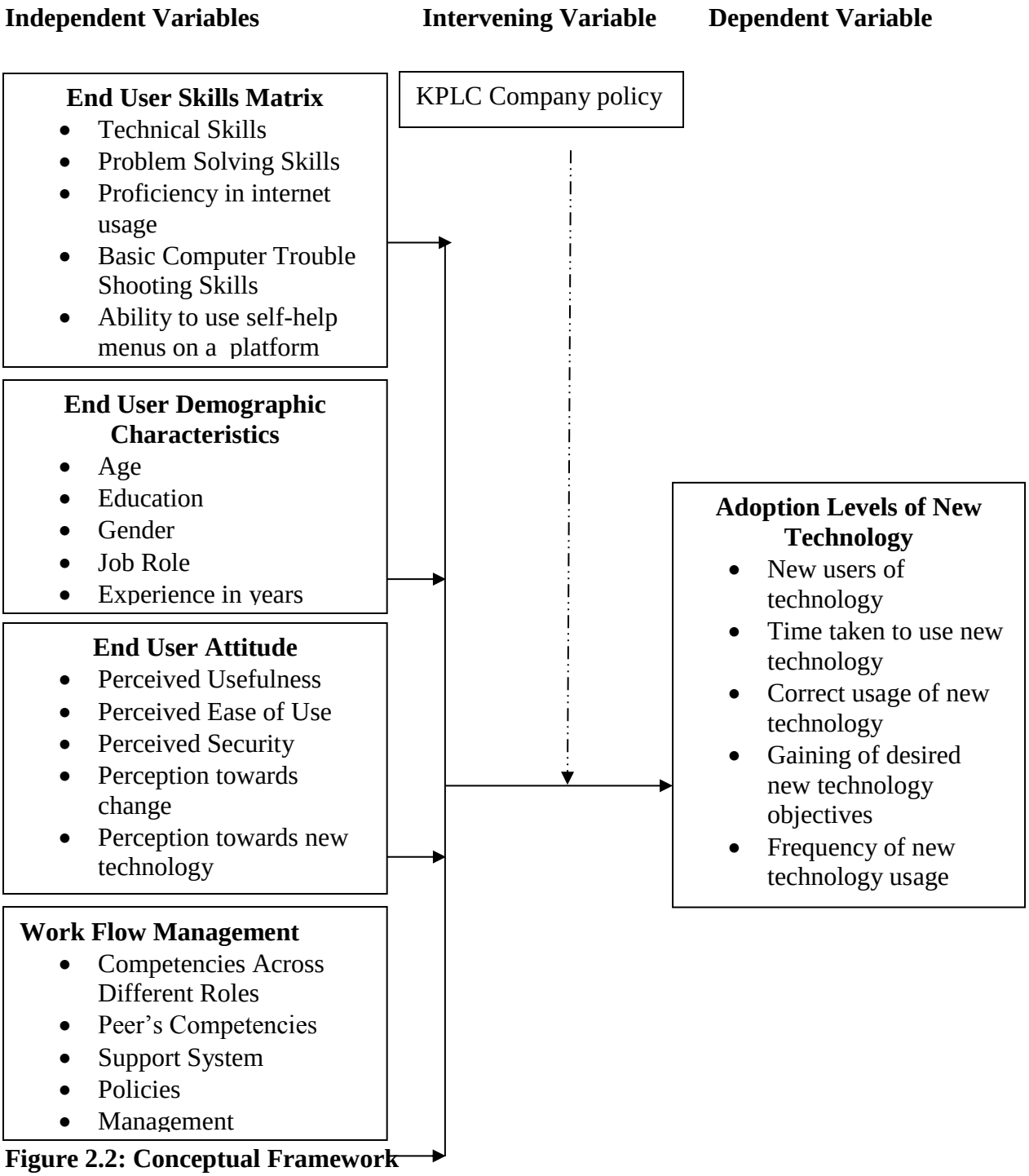

Figure 2.2: Conceptual Framework

The independent variables include End User Skills Matrix, end user demographic characteristics, end user attitudes, and workflow management aspects. The indicators for the End User Skills Matrix include technical skills, problem solving skills, proficiency in internet usage, basic computer trouble shooting skills, and ability to use self-help menus on a platform. On the other hand, the end user demographic characteristics include age, education, gender, job role, and experience in years. The end user attitude was examined using perceived usefulness, perceived ease of use, perceived security, perception towards change, and perception towards new technology. The workflow management aspects include cross functional competencies, peer's competencies, support system, policies, and management.

2.8 Summary of Reviewed Literature

The reviewed literature examined the diverse studies that had covered the specific objectives of this study. The studies indicated that possession of technical skills such as Information Technology (IT) skills enables the end users to better adapt to new technologies. The problem solving skills were critical in the end user being able to adequately adopt new technologies. The ability of the user to solve basic challenges during their usage of the new technologies is critical in them being able to change their attitude towards the new technology.

In the context of demographic characteristics, the studies indicated that the early adopters of technological innovations are typically younger in age, having higher incomes, better educated, and having higher social status .The younger people in an organization are likely to have a higher perceived ease of use that leads to their increased adoption of new

technologies. Education levels were also seen to be positively correlated with the ease of use of the technology. The studies also indicated that men's adoption of new technology was strongly influenced by their perception of usefulness while women were strongly influenced by their perceptions of ease of use. Additionally women displayed a negative perception towards computer use leading to their slow adoption of technology.

The attitudes of end users affect the adoption of new technologies amongst different sectors. The reviewed studies found that PEOU and PU had significant positive effects on behavioral intention to use new technologies. The PU was seen as a more powerful predictor of behavioral intention compared to PEOU. The perception towards change influences the adoption of new technology in the context that change brings disruptions in established policies, and ways of doing things. In the context of technology, change essentially having to learn new skills, adapting to a new process map in the execution of tasks, and develop new coping mechanisms with the demands of the new technologies.

In relations to the workflow management aspects, the management of an institution plays a significant and critical role in their employees' adoption of new technologies through the support they offer such as resources, training aspects, and supervision amongst others. The presence of a support system in the technical aspects of the new technology is a significant factor in the adoption of new technologies. The presence of the support system enables end users to get technical help whenever there are challenges in the usage of the technology as well giving of tips that makes working with the new technology easy. The

reviewed studies also found that the competence of peers enables quicker adoption of technologies as there is a pool of skills that one can consult.

2.9 Research Gaps

This study was undertaken with a view of filling research gaps within the existing body of knowledge. The research gaps prevalent in the reviewed literature are in the differences in contextual and geographical scope. The studies that have a contextual scope gap include studies that don't focus on adoption of technologies within the context of utility firms in general and energy firms in specific. These studies include Al-Smadi (2012) who studied factors of adoption of electronic banking, Baariu (2015) who examined factors affecting adoption mobile payments, and Krysa (2010) who examined factors leading to adoption of computers in schools. The researcher noted that there is huge literature base of available studies on adoption of new technologies within banking sector such as mobile and internet banking. The studies that have a geographical scope include Azmi& Bee (2011) who examined acceptance of e filling system by Malaysian taxpayers, and Talukder (2012) who examined factors leading to adoption of technological innovation by individual employees in Australia.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The research methodology refers to the organization and systematic inquiry or investigation in search of answers to specific questions. The research methodology involves the research design, target population, sampling, research instrument, piloting, validity and reliability of research instrument, data collection procedures, and data analysis aspects.

3.2 Research Design

The research design has been defined as the blue print for collection, measurement and analysis of data. Research design has been defined as roadmap used in answering of research questions. The purpose of the research design includes optimal utilization of available resources to achieve the research objectives, and ensuring clarity of research to address research objectives. The descriptive survey research design was used for the study. The descriptive survey research describes the characteristics of the research phenomenon as it is on the ground without any manipulation of the variables. The descriptive survey research design was most suitable for this study in the context that the research is interested in the examination of the factors affecting the end user adoption of new technologies at KPLC. The study described the factors as they are on the ground without any manipulation of variables.

3.3 Target Population

A population has been described as a group of objects or individuals having common observable characteristics that is of interest to the researcher. The population has also

been defined as the entire group of individuals or objects to which the researchers are interested in generalizing the results. This study sought to find the end user characteristics that influence the adoption of new technologies at Kenya Power and Lighting Company in Nakuru. The target population is therefore the Kenya Power and Lighting Company staff in Nakuru. There are 274 KPLC staff at Nakuru distributed in the following manner (Kenya Power and Lighting Company, 2017).

Table 3.1: Target Population

Departments	**Number of Staff**
Regional Management	3
Design and Construction	37
Finance	41
Supply Chain	22
Transport	10
Technical Services	36
Security	4
Information and Communications Technology	16
Customer Service	90
Human Resources and Administration	15
Grand Total Staff-Regional Office	**274**

Source: KPLC (2017)

3.4 Sampling Procedures

Sampling refers to the selection of a representative finite number from the population with a view of analyzing it in order to get the views of the whole population. The sample size of this study was calculated using the Nassiuma's (2009) formula to derive the sample size as illustrated below;

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

Where

n = sample size

N =size of target population

C = coefficient of variation (0.5)

e = error margin (0.05)

Substituting these values in the equation, estimated sample size (n) were:

$$n = \frac{274\ (0.5^2)}{0.5^2+(274-1)0.05^2}$$

= 73 respondents

Therefore, 73 respondents were used in the study as the sample size.

The stratified random sampling was utilized for the purposes of selecting the sample members to be used in the study. The stratified random sampling is based on the division in the population known as strata that are based on common aspects within the strata.

Table 3.2: Stratified Sampling

Departments	**Number of Staff**	**Percentage**	**Sample Size**
Regional Management	3	1.0%	1
Design and Construction	37	13.5%	10
Finance	41	14.9%	11
Supply Chain	22	8.0%	6
Transport	10	3.6%	3
Technical Services	36	13.1%	9
Security	4	1.5%	1
Information and Communications Technology	16	5.8%	4
Customer Service	90	32.8%	24
Human Resources and Administration	15	5.8%	4
Total	**274**	**100%**	**73**

Once the strata has been formed the number of members to be used from each strata are calculated based on the proportionality of the total number of the population size of the individual stratum relative to the total population size. Thereafter, the random sampling was used to pick the members from each of the stratum. The stratified random sampling enables the researcher to make conclusion on the individual sub groups within the population

3.5 Research Instrument

A research instrument refers to an item that was used for the purposes of collecting data to support the research objectives. A structured questionnaire was used in this study. A structured questionnaire consists of closed ended questions in which the respondents have been given options in response to the asked questions. There are several advantages of the structured questionnaires that informed their choice as the research instrument. These advantages included cost efficiency, ease of analysis using Statistical Packages for Social Sciences (SPSS) as a structured questionnaire provides quantitative data, and higher response rate due to a shorter questionnaire. The questionnaire was divided into six parts that is parts A, B, C, D, E and F. Parts A consisted of background of respondents while parts B, C, D, E and F consisted of the variables of the study. The parts B, C, D, E and F consisted of the Likert scale questions with a five point Likert scale. The Likert scale questions enabled the respondents to rate the indicators of the specific variables (both independent and dependent) in a scale of 1, 2, 3, 4, and 5 corresponding to Strongly Disagree (SD), Disagree (D), Uncertain (U), Agree (A), and Strongly Agree (SA) respectively. The Likert scale questions were used due to the advantages they presented such as ease of being understood by the respondents, accommodation of a neutral feeling on a given issue, and ease of data analysis.

3.6 Pilot Study

The pilot study was undertaken with a view of testing validity and reliability. The pilot study was also undertaken to eliminate any challenges that may hinder full achievement of data collection phase of the research project. In order to achieve its objectives, the pilot study was undertaken using the same procedure as those that were used in the final study.

The pilot study was undertaken in Nakuru offices using 10% sample size, that is,27 respondents who were not subsequently used in the final study so as not to contaminate the field of study. This sample size of was as recommended by Orodho & Kombo (2002). The purpose of the pilot study was to test the reliability and validity of the research instrument. The pilot study found that all the questions that were set in the structured questionnaires were both reliable and valid. The pilot study respondents also indicated that the questionnaire was clear and there were no formatting challenges that were noted. Having been satisfied with the pilot study results, the questionnaire was adopted for final study.

3.6.1 Validity of Research Instrument

The validity of the research instrument refers to the degree to which the research instrument measures that which it was intended to measure. Validity of data collection items is the degree to which each item measures what it claims to. The validity of the study was undertaken using the content validity. The content validity examines the relevance of the questions and their ability to address the research objectives. The content validity of the study was examined using subject matter experts in the study.

The validity of the research instrument was examined using the content validity index. The content validity (also known as logical validity) refers to the extent to which a measure represents all facets of a given construct (Kumar, 2007). The validity of the variables (both independent and dependent variables) was calculated using both the Item Level Content Validity Index (I-CVI) and the Scale Level Content Validity Index (S-CVI). Five experts denoted as E1, E2, E3, E4, and E5 were asked to rank the individual

indicators of the dependent and independent variables using a four point Likert scale. The four Likert scale metrics included 1= Not Relevant, 2 = Somewhat Relevant, 3= Quite Relevant, and 4= Highly Relevant. The I-CVI was calculated using the total number of experts who choose either a 3 or 4 divided by the total number of experts that is;

I-CVI = $\frac{Number\ of\ Responses\ as\ "3\ or\ 4"}{Total\ number\ of\ responses}$ (I-CVI calculation formula)

On the other hand, the S-CVI was calculated through getting the average of individual I-CVI for each sub section for the independent variables and dependent variables.

S-CVI = $\frac{\sum_i^n \mathbf{I-CVIi}}{\boldsymbol{n}}$

According to Chawla & Sodhi (2011), the minimum score for the I-CVI and S-CVI is 0.6 for the validity of the indicators to be acceptable at item and scale level respectively. The I-CVI for each of the five indicators of the End User Skills Matrix was acceptable as they had surpassed the 0.6 minimum score for I-CVI. In this context, the I-CVI for technical skills, problem solving skills, proficiency in internet usage, basic computer trouble shooting skills, and ability to use self-help menus on a platform were 1, 1, 1, 0.8 and 0.8 respectively. On the other hand, the S-CVI was 0.92 which was above the 0.6 threshold for S-CVI. A conclusion that the metrics for End User Skills Matrix were valid for this research was therefore reached.

Table 3.3: Validity for End User Skills Matrix

	E1	**E2**	**E3**	**E4**	**E5**	**I-CVI**
Technical Skills	4	4	3	4	4	1
Problem Solving Skills	3	3	4	4	3	1
Proficiency in internet usage	4	4	4	4	4	1
Basic Computer Trouble Shooting Skills	4	2	3	4	3	0.8
Ability to use self-help menus on a platform	4	3	2	3	4	0.8
Scale Level Content Validity Index (S-CVI)						**0.92**

In the context of the end user demographic characteristics, the I-CVI for each of the five indicators were acceptable as they had surpassed the 0.6 minimum score for I-CVI. In this context, the I-CVI for age, education, gender, job role and experiences in years were 1, 1, 1, 0.8 and 1 respectively. On the other hand, the S-CVI for end user demographic was 0.96 which was above the 0.6 threshold for S-CVI. A conclusion that the metrics for end user demographic characteristics were valid for this research was therefore reached.

Table 3.4: Validity for End User Demographic Characteristics

	E1	**E2**	**E3**	**E4**	**E5**	**ICV**
Age	4	3	4	3	4	1
Education	4	4	3	4	3	1
Gender	4	4	4	3	3	1
Job Role	4	3	3	4	2	0.8
Experience in years	4	4	3	3	3	1
Scale Level Content Validity Index (S-CVI)						**0.96**

In the context of the end user attitudes, the I-CVI was 1 for each of the end user attitude matrix indicators which was above 0.6 threshold score. On the other hand, the S-CVI was 1 which was above the 0.6 threshold for S-CVI. A conclusion that the metrics for end user attitude were valid for this research was therefore reached.

Table 3.5: Validity for End User Attitudes

	E1	**E2**	**E3**	**E4**	**E5**	**ICVI**
Most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc.	3	4	4	4	4	1
Most new technologies are useful in specific line of work at KPLC	3	3	4	3	4	1
I find most new technologies easy to use	4	4	3	4	3	1
Most new technologies preserve historically held data in my line of work	3	4	4	4	4	1
I am receptive to changes in technology advances	4	4	3	4	3	1
I consider new technologies necessary for work functions at KPLC	3	3	4	3	4	1
Scale Level Content Validity Index (S-CVI)						**1**

In the context of the workflow validity, the I-CVI for each of the five indicators were acceptable as they had surpassed the 0.6 minimum score for I-CVI. In this context, the I-CVI for cross functional competencies, peer's competencies, support system, policies, and management index were 1, 1, 1, 1 and 1 respectively. On the other hand, the S-CVI was 1 which was above the 0.6 threshold for S-CVI. A conclusion that the metrics for work flow management were valid for this research was therefore reached.

Table 3.6: Validity for Work Flow Management

	E1	**E2**	**E3**	**E4**	**E5**	**ICVI**
Cross functional competencies	4	4	4	3	3	1
Peer's Competencies	4	3	3	4	4	1
Support System	3	3	4	3	4	1
Policies	4	4	4	3	3	1
Management	3	4	3	4	4	1
Scale Level Content Validity Index (S-CVI)						**1**

In the context for the adoption of new technologies, the I-CVI for each of the five indicators was acceptable as they had surpassed the 0.6 minimum score for I-CVI. In this context, the I-CVI for new users of technology, time taken to use new technology, correct usage of new technology, gaining of desired new technology objectives, and frequency of new technology usage index were 1, 1, 1, 1 and 1 respectively.

Table 3.7: Validity for Adoption of New Technologies

	E1	**E2**	**E3**	**E4**	**E5**	**ICVI**
New users of technology	3	3	4	4	3	1
Time taken to use new technology	3	4	4	4	4	1
Correct usage of new technology	4	3	4	3	4	1
Gaining of desired new technology objectives	4	4	4	4	4	1
Frequency of new technology usage	4	3	3	4	3	1
Scale Level Content Validity Index (S- CVI)						**1**

On the other hand, the S-CVI was 1 which was above the 0.6 threshold for S-CVI. A conclusion that the metrics for adoption levels of new technology were valid for this research was therefore reached.

3.6.2 Reliability of Research Instrument

The reliability of research instrument concerns the degree to which a particular instrument gives similar results over a number of repeated trials. The reliability of the study was examined using the internal reliability by applying cronbach alpha coefficient. According to Lim & Ting (2013), a cronbach alpha coefficient of 0.7 and above is deemed sufficient to establish the reliability of the study.

The cronbach alpha coefficient for End User Skills Matrix, end user demographic characteristics, end user attitudes, work flow management, and adoption of new technologies were 0.773, 0.745, 0.706, 0.747, and 0.830 respectively. These cronbach alpha coefficients had surpassed the minimum threshold of 0.7 and were thus considered reliable for this research.

Table 3.8: Reliability of the Research Instrument

Variable	No of Items	Cronbach's Alpha Coefficient
End User Skills Matrix	5	0.773
End User Demographic Characteristics	5	0.745
End User Attitudes	6	0.706
Work Flow Management	5	0.747
Adoption Levels of New Technology	5	0.830

3.7 Data Collection Procedures

The data collection procedures were undertaken using the authority from three different institutions as follows (i) University of Nairobi, (ii) National Commission for Science, Technology and Innovation (NACOSTI), (iii) KPLC Nakuru Branch management and

(iv) individual respondents. After the undertaking of the proposal defense, the researcher was formally issued with a letter from University of Nairobi authorizing data collection and which introduced the student to NACOSTI. The authority of NACOSTI to undertake the study was sought with a view of being cleared on all ethical considerations for research being undertaken in Kenya. The researcher then sought formal authority from KPLC Nakuru management to undertake a study within their organization. Finally, the respondents were issued with a consent statement that advised them on the purpose of the study and asked to voluntary participate in the study.

3.8 Data Analysis Procedures

The data analysis involves the detailed transformation, synthesis and interpretation of data collected from primary sources. The collected raw data was edited, coded, analyzed and tabulated for the purposes of eases of analysis. The editing of data involved the scrutiny of collected raw data to ensure that collected data was accurate, and consistent. The coding involved the assignment of numerical digits to the collected raw answers of the questionnaires within the SPSS software for the purposes of ease of analysis. On the other hand, the tabulation involved the process of summarizing raw data and displaying the same in compact form for further analysis.

The statistics to be undertaken included the descriptive statistics (means, frequency distributions, and standard deviations), diagnostic tests (normality statistics), and multiple linear regression as illustrated in the Table 3. In the context of hypothesis testing, some six steps were followed that (i) examination of data structure to determine the inferential tests to undertake (ii) deciding on the test statistic to be utilized (iii) deciding on the

significance level that will be utilized for the hypothesis testing and (iv) deciding on the conditions for acceptance or rejection of the null hypothesis. In this context, the study used the Likert scale type of data in which there are a set of related questions under a variable that uses a five point Likert scale. The data in this context was treated as interval data. The one way ANOVA was thus utilized and was generated through regressing individual metrics of an independent variable against a composite dependent variable in SPSS.

Table 3.9: Summary of Statistics to be undertaken

	Functions	Statistics to be undertaken	Test Statistic/Methods
1)	Descriptive Statistics (to describe the results)	-Frequency Distributions -Means -Standard Deviations	Achieved means (μ) scores: $1<\mu<1.5$, $1.5<\mu<2.5$, $2.5<\mu<3.5$, $3.5<\mu<4.5$, and $4.5<\mu\leq5$ to be interested as the respondents on average tended to strongly disagree, disagree, be uncertain, agree and strongly agree respectively in relations to the given metric respectively Achieved standard deviation (σX) scores; $0<\sigma X<0.5$, $0.5<\sigma X<1$, and $\sigma X\geq1$ to be interpreted as responses clustered around the mean, responses moderately distributed, and lack of consensus on a given metric respectively.
2)	Reliability Tests	-Cronbach Alpha Coefficient	Cronbach alpha coefficient to be tested if above 0.7
3)	Diagnostic Tests/Preliminary Tests	-Skewness& Kurtosis (Normality Diagnostic Tests) NB: Normality a prerequisite for Multiple linear regression	The normality of the data will be assumed if skewness scores are within the interval (-3.0, 3.0) and kurtosis statistics lay in the interval (-10.0, 10.0).
		-Multicollinearity NB: Normality a prerequisite for Multiple linear regression	Variance inflation factor (VIF) and tolerance levels to be used -Tolerance levels to be accepted if above 0.1 -VIF to be accepted if below 10
4)	Hypothesis Testing	-F Statistics	Reject Null Hypothesis (to be tested at 0.05 significance level) if $p<0.05$
5)	To gain understanding of indictors of individual independent variables predictive ability on dependent variable	-Multiple Linear Regression (Individual indicators of independent variables regressed against composite variable of dependent variable)	-Multiple correlation coefficient (R) to be examined to give the cumulative effect of the indicators of an individual independent variable on dependent variable - Coefficient of determination (R Square) to be examined to indicate the variance in percentage explained by the indicators of an individual independent variable (cumulatively) on dependent variable

3.9 Ethical Considerations

The ethical consideration in the research aspects involves the consideration of acceptable research behavior in the conduct of the researcher, the treatment of the respondents, the handling of the collected data, the independence of the researcher, and the integrity of the sources in the development of the work. This study was guided by ethics in the planning, conducting, and reporting of results through the use of four ethical principles in research that is truthfulness, thoroughness, objectivity, and relevance. In this context, a consent statement was issued to the respondents indicating the purpose of the study, the right to voluntary participate without any financial compensation, the right to voluntary exit the research at any stage without financial penalties, and the treatment of the collected data for academic purposes only.

3.10 Operational Definition of Variables

Table 3.10: Operational Definition of Variables

Objectives of the Study	Variables	Indicators	Measurement Scales	Type of analysis	Tools of Analysis
To examine the influence of End User Skills Matrix on adoption of new technologies at Kenya Power and Lighting Company, Kenya	End User Skills Matrix	•Technical Skills • Problem Solving Skills • Proficiency in internet usage •Basic Computer Trouble Shooting Skills •Ability to use self-help menus on a platform	Interval Measurement Scale	Descriptive Analysis	-Frequency Distribution -Means -Standard Deviations
				Inferential Statistics	-Regression Analysis
To examine the influence of end user demographic characteristics on adoption of new technologies at Kenya Power and Lighting Company, Kenya	End User Demographic Characteristics	• Age •Education •Gender •Job Role •Experience in years	Interval Measurement Scale	Descriptive Analysis	-Frequency Distribution -Means -Standard Deviations
				Inferential Statistics	-Regression Analysis
To establish the influence of end user attitudes on adoption of new technologies at Kenya Power and Lighting Company, Kenya	End User Attitudes	•Perceived Usefulness •Perceived Ease of Use •Perceived Security •Perception towards change •Perception towards new technology	Interval Measurement Scale	Descriptive Analysis	-Frequency Distribution -Means -Standard Deviations
				Inferential Statistics	-Regression Analysis

To establish the influence of workflow management on adoption of new technologies at Kenya Power and Lighting Company, Kenya	Workflow Management	•Competencies Across Different Roles •Peer's Competencies •Support System •Policies •Management	Interval Measurement Scale	Descriptive Analysis	-Frequency Distribution -Means -Standard Deviations
				Inferential Statistics	Simple Linear Regression
-	Adoption of New Technology	•New users of technology •Time taken to use new technology •Correct usage of new technology •Gaining of desired new technology objectives •Frequency of new technology usage	Interval Measurement Scale	Descriptive Analysis	-Frequency Distribution -Means -Standard Deviations
				Inferential Statistics	-Regression Analysis

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSIONS

4.1 Introduction

This study sought to examine the influence of end user characteristics on adoption of new technologies among utility firms with a reference to Kenya Power and Lighting Company (KPLC) in Nakuru. In order to achieve the general objective, the study examined the specific objectives of the study in terms of End User Skills Matrix, end user demographic characteristics, end user attitudes, and workflow management aspects. The study results were analyzed using three set of statistics that is descriptive statistics, diagnostic statistics and inferential statistics.

4.2 Questionnaire Return Rate

The target population for this study was 274 employees of Kenya Power and Lighting Company staff in Nakuru across various departments, that is, regional management, design and construction, finance, supply chain, transport, technical services, security, information and communications technology, customer service, and human resources and administration. A sample size of 73 respondents was utilized for the study which was calculated using Nassiuma's (2009) formula, therefore 73 questionnaires were issued to the potential respondents with distribution per department shown in Table 4.1. Out of the questionnaires distributed, 70 questionnaires were returned with 3 questionnaires not being returned. One respondent who whose questionnaire was not returned opted not to participate in the study despite assurance that the responses will be kept strictly confidential and that the purpose of the study was academic only. The other 2 questionnaires that were not returned was because they had not been filled due to lack of

time on the part of the respondents despite the questionnaires having been left with the respondents to be collected at a pre agreed time. During data cleaning 1 questionnaire was rejected because it was incomplete which left 69 questionnaires whose data was entered into SPSS and analyzed. The study results and findings were therefore based on 69 questionnaires. The return rate was 94.5% which was deemed sufficient for the studies as it was above the 80% that is recommended by Mugenda &Mugenda (1999).

Table 4.1: Return Rate by Department

Departments	Questionnaires Issued	Questionnaire Analysed	Response Rate
Regional Management	1	1	100%
Design and Construction	10	9	90%
Finance	11	10	91%
Supply Chain	6	5	83%
Transport	3	2	67%
Technical Services	9	9	100%
Security	1	1	100%
ICT	4	4	100%
Customer Service	24	24	100%
Human Resources and Administration	4	4	100%
Total	**73**	**69**	**94.5%**

4.3 Background Characteristics

The background characteristics of the study were examined using distribution by gender, age, education level, and job role.

4.3.1 Distribution of Respondents by Gender

The study sought to know the distribution of the respondents by gender. Majority of the respondents were male at 59.4% of the respondents while female respondents were at 40.6%. The high percentage of the male respondents was attributed to the fact that KPLC is hugely an engineering company and very technical oriented. The engineering and

technical orientation of the company is thus mostly attractive to males within the fields of engineering, surveying, cartography and other science oriented aspects.

Table 4.2: Gender Distribution

	Frequency	Percentage
Male	41	59.4%
Female	28	40.6%
Total	**69**	**100.0%**

4.3.2 Distribution of Respondents by Age

The age distribution of the respondents was examined. These were grouped into four groups, that is, below 25 years, 26-35 years, 36-45 years, over 45 years. The respondents were distributed across all the groups with majority being over 45years (36.2%) followed by those who were 26-35 years (34.8%). The respondents aged below 25 years and 36-45 years were 5.8% and 23.2% respectively. The high number of respondents who were over 45 years old (36.2%) and a high number of cumulative percentages above 36 years of age (59.4%) is attributable to the high staff retention levels at the company.

Table 4.3: Distribution by Age

	Frequency	Percentage
Below 25 Years	4	5.8%
26-35 Years	24	34.8%
36-45 Years	16	23.2%
Over 45 Years	25	36.2%
Total	**69**	**100.0%**

4.3.3 Distribution of Respondents by Education Level

The education level was of importance studying the influence of end user characteristics on adoption of new technologies at KPLC, Nakuru, Kenya. Most of the respondents (39.1%) had graduate level of education with the least number of respondents (1.4%) being at Doctor of Philosophy (PhD) level of education. The respondents who were

KCSE graduates, had diploma and masters levels of education were 10.1%, 37.7% and 11.6% respectively. The study results indicated that 52.1% of the respondents were university graduates at different levels (bachelors, masters, PhD) levels which can be attributed to the technical nature of the company.

Table 4.4: Distribution by Education Level

	Frequency	Percentage
KCSE Graduate	7	10.1%
Diploma	26	37.7%
Bachelor	27	39.1%
Masters	8	11.6%
Doctor of Philosophy (PhD)	1	1.4%
Total	**69**	**100.0%**

4.3.4 Distribution of Respondents by Job Role

The job role of the respondents was important in examining the influence of end user characteristics on adoption of new technologies at KPLC, Nakuru, Kenya. The respondents were sampled from various departments at KPLC, Nakuru, Kenya which included regional management, design and construction, finance, supply chain, transport, technical services, security, information and communications technology, customer service, and human resources and administration.

Table 4.5: Distribution by Job Role

Departments	Frequency	Percentage
Regional Management	1	1.4%
Design and Construction	9	13.0%
Finance	10	14.4%
Supply Chain	5	7.2%
Transport	2	2.8%
Technical Services	9	13.0%
Security	1	1.4%
ICT	4	5.8%
Customer Service	24	35.2%
Human Resources and Administration	4	5.8%
Total	**69**	**100%**

Most of the respondents were in the customer service department (35.2%), followed by finance department with 14.4% of the respondents. Technical services and design and construction departments had an equal number of respondents (13.0% each), same as human resources and administration and ICT (5.8% each), and regional management and security (1.4% each). The respondents from the supply chain department and transport department were 7.2% and 2.8% respectively.

4.4 Frequency Distribution of Variables

The frequency distribution for both the dependent and independent variables were calculated. According to Scruggs & Mastropieri (2006), frequency distribution refers to the tabulation of the different measurement categories and the number of observations in each category. In this context, this study utilized univariate (singe variable) and discrete frequency distribution that organized occurrences of the measurement categories (in terms of a five point Likert scale) of indicators of the given variable in terms of frequencies and percentages. The five point Likert scale was in terms of 1=Strongly Disagree (SD), 2=Disagree (D), 3= Uncertain (U), 4=Agree (A), and 5= Strongly Agree (SA).

4.4.1 Frequency Distribution of End User Skills Matrix

The study sought to find out which End User Skills Matrix have been instrumental in adoption of new technologies among technical skills, problem solving skills, proficiency in internet usage, basic computer trouble shooting skills, and ability to use self-help menus on a platform. The respondents were asked to choose the level that best explained their situation with 1=Strongly Disagree (SD), 2=Disagree (D), 3= Uncertain (U), 4=Agree (A), and 5= Strongly Agree (SA). A cumulative majority of 78.3% were of the

opinion that technical skills have been instrumental in adoption of new technologies with those who responded with strongly agree and agree being 31.9% and46.4% respectively. Those who disagreed, strongly disagreed and were uncertain were 2.9%, 7.2%, and 11.6% respectively. The high percentage of respondents who indicated that technical skills were critical for the adoption of new technology can be attributed to the fact that most technologies are ICT based and technical in nature. Therefore, possession of technical skills becomes critical in the adoption of the new technologies.

In response to whether problem solving skills have been instrumental in adoption of new technologies, most of the respondents affirmed that they were, with 53.6% choosing the agree prompt while 29.0% chose the strongly agree prompt. None of the respondents gave a strongly disagree response. The problem solving skills are critical in the adoption of new technologies due to the fact that there is a learning curve associated with adoption of new technologies. These skills are critical in the solving of emergent challenges in the process of adoption of new technologies.

Proficiency in internet usage has been instrumental in adoption of new technologies as only a minority of 10.1% felt it was not (disagree= 8.7%, strongly disagree=1.4%). Respondents who were unsure were 8.7% while those who felt that proficiency in internet usage has been instrumental in adoption of new technologies were 81.2% (agree=49.3%, strongly agree=31.9%). Proficiency in internet usage is important in the adoption of new technologies in the context that a majority of technologies are web based in nature and prior proficiency of internet is thus useful. This is due to the fact that the end users may

relate their experiences with the new technology with previous experiences on web based or internet based software.

Basic computer trouble shooting skills have been instrumental in adoption of new technologies with most of the respondents (55.1%) in agreement. The respondents, who were unsure, disagreed and strongly disagreed that basic computer trouble shooting skills have been instrumental in adoption of new technologies were 15.9%, 7.2%, and 1.4% respectively. The new technologies may to a greater extent involve the use of computer applications in their execution and thus basic computer trouble shooting skills becomes critical.

Table 4.6: Frequency Distribution of End User Skills Matrix

	SA Freq. (%)	**A Freq. (%)**	**U Freq. (%)**	**D Freq. (%)**	**SD Freq. (%)**
Technical Skills	22 31.9%	32 46.4%	8 11.6%	5 7.2%	2 2.9%
Problem Solving Skills	20 29.0%	37 53.6%	10 14.5%	2 2.9%	0 0.0%
Proficiency in internet usage	22 31.9%	34 49.3%	6 8.7%	6 8.7%	1 1.4%
Basic Computer Trouble Shooting Skills	14 20.3%	38 55.1%	11 15.9%	5 7.2%	1 1.4%
Ability to use self-help menus on a platform	17 24.6%	34 49.3%	13 18.8%	4 5.8%	1 1.4%

Finally, when asked on whether the ability to use self-help menus on a platform has been instrumental in adoption of new technologies, 24.6%, 4.3%, 18.8%, 5.8% and 1.4% of the respondents chose the strongly agree, agree, uncertain, disagree, and strongly disagree prompts respectively. Most new technologies come with instructional materials on how to undertake diverse operational aspects of the new technologies. In this context, the ability to use the self-help menus thus becomes of critical concern.

4.4.2 Frequency Distribution of End User Demographic Characteristics

The study sought to know which end user demographic characteristics have been instrumental in adoption of new technologies. Age, education, gender, job role, and experience in years were the metrics used to measure the end user demographic characteristics. In the context of age, most of the respondents (42.0%) gave an agree response which affirmed that age had been instrumental in adoption of new technologies. This was further supported by 8.7% of the respondents who gave a strongly agree response, with 15.9% unsure. The respondents who chose disagree and strongly disagree prompts were 11.6% and 8.7% respectively. The high percentage of respondents who were affirmative (50.7%) that age was critical in the adoption of new technologies is attributable to the fact that the young employees are flexible and more willing to learn and adopt new technologies.

Education has been very instrumental in adoption of new technologies as supported by 39.1% and 49.3% of the respondents who chose the strongly agree and agree prompts. None of the respondents chose the strongly disagreed prompt with only 4.3% disagreed with the metric that education has been instrumental in adoption of new technologies. The education level is critical in the adoption of new technologies due to the ability to comprehend instructions on the operations of new technologies as well as comprehend self-help instructional materials.

In the context of whether gender been instrumental in adoption of new technologies, the responses were fairly distributed between those who affirmed and those who were of a

contrary opinion with an equal number of respondents (11.6%) choosing the strongly agreed and strongly disagreed prompts. The agree and disagree prompts also received an almost equal number of responses, that is, 24.6% and 29.0% respectively, while those who were unsure were 23.2%. The gender is of importance to the adoption of new technologies due to the fact that different genders display different attitudes towards technology which has an impact on their adoption levels. The female gender are often less receptive towards new technologies.

Table 4.7: Frequency Distribution of End User Demographic Characteristics

	SA Freq. (%)	**A Freq. (%)**	**U Freq. (%)**	**D Freq. (%)**	**SD Freq. (%)**
Age	6 8.7%	29 42.0%	11 15.9%	8 11.6%	6 8.7%
Education	27 39.1%	34 49.3%	5 7.2%	3 4.3%	0 0.0%
Gender	8 11.6%	17 24.6%	16 23.2%	20 29.0%	8 11.6%
Job Role	16 23.2%	36 52.2%	10 14.5%	5 7.2%	2 2.9%
Experience in years	16 23.2%	26 37.7%	12 17.4%	13 18.8%	2 2.9%

Most of the respondents affirm that job role at KPLC Nakuru, Kenya has been instrumental in adoption of new technologies with 52.2% and 23.2% responding with agree and strongly agree. Only 2.9% and 7.2% of the respondents strongly disagreed and disagreed that job role has been instrumental in adoption of new technologies. The employees who are undertaking technical oriented roles are likely to have an easier time in relations to the adoption of technically inclined new technologies. In the context of experience in years, 37.7% and 23.2% were of the opinion that it has been instrumental in adoption of new technologies, while 14.5% 7.2% and 2.9% chose the uncertain, disagreed and strongly disagreed prompts.

4.4.3 Frequency Distribution of End User Attitude

The study sought to know whether end user attitude has been instrumental in adoption of new technologies. When asked whether most new technologies are useful in generic work functions at KPLC like leave application, training etc., most of the respondents (91.3%) were of the opinion that they were, with 40.6% and 50.7% choosing strongly agree and agree prompts respectively. An equal number of respondents, that is, 1.4% chose disagree and strongly disagree prompts while 5.8% were unsure. The generic work functions refer to the common functions that are applicable to the employees irrespective of their departments. The ability of the new technologies to address these needs is critical in building the perceived usefulness of these new technologies and thus impacting on their adoption levels.

In the context of whether most new technologies are useful in specific line of work at KPLC, 40.6% and 37.7% of the respondents were of the opinion that they were as they chose the agree and strongly agree prompts respectively. Majority of the respondents chose the agree prompt (53.6%), further supported by 13.0% of the respondents who chose strongly agree to affirm that most of the respondents find most new technologies easy to use. The ability of the new technologies being useful to the specific line of work leads to the technologies impacting on the productivity of the employee. These new technologies are likely to have a very high perceived value and hence influencing the employee attitude towards the technology thus its adoption levels.

In the context of whether most new technologies preserve historically held data in their line of work, most of the respondents said they did with 58.0% and 20.3% responding

with agree and strongly agree respectively. The ability of new technologies to preserve historically held data is key to the continuity aspects of work functions deliverables. This is due to the fact that the previously held information is still preserved in the system. When asked whether they are receptive to changes in technology advances, 34.8% and 43.5% responded with strongly agreed and agree respectively, which affirmed that they are receptive to changes in technology advances. Being receptive to changes in technology advances is key in determining the efforts that is expended in learning of the new technologies.

Table 4.8: Frequency Distribution of End User Attitude

	SA Freq. (%)	A Freq. (%)	U Freq. (%)	D Freq. (%)	SD Freq. (%)
Most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc.	28 40.6%	35 50.7%	4 5.8%	1 1.4%	1 1.4%
Most new technologies are useful in specific line of work at KPLC	26 37.7%	28 40.6%	9 13.0%	5 7.2%	1 1.4%
I find most new technologies easy to use	9 13.0%	37 53.6%	9 13.0%	12 17.4%	2 2.9%
Most new technologies preserve historically held data in my line of work	14 20.3%	40 58.0%	5 7.2%	8 11.6%	2 2.9%
I am receptive to changes in technology advances	24 34.8%	30 43.5%	10 14.5%	3 4.3%	2 2.9%
I consider new technologies necessary for work functions at KPLC	37 53.6%	26 37.7%	3 4.3%	2 2.9%	1 1.4%

When asked whether they find most new technologies easy to use, most new technologies preserve historically held data in their line of work, and whether they are receptive to changes in technology advances,(2.9%) of the respondents chose the strongly disagreed prompt in respect to each indicator. A few of the respondents (4.3%) were unsure about whether they consider new technologies necessary for work functions at KPLC, while a

cumulative minority of 4.3% (disagree=2.9%, strongly disagree=1.4%) do not consider new technologies necessary for work functions at KPLC. However, most of the respondents highly consider new technologies necessary for work functions at KPLC (53.6%=strongly agree) further supported by 37.7% of respondents who responded with agree. The necessity of the new technologies for the work functions is key for the employees to expend energy in learning the new technologies.

4.4.4 Frequency Distribution of Work Flow Management

The study sought to know whether the workflow management metrics, that is, cross functional competencies, peer's competencies, support system, policies, and management have been instrumental in adoption of new technologies. In the context of cross functional competencies, most of the respondents were of the opinion that they have been instrumental in adoption of new technologies with 39.1% responding with agree and 23.2% strongly agree. Those who were unsure whether cross functional competencies have been instrumental in adoption of new technologies were 29.0% while an equal number of respondents (4.3%) disagreed and strongly disagreed with the metric. The cross functional competencies implies that the end user is competent across many functions which expands their knowledge base. This is useful to the ability to trouble shoot the system.

Peer's competencies have been instrumental in adoption of new technologies as evidenced by 44.9% of the respondents who chose agree and 8.7% who chose strongly agree. An equal number of respondents (1.4%) strongly disagreed that both peer's competencies and support system have been instrumental in adoption of new

technologies. The peer competencies are critical in the adoption of the new technologies as the individual end user has a support system in cases of challenges emerging in the adoption of new technologies. This is because there are other employees who are utilizing the system and are able to support the employees in gaining knowledge on the new system.

Table 4.9: Frequency Distribution of Work Flow Management

	SA Freq. (%)	A Freq. (%)	U Freq. (%)	D Freq. (%)	SD Freq. (%)
Cross functional competencies	16 23.2%	27 39.1%	20 29.0%	3 4.3%	3 4.3%
Peer's Competencies	6 8.7%	31 44.9%	19 27.5%	12 17.4%	1 1.4%
Support System	18 26.1%	35 50.7%	8 11.6%	7 10.1%	1 1.4%
Policies	17 24.6%	33 47.8%	8 11.6%	10 14.5%	17 24.6%
Management	16 23.2%	44 63.8%	2 2.9%	5 7.2%	2 2.9%

There were 50.7%of the respondents who affirmed (chose agree) that support system has been instrumental in adoption of new technologies, further supported by 24.6% who chose strongly agree. Policies have been instrumental in adoption of new technologies with 47.8% responding with agree while 11.6% were uncertain. However, an equivalent number of respondents (24.6%) chose strongly agree and strongly disagree which was a contradiction on the metric. The policies are critical in the adoption of new technologies. Where policy directives direct that new technologies must be used for a given function without the old technologies being utilized then it quickens the adoption rate. Management has been very instrumental in adoption of new technologies with 63.8% of the respondents choosing agree and 23.2% choosing strongly agree. The management

assist in terms of allocation of budget and time off for the purposes of new technologies adoption training aspects.

4.4.5 Frequency Distribution of Adoption of New Technology

The adoption levels of new technology were examined using various metrics which included new users of technology, time taken to use new technology, correct usage of new technology, gaining of desired new technology objectives, and frequency of new technology usage. In respect to whether workflow management, End User Skills Matrix, end user attitudes, and end user demographic characteristics have an impact on the new technology users, there were varied responses. Most of the respondents (62.3%) affirmed that they use new technology as they responded with an agree prompt with an additional 18.8% who responded with a strongly agree prompt. On the other hand, 4.3% and 1.4% chose disagree and strongly disagree prompts respectively while 13.0% were unsure whether they are users of new technology.

The time taken to use new technology has an effect on adoption levels of the technology with 59.4% of the respondents supporting this metric with an agree response and 10.1% with a strongly agree response. The time taken to competently use the new technology is indicative of the adoption levels of new technologies with shorter time indicating a higher adoption level. When asked whether there is correct usage of new technology, most of the respondents (50.7%=agree) were of the opinion that there is correct usage of new technology with only 4.3% of the respondents choosing the strongly disagree and 11.6% choosing disagree prompts. The correct usage of the new technology is critical in ensuring that the users gain optimum benefit from the use of the new technology.

None of the respondents chose the strongly disagree prompt in response to time taken to use new technology and gaining of desired new technology objectives metrics. However, 55.1% and 21.7% of the respondents chose agree and strongly agree in response to gaining of desired new technology objectives metric. Most of the respondents affirmed that frequency of new technology usage had an effect on the adoption levels of new technology with 49.3% choosing agree and 23.2% choosing strongly agree. Those who were unsure whether frequency of new technology usage had an effect on the adoption levels of new technologies were 23.2% while those who disagreed and strongly disagreed were 2.9% and 1.4% respectively. The frequency of the usage of the new technology is an indicator of the acceptability and adoptability of the new technology. This is because the frequency of the new technology is likely to indicate that the user is both competent and has positive attitude on usage of such a new technology.

Table 4.10: Frequency Distribution of Adoption Levels of New Technology

	SA Freq. (%)	**A Freq. (%)**	**U Freq. (%)**	**D Freq. (%)**	**SD Freq. (%)**
New users of technology	13 18.8%	43 62.3%	9 13.0%	3 4.3%	1 1.4%
Time taken to use new technology	7 10.1%	41 59.4%	12 17.4%	9 13.0%	0 0.0%
Correct usage of new technology	12 17.4%	35 50.7%	11 15.9%	8 11.6%	3 4.3%
Gaining of desired new technology objectives	15 21.7%	38 55.1%	14 20.3%	2 2.9%	0 0.0%
Frequency of new technology usage	16 23.2%	34 49.3%	16 23.2%	2 2.9%	1 1.4%

4.5 Simple Arithmetic Means of Variables

The arithmetic mean or simply means of both independent and dependent variables were calculated. The arithmetic mean is a measure of central tendency. The measures of central tendency are defined as the statistical measure that identifies a single value as a

representative of an entire distribution. This study utilized simple arithmetic means in which all the measures were given equal weightings in the calculation. The metrics of each of the variable was measured through the use of the Likert scale with the descriptors Strongly Disagree (SD), Disagree (D), Uncertain (U), Agree (A) and Strongly Agree (SA). These descriptors were represented as 1, 2, 3, 4 and 5 respectively in the SPSS input spread sheet. The means (μ) in the study were thereafter grouped into five intervals, that is, ($4.5< \mu \leq 5$) indicating tendency to strongly agree, ($3.5< \mu < 4.5$) indicating tendency to agree, ($2.5< \mu < 3.5$) indicating tendency to be uncertain, ($1.5< \mu <2.5$) indicating an inclination to disagree, and ($1 \leq \mu < 1.5$) indicating inclination to strongly disagree.

4.5.1 Means of End User Skills Matrix

In order to gain greater insights as to whether the End User Skills Matrix have had an impact on adoption of new technologies, the means were generated. The various metrics of the End User Skills Matrix whose means were generated were technical skills, problem solving skills, proficiency in internet usage, basic computer trouble shooting skills, and ability to use self-help menus on a platform.

Technical skills scored a mean of 3.97 while problem solving skills had a mean score of 4.09. Proficiency in internet usage had a mean score of 4.01, basic computer trouble shooting skills had a mean score of 3.86, and ability to use self-help menus on a platform had a mean score of 3.90. This implied that on average the respondents tended to agree that technical skills, problem solving skills, proficiency in internet usage, basic computer trouble shooting skills, and ability to use self-help menus on a platform had an impact on

the adoption of new technologies at KPLC. The aggregate mean of 3.97 implied that on average the respondents tended to agree that End User Skills Matrix had an impact on adoption of new technology.

The results of this study are consistent with the reviewed literature. In the context of technical skills being useful in adoption of new technology, this study found that the respondents tended to agree (with a mean of 3.97) on its usefulness on adoption of new technology at KPLC. This is consistent with the findings of Mucheru (2013) study on factors influencing adoption of information systems. The study noted that users who are equipped with technical skills have better capabilities to handle arising challenges, display higher confidence level in their capability to handle new technologies and thus an overall positive attitude towards adoption of new technologies. These factors act to lead to a higher adoption levels of the new technologies.

The results of the study that proficiency in internet usage (mean of 4.01), basic computer trouble shooting skills (mean of 3.86), and ability to use self-help menus (mean of 3.90) had the respondents agreeing that these metrics impacted on adoption of new technologies. These results are consistent with the findings of Mandola (2013) and Muhangi (2012). In this context, Mandola (2013) in the examination of the adoption of Integrated Tax Management System (ITMS) in Kenya found a correlation between an individual's proficiency in internet usage and adoption of (ITMS) amongst target users of the system. On the other hand, Muhangi (2012) in a study on the examination of the online filing in Uganda found that ability to use the self-help menus on a web based

technology was critical in ensuring improvement in adoption levels of new technology. In this context, Muhangi (2012) notes that the self-help menus empower the user and hence reduce perceived ease of use.

The mean scores of the different metrics of the End User Skills Matrix were ranked from the highest to the lowest from 1 to 5 with a rank of 1 having the highest mean score and a rank of 5 having the lowest mean score. Problem solving skills ranked first as the metric with the highest mean of 4.09. This implied that in the context of end user matrix, problem solving skills were the most instrumental in adoption of new technologies. This was followed by proficiency in internet usage, technical skills, ability to use self-help menus on a platform, and basic computer trouble shooting skills which raked second, third, fourth and fifth respectively. The aggregate mean of the End User Skills Matrix was also determined by getting the average of the mean scores of individual metrics in the End User Skills Matrix. The aggregate mean score was 3.97 for the End User Skills Matrix which implied that the respondents on average were inclined to agree that End User Skills Matrix have been instrumental in adoption of new technologies.

Table 4.11: Means of End User Skills Matrix

	N	Min.	Max.	Mean	Respondents on average tended to	Rank
Technical Skills	69	1	5	3.97	Agree	3
Problem Solving Skills	69	2	5	4.09	Agree	1
Proficiency in internet usage	69	1	5	4.01	Agree	2
Basic Computer Trouble Shooting Skills	69	1	5	3.86	Agree	5
Ability to use self-help menus on a platform	69	1	5	3.90	Agree	4
Aggregate mean				**3.97**		

4.5.2 Means of End User Demographic Characteristics

The means of the respondents' responses on the influence of end user demographic characteristics were examined. In this context, the means for influence of age, education, gender, job role and experience in years on adoption of new technologies were 3.57, 4.23, 2.97, 3.86, and 3.59 respectively. These responses indicated that the respondents tended to agree in relations to the influence of age, education, job role and experience in years having an influence on the adoption of new technologies at KPLC. This was due to means of between 3.5 and 4.5. On the other hand, the respondents tended to be uncertain as to whether gender had an influence on the adoption of new technologies due to a mean between 2.5 and 3.5.

The results that respondents tended to agree in relations to the influence of age (mean of 3.57), education (mean of 4.23), job role (mean of 3.86) and experience in years (mean of 3.59) having an influence on the adoption of new technologies at KPLC was consistent with other scholars. The results on the influence of age on new technologies was consistent with Baariu (2015) and Abdelbary (2011) findings. In this context, Baariu (2015) argued that younger demographics are usually early adopters of technological innovations due to a higher perceived ease of use. The result on the education levels being a critical factor in the adoption of new technologies was consistent with Abdelbary (2011) findings. This was attributed to the fact that high education levels was associated with high cognitive skills that aid in adoption of new technologies.

In the context of the job role being influential on the adoption of new technologies. The results that the respondents' job roles had an influence on the adoption of new technologies (mean of 3.86) were consistent with Gachukia (2012) findings. Gachukia (2012) study found that employees in technically oriented jobs had an advantage over their peers in non-technical oriented roles when it comes to adoption of new technologies. Similarly, in terms of the role of experience in years in adoption of new technologies Qatawneh (2015) indicated that users who have been exposed to similar technologies in the past have a higher chance of having a positive attitude towards adoption of new technologies (Qatawneh, 2015). On the other hand, Alzighaibi, Mohammadian, &Talukder (2016) indicates that experience in Information Technology (IT) often influence the adoption of new technologies as most technologies are IT based.

The results of this study indicated that the respondents on average were uncertain in respect to whether the gender had an influence on adoption of new technologies. This was due to a mean of 2.97 which was between 2.5 and 3.5. This could be attributed to the fact that the women employed at KPLC are often technically oriented and have undertaken science oriented courses such as engineering and surveying amongst other such courses. Therefore, the differences that would be there between male and female in terms of perceived ease of use and usefulness would be reduced at KPLC compared to general population. The finding of this study is different from other studies examining gender aspects and adoption of new technologies. For example, Gachukia (2012) in a study on influence of demographics on adoption of social media noted gender differences in the adoption of new technologies. The study noted that men's adoption of new

technology was strongly influenced by their perception of usefulness while women were strongly influenced by their perceptions of ease of use. Additionally the study notes that more males than females are likely to adopt to new technologies faster. Amongst the major issue that led to the slower adoption of new technologies was that females displayed more negative attitude towards computer based technology.

These means of the end user demographic characteristics were ranked from the highest to the lowest based on their mean scores. In the context of the mean scores of the end user demographics, education was the highest rank (mean of 4.23), job role was second (mean of 3.86), experience in years was third (mean of 3.59), age was four (mean of 3.57), and finally gender with a mean of 2.97. This implied that education level was the highest ranked item at KPLC that had an influence on the adoption of new technologies. The aggregate mean was 3.64 implying that in respect to the end user demographic characteristics the respondents tended to agree that they impacted on adoption of new technologies.

Table 4.12: Means of End User Demographic Characteristics

	N	Min.	Max.	Mean	Respondents on average tended to	Rank
Age	69	1	5	3.57	Agree	4
Education	69	2	5	4.23	Agree	1
Gender	69	1	5	2.97	Uncertain	5
Job Role	69	1	5	3.86	Agree	2
Experience in years	69	1	5	3.59	Agree	3
Aggregate mean				**3.64**		

4.5.3 Means of End User Attitudes

The study sought to know on average whether end user attitudes had been instrumental in adoption of new technologies. The mean scores of individual metrics within the end user

attitudes' matrix were generated. These metrics were most new technologies are useful in generic work functions at KPLC, ease of use of new technologies, most new technologies preserve historically holding data, reception to changes in technology advances, and necessity of new technologies for work functions at KPLC. On average, the respondents tended to agree that most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc (mean score=4.26), and that most new technologies are useful in specific line of work at KPLC (mean score=4.06). The respondents on average tended to agree that they find most new technologies easy to use (mean score=3.57), and that most new technologies preserve historically held data in their line of work (mean score=3.81). Additionally, the respondents also tended to agree that, they consider new technologies necessary for work functions at KPLC (mean score=4.03), and that they are receptive to changes in technology advances (mean score=4.39).

The results of the end user attitudes being influential to the adoption of new technologies was supported by the reviewed literature. The findings that that the respondents tended to agree that most new technologies are useful in generic work functions at KPLC (mean score=4.26), and that most new technologies are useful in specific line of work at KPLC (mean score=4.06) is tandem with findings of Phan & Daim (2011). Phan & Daim, (2011) noted that the perception of which the user perceives the new technology is critical in the improvement of the user's performance of given task is key in informing its adoption levels.

Similarly, the results that reception towards change in technology advances (mean score of 4.39) being influential to the adoption of new technology is supported by Bitengo (2015) and Watiri (2013) studies. In this context, Bitengo (2015) notes that a positive towards change enables the end user to be more receptive to learning the skills of new technology hence reducing perceived ease of use. Finally, the perception towards new technology, whether positive or negative, has a great influence on the adoption of new technologies (Watiri, 2013). The end users with positive perception towards the use of new technology adopt the new technology faster.

The means of the metrics on end user attitudes were ranked on a scale of 1 to 6 from the highest scored mean(1) to the lowest scored mean (6). On average, the respondents consider new technologies necessary for work functions at KPLC as most instrumental in adoption of new technologies among the metrics on end user attitude as it was ranked first. The second, third, fourth, fifth and sixth ranking mean scores corresponded to the metrics most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc., most new technologies are useful in specific line of work at KPLC, the respondents were receptive to changes in technology advances, most new technologies preserve historically held data in my line of work, and I find most new technologies easy to use, respectively.

In the context of end user attitudes, the respondents on average tended to agree that end user attitudes have been instrumental in adoption of new technologies at KPLC Nakuru, Kenya with an aggregate mean score of 4.02 ($3.5< \mu < 4.5$). The aggregate mean score

was generated by doing an average of the individual mean scores of the metrics of the end user attitude matrix. This aggregate mean which show that the respondents tended to agree that end user attitudes tended to influence the adoption of new technologies is consistent with the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB). According to Kukafka et al (2003), the TRA indicates that an individual user's intention to adopt and use new technologies is affected by personal interests. The personal interests of the individual user of new technologies refer to the attitude towards the new technology after a personal evaluation of ease of adoption of the new technologies (Azmi & Bee, 2011).

Table 4.13: Means of End User Attitude

	N	Min.	Max.	Mean	Respondents on average tended to;	Rank
Most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc.	69	1	5	4.26	Agree	2
Most new technologies are useful in specific line of work at KPLC	69	1	5	4.06	Agree	3
I find most new technologies easy to use	69	1	5	3.57	Agree	6
Most new technologies preserve historically held data in my line of work	69	1	5	3.81	Agree	5
I am receptive to changes in technology advances	69	1	5	4.03	Agree	4
I consider new technologies necessary for work functions at KPLC	69	1	5	4.39	Agree	1
Aggregate mean				**4.02**		

4.5.4 Means of Work Flow Management

The study sought to find out whether on average work flow management had been instrumental in adoption of new technologies. The work flow management aspects that

were examined included cross functional competencies, peer's competencies, support system, policies, and management. The results of the means indicated that the mean scores for cross functional competencies was 3.72, peer's competencies (3.42), support system (3.90), policies (3.80), and management (4.00). On average, the respondents tended to agree that work flow management has been instrumental in adoption of new technologies with the aggregate mean being 3.7623.

The individual mean scores for the metrics were all in the interval ($3.5< \mu < 4.5$) implying that on average the respondents tended to agree that each metric had been instrumental in adoption of new technologies except in relations to the influence of peers' competencies. The mean score for the peers' competencies impact on the adoption of new technologies was 3.42 implying that the respondents tended to be uncertain as to whether the competencies impacted on the adoption of new technology. This is in contrast with the results for Oluoch*et al* (2015). Oluoch et al (2015) noted that competence of peers create a pool of a group of people that an individual user consults in times of difficulties in use of new technology. This enables social learning aspects. In the absence of competence amongst peers then individual users may face more challenges in learning and adoption of new technologies.

The results that the cross functional competencies indicated that the respondents tended to agree (mean of 3.72) that it impacted on the adoption of new technologies. These results are similar to Hamid (2013) and Bultum (2014) results. Hamid (2013) notes that cross functional competencies implies that workers are versatile in their skills matrix

leading to scenario where individual users may have skills with similar family of technologies or a supportive skill to running the technology. These skills may involve Information and Technology Skills, and trouble shooting skills amongst others (Bultum, 2014). In instances where the user has knowledge or experience in another related family of technologies then the user may apply those skills in this particular new technology.

The management was seen with a mean of 4.00 to impact on the adoption of new technologies. In this context, Alzighaibi et al., (2016) notes that management role in the adoption of new technologies lies with the support they offer their employees through issuance of resources, training aspects, and supervision amongst others. On the other hand, the respondents were in agreement (mean of 3.90) that the support system was critical in the adoption of new technologies. This is in tandem with the Krysa (2010) findings. Krysa (2010) noted that having a support system especially in the technical aspects of the new technology is a significant factor in the adoption of new technologies. The presence of the support system enables end users to get technical help whenever there are challenges in the usage of the technology as well giving of tips that makes working with the new technology easy.

To better understand which metric among the five used to examine work flow management was perceived as more instrumental in the adoption of the new technologies the means were ranked on a scale of 1 to 5. The ranking was based on the indicator with the highest mean being ranked 1 and the lowest ranked 5. Management scored the highest mean of 4.00 implying that on average, the respondents tended to agree that management

has been more instrumental in adoption of new technologies of the metrics on work flow management. To get the perception of the respondents in general on whether workflow management had been instrumental in adoption of new technologies, an average of the individual mean scores of the metrics was done to get the aggregate mean. The aggregate mean was 3.77 which meant the respondents on average tended to agree ($3.5< \mu < 4.5$) that in general workflow management had been instrumental in adoption of new technologies.

Table 4.14: Means of Work Flow Management

	N	Min.	Max.	Mean	Respondents on average tended to;	Rank
Cross functional competencies	69	1	5	3.72	Agree	4
Peer's Competencies	69	1	5	3.42	Uncertain	5
Support System	69	1	5	3.90	Agree	2
Policies	69	1	5	3.80	Agree	3
Management	69	1	5	4.00	Agree	1
Aggregate mean				**3.77**		

4.5.5 Means of Adoption Levels of New Technology

The average perception of the respondents on adoption levels of new technology was examined using various metrics which included new users of technology, time taken to use new technology, correct usage of new technology, gaining of desired new technology objectives, and frequency of new technology usage. The mean score corresponding to new users of technology was 3.92, time taken to use new technology was 3.67, and correct usage of new technology was 3.65. Gaining of desired new technology objectives had a mean score of 3.96 while frequency of new technology usage had a mean score of 3.90. All the individual mean scores of the metrics were in the interval $3.5< \mu < 4.5$ indicating that on average the respondents tended to agree that each metric had been influenced by end user characteristics.

When ranked on a scale of 1 to 5 from the highest to the lowest scored mean, gaining of desired new technology objectives had the highest scored mean implying that on average, the respondents tended to agree that it was the most influenced by end user characteristics, followed by new users of technology. The least influenced metric in the context of adoption levels of new technology was correct usage of new technology. The aggregate mean score for adoption levels of new technology was an average of the mean scores of individual metrics which was 3.82 implying that the respondents on average agreed that adoption levels of new technology was influenced by end user characteristics.

Table 4.15: Means of Adoption Levels of New Technology

	N	Min.	Max.	Mean	Respondents on average tended to;	Rank
New users of technology	69	1	5	3.92	Agree	2
Time taken to use new technology	69	2	5	3.67	Agree	4
Correct usage of new technology	69	1	5	3.65	Agree	5
Gaining of desired new technology objectives	69	2	5	3.96	Agree	1
Frequency of new technology usage	69	1	5	3.90	Agree	3
Aggregate mean				**3.82**		

4.6 Standard Deviations of the Variables

The standard deviations of the variables were calculated. The standard deviation is a measure of how much the data in a given collection is scattered around the mean(Peat & Barton, 2005). On the other hand, Keller (2014) noted that standard deviation (σ_X) is a measure that is used to quantify the amount of variation or dispersion of a set of data. The standard deviations were grouped into three intervals indicating high consensus ($\sigma_X \leq 0.5$), moderate consensus ($0.5<\sigma_X<1$) and no consensus $\sigma_X \geq 1$(Ruppert,

2004).Therefore, a low standard deviation means that the responses are clustered around the mean and hence a high consensus amongst the respondents in respect to that indicator (Wasserman, 2004).

4.6.1 Standard Deviations of End User Skills Matrix

The standard deviations (σ_X) in respect to individual metrics were generated. In the context of End User Skills Matrix, the standard deviations of individual metrics was generated, that is, standard deviations for technical skills, problem solving skills, proficiency in internet usage, basic computer trouble shoots skills, and ability to use self-help menus on a platform. Technical skills had standard deviation of 1.00 implying there was no consensus ($\sigma_X \geq 1$) among the respondents on whether they were instrumental in adoption of new technologies. Problem solving skills had a standard deviation of 0.74, proficiency in internet usage had 0.95, basic computer trouble shooting skills had a standard deviation of 0.88, and ability to use self-help menus on a platform had standard deviation of 0.89. These standard deviations implied that there was moderate consensus that they had been instrumental in adoption of new technologies ($0.5<\sigma_X<1$).

The standard deviations were ranked from the lowest to the highest based on the standard deviation scores with the lowest standard deviation being ranked 5 indicating greater consensus while the highest standard deviation was ranked 1 indicating lowest level of consensus. Problem solving skills was ranked 1 giving the highest level of consensus from the respondents since it was closer to 0.5 (high consensus) than all the other metrics. This implied that there was comparatively higher consensus amongst the respondents that

problem solving skills were instrumental in adoption of new technologies at KPLC Nakuru, Kenya among the metrics on End User Skills Matrix.

Technical skills were ranked number 5 (standard deviation of 1.00) implying that there was comparatively low consensus amongst the respondents in respect to its influence on the adoption of new technologies at KPLC.Proficiency in internet usage, ability to use self-help menus on a platform, and basic computer trouble shooting skills ranked 2, 3, and 4 respectively. The aggregate standard deviation was generated by getting the average of the individual standard deviations of the metrics on End User Skills Matrix. The aggregate standard deviation of the metrics on End User Skills Matrix was 0.89 which meant the responses were moderately distributed around the mean for all the metrics implying that there was moderate consensus that all the metrics on End User Skills Matrix have been instrumental in adoption of new technologies

Table 4.16: Standard Deviations of End User Skills Matrix

	N	Std. Deviation	Responses distribution around the mean;	Rank
Technical Skills	69	1.00	Widely	1
Problem Solving Skills	69	0.74	Moderately	5
Proficiency in internet usage	69	0.95	Moderately	2
Basic Computer Trouble Shooting Skills	69	0.88	Moderately	4
Ability to use self-help menus on a platform	69	0.89	Moderately	3
Aggregate		**0.89**		

4.6.2 Standard Deviations of End User Demographic Characteristics

The standard deviations of the various metrics on end user demographic characteristics were generated. These metrics were age, education, gender, job role, and experience in years. The standard deviation for age was 1.21, standard deviation for education was

0.77, and standard deviation for gender was1.22. Job role and experience in years had standard deviations of 0.96 and 1.13 respectively. Education and job role had standard deviations in the interval $0.5<\sigma_X<1$, that is, 0.77 and 0.96 respectively which meant that the responses were moderately distributed around the mean .This implied that there was moderate consensus among the respondents that education and job role have been instrumental in adoption of new technologies. On the other hand, there was no consensus ($\sigma_X \geq 1$) among the respondents whether age, gender and experience in years have been instrumental in adoption of new technologies since the responses were widely distributed around the mean.

The standard deviations for the end user demographic characteristics were ranked on a scale of 1 to 5 with the indicator ranked 1 having the highest standard deviation. The ranking saw gender ranked as number 1 with a standard deviation of 1.22. This implied that comparative to other end user demographic characteristics, gender had the least consensus amongst respondents in relations to its influence on the adoption of new technologies. Age ranked second, experience in years ranked third, job role ranked fourth, and education ranked fifth. This implied that comparatively education had the highest consensus amongst the respondents in relations to its influence on the adoption of new technologies at KPLC. The aggregate standard deviation of end user demographic characteristics was 1.06 which was generated by getting the average of the individual standard deviations of the metrics on end user demographic characteristics meaning that on average responses were widely distributed around the mean showing no consensus ($\sigma_X \geq 1$) in general.

Table 4.17: Standard Deviations of End User Demographic Characteristics

	N	Std. Deviation	Responses distribution around the mean;	Rank
Age	69	1.21	Widely	2
Education	69	0.77	Moderately	5
Gender	69	1.22	Widely	1
Job Role	69	0.96	Moderately	4
Experience in years	69	1.13	Widely	3
Aggregate Standard Deviation		**1.06**		

4.6.3 Standard Deviations of End User Attitudes

The standard deviations of the metrics on end user attitudes were generated to show how the responses were distributed around the mean and know whether there was high, moderate or no consensus. Most new technologies are useful in generic work functions at KPLC had a standard deviation of 0.76, most new technologies being useful in specific line of work at KPLC had a standard deviation of 0.97, while ease of use of new technologies had a standard deviation of 1.02. The standard deviation for most new technologies preserve historically held data in my line of work was 0.99,and standard deviation of reception to in technology advances was 0.97. On the other hand, the standard deviation of new technologies being necessary for work functions at KPLC was 0.83.

All the metrics on end user attitudes had standard deviations that were moderately distributed around the mean with the exception of ease of use of new technologies which was widely distributed. The ease of use of new technologies was widely distributed due to means of above 1.0. This implies that with the exception of the ease of use of new technologies which had no consensus (due to$\sigma_X \geq 1$), there was moderate consensus (due

to $0.5<\sigma_X<1$) on the influence of individual metrics on adoption of new technologies at KPLC.

The standard deviations were ranked on a scale of 1 to 6 from the highest standard deviation of 1.02 ranked as number 1 to the lowest standard deviation of 0.76 ranked as number 6. Most new technologies are useful in generic work functions at KPLC scored the lowest standard deviation of 0.76 implying compared to other user attitudes there was higher levels of consensus in respect to its influence on the adoption of new technologies. The aggregate standard deviation on end user attitudes was 0.92, which was a result of averaging the standard deviations of the individual metrics. This implied that there was moderate consensus ($0.5<\sigma_X<1$) that end user attitude has been instrumental in adoption of new technologies at KPLC Nakuru, Kenya.

Table 4.18: Standard Deviations of End User Attitudes

	N	Std. Deviation	Responses distribution around the mean;	Rank
Most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc.	69	0.76	Moderately	6
Most new technologies are useful in specific line of work at KPLC	69	0.97	Moderately	4
I find most new technologies easy to use	69	1.02	Widely	1
Most new technologies preserve historically held data in my line of work	69	0.99	Moderately	2
I am receptive to changes in technology advances	69	0.97	Moderately	3
I consider new technologies necessary for work functions at KPLC	69	0.83	Moderately	5
Aggregate		**0.92**		

4.6.4 Standard Deviations of Work Flow Management

The study sought to find out the distribution of the responses around the mean and see if there was consensus on a given metric. The metrics whose standard deviations were used were cross functional competencies, peer's competencies, support system, policies, and management. The standard deviations on cross functional competencies and policies were widely distributed around the mean due to standard deviations of 1.01 and 1.02 respectively. This implied that there was no consensus ($\sigma_X \geq 1$) on whether they had beeninstrumental in adoption of new technologies. Peer's competencies, support system, and management had standard deviations moderately distributed around the mean due to standard deviations of 0.93, 0.98, and 0.91 respectively. This implied moderate consensus among the respondents on the individual metric influence on adoption of new technologies due standard deviation of ($0.5<\sigma X<1$).

Ranks on a scale of 1 to 5 were assigned to the standard deviations from the highest standard deviation (1) to the lowest standard deviation (5). The lowest standard deviation was that of management (standard deviation of 0.91) which implied that there was a comparatively higher level of consensus that it had been instrumental in adoption of new technologies among the metrics on work flow management. The aggregate standard deviation in respect to work flow management was 0.97 which was an average of the individual standard deviations of work flow management metrics. This implied that the respondents had moderate consensus that it has been instrumental in adoption of new technologies due to standard deviations of between $0.5<\sigma_X<1$.

Table 4.19: Standard Deviations of Work Flow Management

	N	Std. Deviation	Responses distribution around the mean;	Rank
Cross functional competencies	69	1.01	Widely	2
Peer's Competencies	69	0.93	Moderately	4
Support System	69	0.96	Moderately	3
Policies	69	1.02	Widely	1
Management	69	0.91	Moderately	5
Aggregate		**0.97**		

4.6.5 Standard Deviations of New Technologies Adoption

The standard deviations in the context of adoption levels of new technology was examined using new users of technology, time taken to use new technology, correct usage of new technology, gaining of desired new technology objectives, and frequency of new technology usage in order to see the behaviour of the responses around the respective means. The standard deviations for new users of technology (0.73), time taken to use new technology (0.83), gaining of desired new technology objectives (0.74), and frequency of new technology usage (0.84) were moderately distributed around the mean. This was due to the standard deviations being between 0.5 and 1. This implied a moderate consensus amongst the respondents in respect to the influence of End User Skills Matrix, end user attitude, end user demographics and work flow management on the adoption of the new technologies at KPLC. The correct usage of new technology had a standard deviation of 1.04 which meant that the responses were widely distributed around the mean and therefore no consensus on whether it was influenced by end user characteristics.

When the standard deviations were ranked from the lowest to the highest on a scale of 1 to 5, that is highest standard deviation being ranked 1 and the lowest standard deviation

ranked 5. The gaining of desired new technology objectives had the lowest standard deviation which implied that there was comparatively greater consensus than in the other metrics on adoption levels of new technology that it was the most influenced by end user characteristics. The aggregate standard deviation for adoption of new technology which was the average of the standard deviations of the metrics was 0.85 implying that there was moderate consensus ($0.5<\sigma X<1$) among the respondents that adoption levels of new technology were influenced by end user characteristics.

Table 4.20: Standard Deviations of New Technologies Adoption

	N	Std. Deviation	Responses distribution around the mean;	Rank
New users of technology	69	0.79	Moderately	4
Time taken to use new technology	69	0.83	Moderately	3
Correct usage of new technology	69	1.04	Widely	1
Gaining of desired new technology objectives	69	0.74	Moderately	5
Gaining of desired new technology objectives	69	0.84	Moderately	2
Aggregate		**0.85**		

4.7 Normality Statistics

The normality of the End User Skills Matrix was examined using the skewness and kurtosis measures. The skewness refers to the degree of symmetry in the variable distribution while kurtosis refers to the sharpness of the peak of a frequency-distribution curve (Ruppert, 2004). Kurtosis has also been defined as the measure of the thickness or heaviness of the tails of a distribution (Patzer, 2006). Kurtosis is a parameter that describes the shape of a random variable's probability distribution. The range of the skewness and kurtosis scores for normality assumed is the measures of -3.0 to 3.0 and -

10.0 to 10.0 respectively. The skewness and kurtosis of the End User Skills Matrix met the conditions for the normality as illustrated in Table 4.21.

Table 4.21: Normality of the End User Skills Matrix

	N	Skewness Scores	Skewness within -3.0 to 3.0 range?	Kurtosis Scores	Kurtosis within -10.0 to10 range?	Is Normality Condition Satisfied?
Technical Skills	69	-1.124	Yes	1.096	Yes	Yes
Problem Solving Skills	69	-.586	Yes	.342	Yes	Yes
Proficiency in internet usage	69	-1.099	Yes	1.027	Yes	Yes
Basic Computer Trouble Shooting Skills	69	-.913	Yes	1.048	Yes	Yes
Ability to use self-help menus on a platform	69	-.815	Yes	.796	Yes	Yes

The normality of the end user demographic characteristics were examined using the skewness and kurtosis measures. The range of the skewness and kurtosis scores for normality assumed is the measures of -3.0 to 3.0 and -10.0 to 10.0 respectively. Since the skewness and kurtosis scores for end user demographic were within -3.0 to 3.0 for skewness levels and -10.0 to 10.0 for kurtosis scores, the normality assumption was met as illustrated in Table 4.22.

Table 4.22: Normality of the End User Demographic Characteristics

	N	Skewness Scores	Skewness within -3.0 to 3.0 range?	Kurtosis Scores	Kurtosis within -10.0 to10 range?	Is Normality Condition Satisfied?
Age	69	-.753	Yes	-.304	Yes	Yes
Education	69	-1.026	Yes	1.230	Yes	Yes
Gender	69	.085	Yes	-.994	Yes	Yes
Job Role	69	-1.040	Yes	1.133	Yes	Yes
Experience in years	69	-.462	Yes	-.770	Yes	Yes

The normality of the end user attitudes were examined using the skewness and kurtosis measures. Since the skewness and kurtosis scores for end user attitudes were within -3.0

to 3.0 for skewness levels and -10.0 to 10.0 for kurtosis scores, the normality assumption was met as illustrated in Table 4.23. Therefore, the normality of the end user attitudes was assumed.

Table 4.23: Normality of End User Attitudes

	N	Skewness Scores	Skewness within -3.0 to 3.0 range?	Kurtosis Scores	Kurtosis within -10.0 to10 range?	Is Normality Condition Satisfied?
Most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc.	69	-1.534	Yes	4.396	Yes	Yes
Most new technologies are useful in specific line of work at KPLC	69	-1.019	Yes	.678	Yes	Yes
I find most new technologies easy to use	69	-.736	Yes	-.201	Yes	Yes
Most new technologies preserve historically held data in my line of work	69	-1.109	Yes	.909	Yes	Yes
I am receptive to changes in technology advances	69	-1.155	Yes	1.436	Yes	Yes
I consider new technologies necessary for work functions at KPLC	69	-1.816	Yes	4.255	Yes	Yes

The normality of the work flow management was examined using the skewness and kurtosis measures. Since the skewness and kurtosis scores for the work flow management were within -3.0 to 3.0 for skewness levels and -10.0 to 10.0 for kurtosis scores, the normality assumption was met as illustrated in Table 4.24.

Table 4.24: Normality of Work Flow Management

	N	Skewness Scores	Skewness within -3.0 to 3.0 range?	Kurtosis Scores	Kurtosis within -10.0 to10 range?	Is Normality Condition Satisfied?
Cross functional competencies	69	-.728	Yes	.523	Yes	Yes
Peer's Competencies	69	-.382	Yes	-.461	Yes	Yes
Support System	69	-.932	Yes	.562	Yes	Yes
Policies	69	-.766	Yes	-.139	Yes	Yes
Management	69	-1.525	Yes	2.820	Yes	Yes

The normality of the new technology was examined using the skewness and kurtosis measures. Since the skewness and kurtosis scores for new technology was within -3.0 to 3.0 for skewness levels and -10.0 to 10.0 for kurtosis scores, the normality assumption was met as illustrated in Table 4.25.

Table 4.25: Normality of the New Technology

	N	Skewness Scores	Skewness within -3.0 to 3.0 range?	Kurtosis Scores	Kurtosis within -10.0 to10 range?	Is Normality Condition Satisfied?
New users of technology	69	-1.150	Yes	2.531	Yes	Yes
Time taken to use new technology	69	-.707	Yes	-.006	Yes	Yes
Correct usage of new technology	69	-.863	Yes	.288	Yes	Yes
Gaining of desired new technology objectives	69	-.386	Yes	.076	Yes	Yes
Frequency of new technology usage	69	-.714	Yes	1.021	Yes	Yes

4.8 Inferential Statistics

The inferential statistics are used to draw inferences on the given phenomenon of the population (Sekaran, 2003). The inferential statistics were examined using the hypothesis testing and multiple linear regression statistics.

4.8.1 Hypothesis Testing

For the purposes of hypothesis testing, this study used the hypothesis testing steps that were enumerated by Kothari in the book *Research Methodology; Methods and Techniques*. According to Kothari (2004), a research hypothesis is a predictive statement that relates an independent variable to a dependent variable. The research hypothesis was also defined as a proposition or a set of proposition set forth as an explanation for the occurrence of some specified group of phenomena either asserted merely as a provisional conjecture to guide some investigation or accepted as highly probable in the light of established facts. According to Kothari (2004), there are six steps that should be used in hypothesis testing; (i) making a formal statement, (ii) Selecting a significance level, (iii) Deciding on the distribution to use, (iv) selecting a random sample and computing an appropriate value, (v) Calculation of the variable, and (vi) comparing the probability.

In respect to the first step of making a formal statement, this step relates to formally stating the null hypothesis (H_0) and also of the alternative hypothesis (H_a).The second step of hypothesis testing involves the selection of the significance levels. The significance level (usually stated as a percentage) refers to the percentage of risk that the researcher is willing to take of rejecting the null hypothesis when the null hypothesis is in fact true(Kothari, 2004). The significance level is therefore the maximum value of rejecting null hypothesis when it is true. This is also referred as the probability of making Type I error that is the probability of rejecting H_0 when H_0 is true. The level of significance of this study was set at 5% (Kothari, 2004).

The third and fourth and step that is selection of a random sample and computation of its appropriate value was undertaken through the use of SPSS software. In this context, the individual metrics of the independent variables were regressed against a composite variable of the independent variable for the purposes of getting the p-value. The p-value statistic was then examined for the viability of each regression model. The indicators for the variables were five indicators for End User Skills Matrix, end user demographic characteristics, and workflow management while the indicators for end user attitudes were six in number. The last step of the hypothesis testing involved the comparison of the calculated p value with the set significance level.

Therefore, in order to test the hypothesis in respect to end user skills matrix influence on adoption of new technologiesat Kenya Power and Lighting Company, Kenya,the following null (**H_{01})** and alternate hypothesis (**H_{a1})** were used;

> **H_{01}:** Skills matrix of end user has no significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya
>
> **H_{a1}:** Skills matrix of end user has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya

In respect to the decision making of whether to reject or accept the null (H01) and alternate hypothesis (Ha1), the p value method was utilized. In this context, the p value for one way ANOVA for End User Skills Matrix was below 0.05 which led to rejection of the null hypothesis (H01). Therefore, the null hypothesis (H01) that skills matrix of end user has no significant influence on adoption of new technologies at Kenya Power

and Lighting Company, Kenya was rejected since p=0.049<0.05. Thus the alternate hypothesis that skills matrix of end user has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya was accepted.

In order to test the hypothesis in respect to end user demographic characteristics influence on adoption of new technologiesat Kenya Power and Lighting Company, Kenya, the following null (**H_{02}**) and alternate hypothesis (**H_{a2}**) were used;

> **H_{02}:** Demographics characteristics of end users has no significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya
>
> **H_{a2}:** Demographics characteristics of end users has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya

The p value for one way ANOVA for end user demographic characteristics was above 0.05 which led to acceptance of the null hypothesis. Therefore, the null hypothesis (H_{02}) that demographic characteristics of end users has no significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya was accepted since p=0.367>0.05. Thus, the alternate hypothesis that demographics characteristics of end users has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya was rejected.

In order to test the hypothesis in respect to end user attitudes influence on adoption of new technologiesat Kenya Power and Lighting Company, Kenya, the following null (**H_{03}**) and alternate hypothesis (**H_{a3}**) were used;

(i) **H_{03}:** The attitudes of end users has no significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya

H_{a3}: The attitudes of end users has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya

The p value for one way ANOVA for end user attitude was 0.005 which led to rejection of the null hypothesis. Therefore, the null hypothesis (H_{03}) that attitudes of end users has no significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya was rejected since $p=0.005<0.05$. Thus, the alternate hypothesis that the attitudes of end users has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya was accepted.

In order to test the hypothesis in respect to work flow management influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya, the following null (**H_{04}**) and alternate hypothesis (**H_{a4}**) were used;

H_{04}: The workflow management has no significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya

H_{a4}: The workflow management has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya

The p value for one way ANOVA for end user attitude was 0.000 which led to rejection of the null hypothesis. Therefore, the null hypothesis ($H0_4$) that work flow management has no significant influence on adoption of new technologies at Kenya Power and

Lighting Company, Kenya was rejected since p=0.005<0.05. Thus, the alternate hypothesis that the workflow management has significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya was accepted.

Table 4.26: Hypothesis testing using p-value

Hypothesis Tested	P Value Method		Conclusion
	P Value	Is p value < 0.05?	
H_{01}	0.049	Yes	Reject H_{01}
H_{02}	0.367	No	Accept H_{02}
H_{03}	0.005	Yes	Reject H_{03}
H_{04}	0.000	Yes	Reject H_{04}

4.8.2 Multiple Linear Regression

The study sought to examine the influence of the four independent variables on the dependent variable in a cumulative manner. This was done by determining the multiple linear regressions which gave the multiple correlation coefficients denoted as R of 0.723. This indicated that the independent variables, that is, End User Skills Matrix, end user demographic characteristics, end user attitudes and workflow management were moderately and positively correlated with adoption levels of new technology. The variance in adoption levels of new technology can be accounted for up to 52.3% by the independent variables as indicated by the coefficient of determination (R^2) of 0.523. Therefore, there are other factors not present in the current regression model that account for 47.7% of the variance in adoption levels of new technology.

Table 4.27: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.723[a]	.523	.494	.46960

a. Predictors: (Constant), End User Attitudes, End User Skills Matrix, End User Demographic Characteristics, Work Flow Management

The overall viability of the regression model was checked by undertaking the ANOVA. The p value from the ANOVA was 0.000 which indicated that there was no likelihood or

probability (0.0%) of the regression model giving a wrong prediction. The p value of 0.000 was less than the 0.05 threshold which implied that the model was reliable.

Table 4.28: ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.498	4	3.875	17.570	.000[b]
	Residual	14.113	64	.221		
	Total	29.612	68			

a. Dependent Variable: Adoption Levels of New Technology

b. Predictors: (Constant), End User Attitudes, End User Skills Matrix, End User Demographic Characteristics, Work Flow Management

The coefficients of the individual independent variables (End User Skills Matrix, end user demographic characteristics, end user attitudes and workflow management) were examined. The resulting regression model was;

Adoption Levels of New Technology =0.951 – 0.051 (End User Skills Matrix) - 0.047 (End User Demographic Characteristics) + 0.203 (End User Attitudes) + 0.645 (Work Flow Management)

This regression model indicates that a unit increase in End User Skills Matrix while other factors are kept constant would result in a 0.051 decrease in adoption levels of new technology. Similarly, a unit increase in end user demographic characteristics would result in a 0.047 decrease in adoption levels of new technology with the other variables kept constant. This indicates that both End User Skills Matrix and end user demographic characteristics cannot positively influence the adoption levels of new technology individually. A unit increase in end user attitudes would result in a 0.203 increase in adoption levels of new technology with the other metrics kept constant while a unit increase in work flow management would result in a 0.645 increase in adoption levels of new technology with the other metrics kept constant. This implies that both end user

attitudes and work flow management individually influence the adoption levels of new technology positively.

Table 4.29: Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.951	.496		1.917	.060
End User Skills Matrix	-.051	.102	-.050	-.498	.620
End User Demographic Characteristics	-.047	.106	-.044	-.447	.656
End User Attitudes	.203	.109	.182	1.872	.066
Work Flow Management	.645	.102	.666	6.343	.000

a. Dependent Variable: Adoption Levels of New Technology

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMEDATIONS

5.1 Introduction

This chapter summarises the results and findings of chapter four and describes recommendations as suggested by the results. The study was interested in examining the influences of end user characteristics on adoption of new technologies in KPLC Nakuru, Kenya. This was investigated by specifically looking at the influences of End User Skills Matrix, end user demographic characteristics, end user attitudes, and work flow management on adoption of new technologies. A sample size of 73 respondents from various departments including regional management, design and construction, finance, supply chain, transport, technical services, security, information and communications technology, customer service, and human resources and administration was utilized with 69 questionnaires being used for data analysis which gave a response rate of 94.5%.

5.2 Summary of the Findings

The study gained insight into the impact of End User Skills Matrix on the adoption of new technologies. Problem solving skills had the highest mean of 4.09 indicating that it has been the most instrumental in adoption of new technologies, followed by proficiency in internet usage, technical skills, ability to use self-help menus on a platform, and basic computer trouble shooting skills. The aggregate mean score was 3.97 (average of the mean scores of individual metrics) for the end user skills matrix which implied that the respondents on average were inclined to agree that end user skills matrix have been instrumental in adoption of new technologies.

Technical skills had standard deviation of 1.00 implying that there was comparatively low consensus amongst the respondents in respect to its influence on the adoption of new technologies at KPLC. Problem solving skills, proficiency in internet usage, basic computer trouble shooting skills, and ability to use self-help menus on a platform had standard deviation of between 0.5 and implying there was moderate consensus that they had been instrumental in adoption of new technologies. The aggregate standard deviation was 0.89 (average of the individual standard deviations of the metrics on end user skills matrix) which meant there was moderate consensus that in general end user skills matrix have been instrumental in adoption of new technologies

In the context of end user demographic characteristics education which had no strongly disagreed response had the highest mean score (4.23) meaning that among the end user demographic characteristics, the respondents on average agreed that it has been most instrumental in adoption of new technologies at KPLC Nakuru, Kenya, followed by job role, experience in years, and fourth age. The lowest mean score was for gender where respondents were on average unsure whether it had been instrumental in adoption of new technologies at KPLC Nakuru, Kenya as it had a mean score of 2.97.The aggregate mean of the end user demographic characteristics was 3.64 (average of the individual mean scores of the metrics on end user demographic characteristics) which implied that the respondents on average tended to agree that end user demographic characteristics have been instrumental in adoption of new technologies at KPLC Nakuru, Kenya. Education and job role had standard deviations in the interval $0.5<\sigma_X<1$ which meant that the

responses were moderately distributed around the mean implying that there was moderate consensus among the respondents on their role in adoption of new technologies.

On the other hand, there was no consensus ($\sigma_X \geq 1$) among the respondents whether age, gender and experience in years have been instrumental in adoption of new technologies since the responses were widely distributed around the mean. Education had the lowest standard deviation among the metrics which implied that comparatively, it had the highest consensus amongst the respondents in relations to its influence on the adoption of new technologies at KPLC. The aggregate standard deviation of end user demographic characteristics was 1.06 meaning that on average responses were widely distributed around the mean showing no consensus ($\sigma_X \geq 1$) in general.

On average, the respondents tended to agree that each of the metrics on end user attitude was instrumental in adoption of new technologies at KPLC as each metric had a mean score between 3.5 and 4.5.On average, the respondents consider new technologies necessary for work functions at KPLC as most instrumental in adoption of new technologies among the metrics on end user attitude as it had the highest mean score followed by most new technologies are useful in generic work functions at KPLC, most new technologies are useful in specific line of work at KPLC, I am receptive to changes in technology advances, most new technologies preserve historically held data in my line of work, and I find most new technologies easy to use. The respondents on average tended to agree that end user attitudes have been instrumental in adoption of new

technologies at KPLC Nakuru, Kenya with an aggregate mean score of 4.02 which was an average of the individual mean scores of the metrics on end user attitude.

The standard deviations of the metrics on end user attitudes were generated to show how the responses were distributed around the mean and know whether there was high, moderate or no consensus. All the metrics on end user attitudes had standard deviations that were moderately distributed around the mean with the exception of I find most new technologies easy to use which was widely distributed. This implies that with the exception of I find most new technologies easy to use which had no consensus$\sigma_X \geq 1$, there was moderate consensus($0.5<\sigma_X <1$)that individual metrics on end user attitude had been instrumental in adoption of new technologies at KPLC.

Most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc. scored the lowest standard deviation implying compared to other user attitudes there was higher levels of consensus in respect to its influence on the adoption of new technologies. The aggregate standard deviation on end user attitudes was 0.92 (average of the standard deviations of the individual metrics) which implied that there was moderate consensus ($0.5<\sigma_X <1$) that end user attitude has been instrumental in adoption of new technologies at KPLC Nakuru, Kenya.

The study sought to know whether the workflow management metrics, that is, cross functional competencies, peer's competencies, support system, policies, and management have been instrumental in adoption of new technologies. The individual mean scores for

the metrics were all in the interval ($3.5< \mu < 4.5$) implying that on average the respondents tended to agree that each metric had been instrumental in adoption of new technologies. Management scored the highest mean of 4.00 implying that on average, the respondents tended to agree that management has been more instrumental in adoption of new technologies of the metrics on work flow management. The aggregate mean was 3.77 (average of the individual mean scores of the metrics) which meant the respondents on average tended to agree ($3.5< \mu < 4.5$) that in general workflow management had been instrumental in adoption of new technologies.

The study sought to find out the distribution of the responses around the mean and see if there was consensus on a given metric. The standard deviations on cross functional competencies and policies were widely distributed around the mean, that is, 1.01 and 1.02 respectively implying that there was no consensus ($\sigma_X \geq 1$) on whether they had beeninstrumental in adoption of new technologies. Peer's competencies, support system, and management had standard deviations moderately distributed around the mean implying moderate consensus ($0.5<\sigma_X <1$) among the respondents on each metric.

The lowest standard deviation was that of management (standard deviation of 0.91) which implied that there was a comparatively higher level of consensus that it had been instrumental in adoption of new technologies among the metrics on work flow management. The aggregate standard deviation was 0.97 (average of the individual standard deviations of work flow management metrics) which implied that the

respondents had moderate consensus ($0.5<\sigma_X<1$) that work flow management has been instrumental in adoption of new technologies.

The perception of the respondents on adoption levels of new technology was examined using various metrics which included new users of technology, time taken to use new technology, correct usage of new technology, gaining of desired new technology objectives, and frequency of new technology usage. All the individual mean scores of the metrics were in the interval $3.5< \mu < 4.5$ indicating that on average the respondents tended to agree that each metric had been influenced by end user characteristics.

When ranked on a scale of 1 to 5 from the highest to the lowest scored mean, gaining of desired new technology objectives had the highest scored mean implying that on average, the respondents tended to agree that it was the most influenced by end user characteristics, followed by new users of technology. The least influenced metric in the context of adoption levels of new technology was correct usage of new technology. The aggregate mean score for adoption levels of new technology (average of the mean scores of individual metrics) was 3.82 implying that the respondents on average agreed that adoption levels of new technology was influenced by end user characteristics.

There was moderate consensus that new users of technology, time taken to use new technology, gaining of desired new technology objectives, and frequency of new technology usage were influenced by end user characteristics as their standard deviations were moderately distributed around the mean ($0.5<\sigma_X<1$). Correct usage of new

technology had a standard deviation of 1.04 which meant that the responses were widely distributed around the mean therefore no consensus ($\sigma_X \geq 1$) on whether it was influenced by end user characteristics.

Gaining of desired new technology objectives had the lowest standard deviation which implied that that there was comparatively greater consensus than in the other metrics on adoption levels of new technology that it was the most influenced by end user characteristics. The aggregate standard deviation for adoption of new technology which was the average of the standard deviations of the metrics was 0.85 implying that there was moderate consensus ($0.5 < \sigma_X < 1$) among the respondents that adoption levels of new technology were influenced by end user characteristics.

5.3 Discussion of the Findings

The study found that the skills matrix of end users had significant influence on the adoption of new technologies at Kenya Power and Lighting Company. The end user skills matrix is critical in the adoption of the new technologies in a utility firm such as Kenya Power and Lighting Company. The improvement in the end user skills matrix would lead to KPLC ability to deploy the needed technologies at a faster rate and therefore pass off the gains of the new technologies to the organization and the electricity consumers.

In respect to the demographic characteristics of end users, the study found that the demographic characteristics of end users had no statistically significant relationship on the adoption of new technologies at Kenya Power and Lighting Company. These results

indicate that the demographic characteristics have little influence on the adoption of new technologies at KPLC. This indicates to the management of KPLC that their staff characteristics in terms of demographic characteristics are adequate for the purposes of adoption of new technologies.

The study found that the attitudes of end users had significant influence on adoption of new technologies at Kenya Power and Lighting Company, Kenya. The attitude of the end users is key in the adoption of the new technologies as it determines the efforts that users of the new technology exert in learning the new technology and hence improving its adoption levels.

Finally, the research found that the work flow management had significant influence on the adoption of new technologies at Kenya Power and Lighting Company, Kenya. The work flow management is critical in the adoption of the new technologies as it indicates the sequence of activities in a work flow and the staff involved in these activities. The management of the bottlenecks or portions within the work flow that reduce the ease of use of new technologies is critical in the overall adoption of that new technology.

5.4 Conculsions of the Study

The study concluded that the highest consensus amongst respondents in relations to the influence of the diverse independent variables on adoption of new technologies at KPLC, was on end user skills. Additionally, the study concluded that end user skills have significant influence on the adoption of new technologies at KPLC.

In terms of the level of agreement (based on a five point Likert scale), the study concluded that end user attitude was the metric that respondents highly agreed that it had an influence on adoption of new technologies at KPLC. Further, the study concluded the end user attitudes have significant influence on the adoption of new technologies at KPLC, as well as positive predictors of adoption of new technologies at KPLC.

On the other hand, the study concluded that the end user demographic characteristics do not have any significant influence on the adoption of new technologies at KPLC. In this context, the study concluded that education has greater influence on the adoption of new technologies at KPLC due to its high mean and low standard deviation.

However, the study concluded that work flow management was a positive predictor of adoption of new technologies at KPLC. In this context, management was considered to have greater influence on work flow management that the other indicators since it had a higher mean.

5.5 Recommendations for the Study

In making the recommendations, the study seeks to give directions to the management of KPLC and other utility firms on the measures that they should utilize in order to enhance the adoption of new technologies in their firms.

An examination of the indicators on work flow management revealed that the support system and management support were the items with high means and low standard deviation. This study therefore, makes a recommendation that KPLC should ensure that

its employees gets adequate support system and management support in order for them to improve on the adoption of new technologies at the institution.

In the context of the skills of the end user, the study recommends that KPLC management enhances the problem solving skills of its employees through regular training and workshops. Additionally, on the job training should be emphasized where the KPLC employees can get a platform to share best practice.

An examination of the end user demographic characteristics indicators gave education as the indicator with the highest mean and lowest standard deviation. Therefore, the study recommends that KPLC should review their basic education requirements for people joining the organization so as to get well educated employees who will be able to adopt new technology faster.

Further, the study recommends that KPLC conducts awareness of the new technology to be adopted among its employees. This will make the employees receptive to the new technology which will make its adoption easier thus improving work functions at the organization.

5.6 Suggestions for Further Studies

The suggestions for further studies for this study was based on the findings of the standard deviation results of diverse metrics influence on the adoption of new technologies at KPLC. The items that had a standard deviation of greater than one

implied that the responses were widely distributed around the means hence leading to a conculsion of lack of consensus in respect to those metrics amongst the respondents. This research therefore suggests those items for further studies in order for them to be examined in detail. In this context the study makes the following suggestions for further studies; An examination of the influence of technical skills on the adoption of new technologies amongst utility firms' employees; An examination of the influence of end user demographics (age, gender, and employee's experience) on the adoption of new technologies amongst utility firms' employees; An examination of the role of ease of use of new technologies on the adoption of new technologies amongst utility firms' employees; An examination on the role of cross functional competencies on the adoption of new technologies amongst utility firms' employees and An examination of the influence of KPLC policies on the adoption of new technologies amongst utility firms' employees.

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APPENDIX A

KPLC FIELD AUTHORIZATION LETTER

Methodius Njoroge Kiarie,
P.O BOX 406-00100 Nairobi.
kmethodius@yahoo.com
0722703695
24th May, 2017.

The Regional Manager,
Kenya Power and Lighting Company,
Nakuru Branch.
P.O BOX 104-20100, Nakuru.

Cc.
Human Resources and Administration Manager.

Your Ref…….

Dear Sir/Madam,

REF: RESEARCH PROJECT DATA COLLECTION AUTHORIZATION REQUEST

My name is Methodius Njoroge Kiarie, a master of arts in project planning and management student at the University of Nairobi, Nakuru Extra Mural Campus. I am in the process of undertaking a research study on your company entitled "***Influence Of End User Characteristics On Adoption Of New Technologies Among Utility Firms; A Case Of Kenya Power And Lighting Company, Nakuru, Kenya***".

The purpose of this letter is to formally request for authority to engage your staff in Nakuru on the above exercise. Care will be taken to minimize interruptions on your normal business operations. It is my belief the study results will be of interest to your human resource office and a copy of the same will be availed.

I retain optimism that your office will be of indispensable help in enabling the success of this research project. I therefore supplicate for a favorable consideration of this request, and affirm my availability to address any concerns your office may have.

Yours' Faithfully,

Methodius Njoroge Kiarie
Encl.
(i) University of Nairobi Field Authorization Letter
(ii) National Commission for Science, Technology and Innovation (NACOSTI) Letter
(iii) Sample Questionnaire

APPENDIX B

CONSENT STATEMENT

Methodius Njoroge Kiarie,
P.O BOX 406-00100 Nairobi.
kmethodius@yahoo.com
0722703695
24th May, 2017.

Dear Sir/Madam,

REF: CONSENT STATEMENT FOR RESEARCH PROJECT DATA COLLECTION

My name is Methodius Njoroge Kiarie, a master's of arts in project planning and management student at the University of Nairobi, Nakuru Extra Mural Campus. I am in the process of undertaking a research study on your company entitled "***Influence Of End User Characteristics On Adoption Of New Technologies Among Utility Firms; A Case Of Kenya Power And Lighting Company, Nakuru, Kenya***".

The purpose of this request is to formally ask you to assist in filling the enclosed questionnaire to the best of your knowledge. An authorization to undertake the process has been granted by your Regional manager.

The following conditions govern the data collection process and your participation in the study is with that understanding;

i) **Confidentiality;** your responses to this research will be anonymous in nature. Kindly do not write any identifying information on the enclosed questionnaire.

ii) **Compensation;** there is no financial compensation or any other material consideration that will accrue from participation in this study.

iii) **Voluntary Participation;** your participation in this study is of voluntary nature. Your participation or lack of participation in the study will not affect your relationship with your employer or researcher (if any). You are free to withdraw at any stage of the research (if you so wish) without giving a reason for the same and without incurring any financial penalties.

Yours' Faithfully,

Methodius Njoroge Kiarie.

Encl.
(i) Questionnaire

APPENDIX C
UNIVERSITY OF NAIROBI FIELD AUTHORIZATION LETTER

UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION
DEPARTMENT OF EXTRA - MURAL STUDIES

Tel 051 - 2210863

P. O Box 1120, Nakuru
27th April 2017

Our Ref: *UoN/CEES/NKUEMC/1/12*

To whom it may concern:

RE: METHODIUS NJOROGE KIARIE – L50/83057/2015

The above named is a student of the University of Nairobi at Nakuru Extra-Mural Centre Pursuing a Masters degree in Project Planning and Management.

Part of the course requirement is that students must undertake a research project during their course of study. He has now been released to undertake the same and has identified your institution for the purpose of data collection on "Influence of End User Characteristics on Adoption of New Technologies Among Utility Firms; A Case of Kenya Power And Lighting Company, Nakuru, Kenya."

The information obtained will strictly be used for the purpose of the study.

I am for that reason writing to request that you please assist him.

Yours faithfully,

NAKURU EXTRA - MURAL CENTRE * UNIVERSITY OF NAIROBI *
RESIDENT LECTURER
P.O. Box 1120
NAKURU

Mumo Mucke
Ag. Resident Lecturer
Nakuru Extra-Mural Centre

APPENDIX D

NACOSTI LETTER

NATIONAL COMMISSION FORSCIENCE, TECHNOLOGY ANDINNOVATION

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

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

Ref: No. **NACOSTI/P/17/15250/17020**

Date: **23rd May, 2017**

Methodius Njoroge Kiarie
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Influence of end user characteristics on adoption of new technologies among utility firms; A case of Kenya Power and Lighting Company, Nakuru, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for the period ending **23rd May, 2018.**

You are advised to report to **the Managing Director, Kenya Power and Lighting Company, the County Commissioner and the County Director of Education, Nakuru County** before embarking on the research project.

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

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The Managing Director
Kenya Power and Lighting Company.

The County Commissioner
Nakuru County.

THIS IS TO CERTIFY THAT:
MR. METHODIUS NJOROGE KIARIE
of THE UNIVERSITY OF NAIROBI,
406-100 NAIROBI,has been permitted to
conduct research in *Nakuru County*

on the topic: *INFLUENCE OF END USER CHARACTERISTICS ON ADOPTION OF NEW TECHNOLOGIES AMONG UTILITY FIRMS; A CASE OF KENYA POWER AND LIGHTING COMPANY, NAKURU, KENYA*

for the period ending:
23rd May,2018

Permit No : NACOSTI/P/17/15250/17020
Date Of Issue : 23rd May,2017
Fee Recieved :Ksh 1000

.....
Applicant's Signature

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

CONDITIONS

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

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEACH CLEARANCE PERMIT

Serial No.A 14139

CONDITIONS: see back page

APPENDIX E
TURNITIN ORIGINALITY REPORT

Turnitin Originality Report

Influence of End User Characteristics on Adoption of New Technologies among Utility Firms; A Case of Kenya Power and Lighting Company, Nakuru, Kenya by Methodius N. Kiarie

From Influence of End User Characteristics on Adoption of New Technologies among Utility Firms; A Case of Kenya Power and Lighting Company, Nakuru, Kenya (Innovative resources)

- Processed on 20-Jul-2017 11:59 EAT
- ID: 832004878
- Word Count: 23706

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Student Papers:
5%

APPENDIX F
INFLUENCE OF END USER CHARACTERISTICS ON ADOPTION OF NEW TECHNOLOGIES AMONG UTILITY FIRMS; A CASE OF KENYA POWER AND LIGHTING COMPANY, NAKURU, KENYA
QUESTIONNAIRE

Instructions: Please complete the following questionnaire appropriately.

Confidentiality: The responses you provide will be strictly confidential. No reference will be made to any individual(s) in the report of the study. This study is a partial requirement for the award of Degree of Master of Arts in Project Planning and Management of the University of Nairobi.

Please tick or answer appropriately for each of the Question provided.

PART A: BACKGROUND INFORMATION

1)	What is your gender?	Male	[ ]
		Female	[ ]
2)	What is your age bracket?	Below 25 Years	[ ]
		26-35 Years	[ ]
		36-45 Years	[ ]
		Over 45 Years	[ ]
3)	What is your highest level of education?	KCSE Graduate	[ ]
		Diploma	[ ]
		Graduate	[ ]
		Masters	[ ]
		Doctor of Philosophy (PhD)	[ ]
4)	Which of the following best indicates your job role?	Regional Management	[ ]
		Design and Construction	[ ]
		Finance	[ ]
		Supply Chain	[ ]
		Transport	[ ]
		Technical Services	[ ]
		Security	[ ]
		Information and Communications Technology	[ ]
		Safety Health & Environment	[ ]
		Customer Service	[ ]
		Regional Management	[ ]
		Human Resource and Administration	[ ]

PART B: END USER SKILLS MATRIX

The following are items in relation to the End User Skills Matrix. In a scale of 1-5; where
1=Strongly Disagree (SD)
2=Disagree (D)
3= Uncertain (U)
4=Agree (A)
5= Strongly Agree (SA)
Please tick (√) where appropriate, the level that best explains your situation.

	The following End User Skills Matrix have been instrumental in adoption of new technologies	**SD 1**	**D 2**	**U 3**	**A 4**	**SA 5**
5)	Technical Skills					
6)	Problem Solving Skills					
7)	Proficiency in internet usage					
8)	Basic Computer Trouble Shooting Skills					
9)	Ability to use self-help menus on a platform					

PART C: END USER DEMOGRAPHIC CHARACTERISTICS

The following are items in relation to the end user demographic characteristics In a scale of 1-5; where
1=Strongly Disagree (SD)
2=Disagree (D)
3= Uncertain (U)
4=Agree (A)
5= Strongly Agree (SA)
Please tick (√) where appropriate, the level that best explains your situation.

	The following end user demographic characteristics have been instrumental in adoption of new technologies	**SD 1**	**D 2**	**U 3**	**A 4**	**SA 5**
10)	Age					
11)	Education					
12)	Gender					
13)	Job Role					
14)	Experience in years					

PART D: END USER ATTITUDE

The following are items in relation to the end user attitude. In a scale of 1-5; where
1=Strongly Disagree (SD)
2=Disagree (D)
3= Uncertain (U)
4=Agree (A)
5= Strongly Agree (SA)

Please tick (√) where appropriate, the level that best explains your situation.

	The following end user demographic characteristics have been instrumental in adoption of new technologies	**SD 1**	**D 2**	**U 3**	**A 4**	**SA 5**
15)	Most new technologies are useful in generic work functions at KPLC e.g. leave application, training etc.					
16)	Most new technologies are useful in specific line of work at KPLC					
17)	I find most new technologies easy to use					
18)	Most new technologies preserve historically held data in my line of work					
19)	I am receptive to changes in technology advances					
20)	I consider new technologies necessary for work functions at KPLC					

PART E: WORK FLOW MANAGEMENT

The following are items in relation to work flow management. In a scale of 1-5; where
1=Strongly Disagree (SD)
2=Disagree (D)
3= Uncertain (U)
4=Agree (A)
5= Strongly Agree (SA)

Please tick (√) where appropriate, the level that best explains your situation.

	The following workflow management metrics have been instrumental in adoption of new technologies	**SD 1**	**D 2**	**U 3**	**A 4**	**SA 5**
21)	Cross functional competencies					
22)	Peer's Competencies					
23)	Support System					
24)	Policies					
25)	Management					

PART F: ADOPTION LEVELS OF NEW TECHNOLOGY

The following are items in relation to the adoption levels of new technology in a scale of 1-5; where
1=Strongly Disagree (SD)
2=Disagree (D)
3= Uncertain (U)
4=Agree (A)
5= Strongly Agree (SA)

Please tick (√) where appropriate, the level that best explains your situation.

	The adoption levels of new technology;	**SD 1**	**D 2**	**U 3**	**A 4**	**SA 5**
26)	New users of technology					
27)	Time taken to use new technology					
28)	Correct usage of new technology					
29)	Gaining of desired new technology objectives					
30)	Frequency of new technology usage					

APPENDIX G
F RATIO TABLE AT 0.05 SIGNIFICANCE LEVEL

Table of critical values for the F distribution (for use with ANOVA):

How to use this table:

There are two tables here. The first one gives critical values of F at the p = 0.05 level of significance. The second table gives critical values of F at the p = 0.01 level of significance.
1. Obtain your F-ratio. This has (x,y) degrees of freedom associated with it.
2. Go along x columns, and down y rows. The point of intersection is your critical F-ratio.
3. If your obtained value of F is equal to or larger than this critical F-value, then your result is significant at that level of probability.
An example: I obtain an F ratio of 3.96 with (2, 24) degrees of freedom.
I go along 2 columns and down 24 rows. The critical value of F is 3.40. My obtained F-ratio is larger than this, and so I conclude that my obtained F-ratio is likely to occur by chance with a p<.(

Critical values of F for the 0.05 significance level:

	1	2	3	4	5	6	7	8	9	10
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.39	19.40
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14
10	4.97	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98
11	4.84	3.98	3.59	3.36	3.20	3.10	3.01	2.95	2.90	2.85
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49
17	4.45	3.59	3.20	2.97	2.81	2.70	2.61	2.55	2.49	2.45
18	4.41	3.56	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35
21	4.33	3.47	3.07	2.84	2.69	2.57	2.49	2.42	2.37	2.32
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.38	2.32	2.28
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.26
25	4.24	3.39	2.99	2.76	2.60	2.49	2.41	2.34	2.28	2.24
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.17
31	4.16	3.31	2.91	2.68	2.52	2.41	2.32	2.26	2.20	2.15
32	4.15	3.30	2.90	2.67	2.51	2.40	2.31	2.24	2.19	2.14
33	4.14	3.29	2.89	2.66	2.50	2.39	2.30	2.24	2.18	2.13
34	4.13	3.28	2.88	2.65	2.49	2.38	2.29	2.23	2.17	2.12
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11

36	4.11	3.26	2.87	2.63	2.48	2.36	2.28	2.21	2.15	2.11
37	4.11	3.25	2.86	2.63	2.47	2.36	2.27	2.20	2.15	2.10
38	4.10	3.25	2.85	2.62	2.46	2.35	2.26	2.19	2.14	2.09
39	4.09	3.24	2.85	2.61	2.46	2.34	2.26	2.19	2.13	2.08
40	4.09	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08
41	4.08	3.23	2.83	2.60	2.44	2.33	2.24	2.17	2.12	2.07
42	4.07	3.22	2.83	2.59	2.44	2.32	2.24	2.17	2.11	2.07
43	4.07	3.21	2.82	2.59	2.43	2.32	2.23	2.16	2.11	2.06
44	4.06	3.21	2.82	2.58	2.43	2.31	2.23	2.16	2.10	2.05
45	4.06	3.20	2.81	2.58	2.42	2.31	2.22	2.15	2.10	2.05
46	4.05	3.20	2.81	2.57	2.42	2.30	2.22	2.15	2.09	2.04
47	4.05	3.20	2.80	2.57	2.41	2.30	2.21	2.14	2.09	2.04
48	4.04	3.19	2.80	2.57	2.41	2.30	2.21	2.14	2.08	2.04
49	4.04	3.19	2.79	2.56	2.40	2.29	2.20	2.13	2.08	2.03
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03
51	4.03	3.18	2.79	2.55	2.40	2.28	2.20	2.13	2.07	2.02
52	4.03	3.18	2.78	2.55	2.39	2.28	2.19	2.12	2.07	2.02
53	4.02	3.17	2.78	2.55	2.39	2.28	2.19	2.12	2.06	2.02
54	4.02	3.17	2.78	2.54	2.39	2.27	2.19	2.12	2.06	2.01
55	4.02	3.17	2.77	2.54	2.38	2.27	2.18	2.11	2.06	2.01
56	4.01	3.16	2.77	2.54	2.38	2.27	2.18	2.11	2.05	2.01
57	4.01	3.16	2.77	2.53	2.38	2.26	2.18	2.11	2.05	2.00
58	4.01	3.16	2.76	2.53	2.37	2.26	2.17	2.10	2.05	2.00
59	4.00	3.15	2.76	2.53	2.37	2.26	2.17	2.10	2.04	2.00
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99
61	4.00	3.15	2.76	2.52	2.37	2.25	2.16	2.09	2.04	1.99
62	4.00	3.15	2.75	2.52	2.36	2.25	2.16	2.09	2.04	1.99
63	3.99	3.14	2.75	2.52	2.36	2.25	2.16	2.09	2.03	1.99
64	3.99	3.14	2.75	2.52	2.36	2.24	2.16	2.09	2.03	1.98
65	3.99	3.14	2.75	2.51	2.36	2.24	2.15	2.08	2.03	1.98
66	3.99	3.14	2.74	2.51	2.35	2.24	2.15	2.08	2.03	1.98
67	3.98	3.13	2.74	2.51	2.35	2.24	2.15	2.08	2.02	1.98
68	3.98	3.13	2.74	2.51	2.35	2.24	2.15	2.08	2.02	1.97
69	3.98	3.13	2.74	2.51	2.35	2.23	2.15	2.08	2.02	1.97
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97
71	3.98	3.13	2.73	2.50	2.34	2.23	2.14	2.07	2.02	1.97
72	3.97	3.12	2.73	2.50	2.34	2.23	2.14	2.07	2.01	1.97
73	3.97	3.12	2.73	2.50	2.34	2.23	2.14	2.07	2.01	1.96
74	3.97	3.12	2.73	2.50	2.34	2.22	2.14	2.07	2.01	1.96
75	3.97	3.12	2.73	2.49	2.34	2.22	2.13	2.06	2.01	1.96
76	3.97	3.12	2.73	2.49	2.34	2.22	2.13	2.06	2.01	1.96
77	3.97	3.12	2.72	2.49	2.33	2.22	2.13	2.06	2.00	1.96
78	3.96	3.11	2.72	2.49	2.33	2.22	2.13	2.06	2.00	1.95
79	3.96	3.11	2.72	2.49	2.33	2.22	2.13	2.06	2.00	1.95
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95
81	3.96	3.11	2.72	2.48	2.33	2.21	2.13	2.06	2.00	1.95
82	3.96	3.11	2.72	2.48	2.33	2.21	2.12	2.05	2.00	1.95
83	3.96	3.11	2.72	2.48	2.32	2.21	2.12	2.05	2.00	1.95
84	3.96	3.11	2.71	2.48	2.32	2.21	2.12	2.05	1.99	1.95
85	3.95	3.10	2.71	2.48	2.32	2.21	2.12	2.05	1.99	1.94

86	3.95	3.10	2.71	2.48	2.32	2.21	2.12	2.05	1.99	1.94
87	3.95	3.10	2.71	2.48	2.32	2.21	2.12	2.05	1.99	1.94
88	3.95	3.10	2.71	2.48	2.32	2.20	2.12	2.05	1.99	1.94
89	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94
90	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94
91	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.98	1.94
92	3.95	3.10	2.70	2.47	2.31	2.20	2.11	2.04	1.98	1.94
93	3.94	3.09	2.70	2.47	2.31	2.20	2.11	2.04	1.98	1.93
94	3.94	3.09	2.70	2.47	2.31	2.20	2.11	2.04	1.98	1.93
95	3.94	3.09	2.70	2.47	2.31	2.20	2.11	2.04	1.98	1.93
96	3.94	3.09	2.70	2.47	2.31	2.20	2.11	2.04	1.98	1.93
97	3.94	3.09	2.70	2.47	2.31	2.19	2.11	2.04	1.98	1.93
98	3.94	3.09	2.70	2.47	2.31	2.19	2.10	2.03	1.98	1.93
99	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.98	1.93
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.98	1.93