

**INSTITUTIONAL FACTORS INFLUENCING INNOVATION OF TECHNOLOGICAL
PRODUCTS AND PROCESSES: A CASE OF FIRMS IN THE
TELECOMMUNICATIONS SECTOR IN KENYA**

WILLIAM OMONDI OUSO

**A Research report Submitted in Partial Fulfilment of the Requirements for the Award of
the Degree of Master of Arts in Project Planning and Management, University of Nairobi.**

2018

DECLARATION

This research report is my own work and has not been copied from any other work.

Signed Date

WILLIAM OMONDI OUSO

L50/71441/2014

This research report has been submitted for approval by university supervisor.

Signed Date

DR. OMONDI BOWA

DEPARTMENT OF OPEN LEARNING

UNIVERSITY OF NAIROBI

DEDICATION

This research project is dedicated to my parents Mr. Absalom Ouso Sunga and Mrs. Roselyn Ayoo Okuku who impressed upon me the importance of education and sacrificed their needs to fund my education.

ACKNOWLEDGEMENT

This research project would have not been possible without the support, help, encouragement and cooperation I received from different quarters.

First and foremost I thank the Almighty God for the breath of life without which I would not accomplish anything.

Secondly, I would like to appreciate my supervisor Dr. Omondi Bowa, who took his time to review my work and provided invaluable guidance and feedback. I would also like to thank the University of Nairobi for the opportunity to study and for availing various resources that supported my research project. Special thanks to the whole teaching and support fraternity of the department of extra mural studies for making it possible for me to gain so much knowledge.

I thank my dear wife Lencer Amondi, for her encouragement and support throughout the course of this research project.

TABLE OF CONTENT

	Page
DECLARATION	i
DEDICATION	ii
TABLE OF CONTENT	iv
LIST OF TABLES.....	viii
ABSTRACT.....	xi
CHAPTER ONE	1
1.1 Background of the Study.....	1
1.2 Statement of the Problem	3
1.3 Purpose of the Study.....	4
1.4 Objectives of the Study.....	4
1.5 Research Questions	4
1.6 Hypotheses guiding the study.....	5
1.7 Assumptions of the Study	5
1.8 Delimitations of the study.....	6
1.9 Limitations of the study	6
1.10 Definition of significant terms used in the study.....	6
1.11 Organization of the study	8
CHAPTER TWO	9
2.1 Introduction	9
2.2 Innovation of Technological Products and Processes.....	9
2.3 Institutional Structure and innovation of technological products and processes.....	9
2.3 Employee Characteristics and innovation of technological products and processes.....	10
2.4 Institutional Culture and innovation of technological products and processes.....	10
2.5 Financial Resources and innovation of technological products and processes.....	11
2.6 Knowledge Management and innovation of technological products and processes.....	11
2.7 Leadership Style and innovation of technological products and processes	12
2.8 Theoretical Framework	12
2.8.1 Upper Echelon Theory	12

2.8.2 Dynamic Capability Theory	13
2.8.3 Organizational Process Theory	14
2.9 Conceptual Framework.....	14
2.10 Research Gaps.....	17
2.11 Summary	17
CHAPTER THREE	18
3.1 Introduction	18
3.2 Research paradigm	18
3.2.1 Research Design	18
3.3 Target Population.....	19
3.4 Size and Sampling Procedure.....	20
3.4.1 Sample Size	20
3.4.2 Sapling Procedure	22
3.5 Research Instruments	22
3.5.1 Pilot Testing.....	23
3.5.2 Validity of Instruments.....	23
3.6 Data Collection Procedure	24
3.7 Data Analysis Techniques.....	24
3.8 Ethical Consideration	24
CHAPTER FOUR	31
4.1 Introduction	31
4.2 Response Rate.....	31
4.3 Number of employees	31
4.4 Firm’s Years in Operation.....	32
4.5 Organizational Structure	33
4.5.1 Statements on Organizational structure.....	33
4.5.2 Decision Making Process.....	34
4.5.3 Degree of Control on Work.....	35
4.6 Employee Characteristics.....	36
4.6.1 Statements on Employee Characteristics	36
4.6.2 Training and Qualifications	37

4.6.3 Rewards and Incentives	38
4.7 Financial Resources	38
4.7.1 Statements on Financial Resources	39
4.7.2 Organization Operating Budget	39
4.8 Knowledge Management	40
4.8.1 Statements on Knowledge Management	40
4.8.2 Seeking and Use of Customer Feedback	41
4.8.3 Application and Use of Knowledge Repositories	42
4.8.4 Strength of Alliance	43
4.9 Leadership Style	44
4.9.1 Statements on Leadership Style	44
4.9.2 Predominant Leadership in terms of Autocracy and Consultation	45
4.9.3 Predominant Leadership in terms of Ideas	46
4.10 Innovation	47
4.10.1 Number of New Goods Introduced to the Market	48
4.10.2 Number of Significantly Improved Goods Introduced to the Market	49
4.10.3 Number of New Services Introduced to the Market	49
4.10.4 Number of Significantly Improved Services Introduced to the Market	50
4.10.5 Number of New Production Methods Introduced to the Market	51
4.10.6 Number of Significantly Improved Production Methods Introduced to the Market	52
4.10.7 Number of New Delivery Methods Introduced to the Market	53
4.10.8 Number of Significantly Improved Delivery Methods Introduced to the Market	54
4.10.9 Percentage Sales Turnover From New Products and Services 2015-2016	55
4.10.10 Percentage Sales Turnover From Significantly Improved Products or Processes 2015-2016	56
4.10.11 Innovations Undertaken in 2015-2016	57
4.11 Category of Innovations	59
4.11.1 Innovations New to the Firm	59
4.11.1 Innovations New to Kenya	60
4.11.3 Innovations New to Africa and the World	60
4.12 Inferential Statistics	61
4.12.1 Hypothesi Testing	61

4.13 Discussion of Findings	67
CHAPTER FIVE	69
5.1 Introduction	69
5.2 Summary of Findings.....	69
5.3 Discussion of Findings	70
5.4 Conclusion	72
5.5 Recommendations	73
5.6 Suggestions for Further Research	74
REFERENCES	75
APPENDICES	81
Appendix 1: Consent Form.....	81
Appendix 2: Questionnaire for the head of innovation department.....	82
Appendix 3: Project Time Frame.....	90

LIST OF TABLES

Table 3.1 Categories of Network facilities Providers registered by CAK.....	19
Table 3.2 Population of the Study.....	19
Table 3.3 Number of firms sampled in each category	20
Table 3.4 Study sample size.....	21
Table 3.5 Operationalization of variables	25
Table 4.1: Response Rate	31
Table 4.2: Statements on Organizational structure	34
Table 4.3: Decision Making Process.....	34
Table 4.4: Degree of Control on Work.....	35
Table 4.5: Number of New Production Methods Introduced to the Market	52
Table 4.6: Number of Significantly Improved Production Methods Introduced to the Market.....	53
Table 4.7: Number of New Delivery Methods Introduced to the Market.....	54
Table 4.8: Number of Significantly Improved Delivery Methods Introduced to the Market	55
Table 4.9: Percentage Sales Turnover from New Products and Services 2015-2016.....	56
Table 4.10: Percentage Sales Turnover from Significantly Improved Products or Processes 2015-2016..	57
Table 4.11: Innovations Undertaken in 2015-2016.....	58
Table 4.12: Innovations New to the Firm	59
Table 4.13: Innovations New to Kenya	60
Table 4.14: Innovations New to Africa and the World.....	61

LIST OF FIGURES

Figure 1: Number of employees	32
Figure 2: Firm's Years in Operation	33

LIST OF ABBREVIATIONS AND ACRONYMS

ULF	Unified Licensing Framework.
CAK	Communications Authority of Kenya
SPSS	Statistical Package for Social Sciences
MDGs	Millennium Development Goals
GII	Global Innovation Index
ST&I	Science, Technology and innovation
AU	African Union
KENIA	Kenya National Innovation Authority
BRIC	Brazil, Russia, India and China
MoHEST	Ministry of Higher Education, Science and Technology
KNBS	Kenya National Bureau of Statistics
OECD	Organization for Economic Co-operation and Development
GDP	Gross Domestic Product
TPP	Technological Product and Process

ABSTRACT

The main purpose of the study was to determine the influence of various institutional factors on innovation of technological products and processes in Kenya's telecommunications sector. The study was guided by five research objectives: to assess how institutional structure affects innovation of technological products and processes, to analyse how employees' characteristic impacts innovation of technological products and processes, to examine the influence of financial resources on innovation of technological products and processes, to determine how knowledge management influences innovation of technological products and processes and to establish the influence of leadership style on innovation of technological products and processes, in Kenya's telecommunications sector. The study used a cross-sectional research design to collect data from firms sampled from a list of telecommunications network facilities providers registered in the Communications Authority of Kenya's register of Unified Licensing Framework Licensees. A sample of 35 firms was selected for the study. A questionnaire based on reviewed literature was used for the research and an interview schedule for triangulation purpose. The data is presented in form of graphs, tables and texts. ANOVA was used to test for significance of the influence of the independent variables on the dependent variable at $\alpha=0.05$. The study findings revealed that organizational structure, employees' characteristics, financial resources, knowledge management and leadership style had a statistically significant impact on innovation of technological products and processes in the case of firms in the telecommunication sector in Kenya (p-value=0.001, 0.003, 0.004, 0.002 and 0.004 respectively) . Based on the results of the study telecommunications firms may develop better strategies to improve their innovation capabilities. The study recommendations are that the firms should: Firstly, create institutional structures that not only encourage ideas from everyone within the firms but also decentralize decision making and encourages consultation across the firm. Secondly, continue the use performance rewards and incentives and empowering employees through relevant training. Thirdly, allocate slack financial resources towards innovation. Fourthly, increase the use of knowledge repositories and create strong linkages with other institutions and continue seeking customer feedback on the use of firm's products and processes. Fifthly, Encourage managers to take greater risks and become more aggressive and bold in exploiting new opportunities. At the national level the results may be applied to shape innovation policies.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In 2015 the United Nations adopted a set of goals, termed sustainable development goals to replace the MDGs with the aim to eradicate poverty, protect the planet and ensure that all are prosperous as part of the development agenda. One of the goals recognizes the importance innovation will play in ending poverty and therefore, fostering innovation is part of the 9th sustainable development goal. It targets all countries but in particular developing nations such as Kenya with an aim to enhance research in science and increase technological capabilities of industrial sectors. Kenya in its own development blue print, vision 2030, launched in 2008 recognized the need to track innovation activities to achieve sustainable development. In the Global innovation Index report of 2015, the number of sub-Saharan African innovation achievers expanded more than any other groups over recent years with Kenya consistently reaching innovation achiever status over the period 2011 to 2013. Indeed according to AU invest in Africa 2016 publication: Africa, a continent that relied on technological advances from developed economies, is increasingly innovating itself.

In 2012 the government of Kenya came up with a Science , Technology and Innovation policy to provide a platform that leverages ST&I in the transformation of the economy through identified priority areas , create an efficient and effective system of innovation in Kenya, operationalize the triple helix and make research outputs commercially viable through the Kenya National Innovation agency, mobilize resources from the government , private sector and other sources to support the whole ST&I value chain. This policy framework will ensure that all sectors of the economy apply innovation as Kenya transitions to a knowledge driven economy. Kenya is home to several innovation hubs such as iHub, NAI Lab and m-Lab that cater for technology community to collaborate and provide facilities and opportunities for innovation. To fully exploit the potential in the sector the government continues to ease access to startup funds to support investments in mobile application development. The government is also in the process of establishing Konza technology city to be an innovation hub to create an environment

conducive for innovators. The efforts put by the government, private sector and civil society can be seen to bear fruit as far as innovation is concerned. The World economic forum's Global competitive index (2015) ranked Kenya very close to the BRICs nations in terms of innovation but lagging far behind in terms of overall ranking.

Telecommunications is one of the priority areas because of its ability to address social and economic challenges in Kenya. Telecommunication has had unprecedented growth in the last few years in Kenya with the mobile penetration reaching over 80%. According to the Communications Authority of Kenya sector statistics report (Quarter 1, 2015/16); the broadband subscriptions have grown 115% from 2.95 million subscriptions to 6.35 million subscriptions over the period between September 2014 and September 2015. This tremendous growth is expected to continue in the coming years as mobile devices become more affordable and advanced.

Telecommunications sector in Kenya has contributed world class innovations that have been applied in Kenya successfully to solve socio economic problems and also have been replicated in many parts of the world. In 2007, Safaricom Kenya limited launched M-PESA mobile money transfer service that has seen tremendous growth. A study recently conducted by the audit firm KPMG, reported that M-PESA made an estimate value of 133.8 billion Kenya Shillings in the 2014/2015 fiscal year in the Kenyan Economy. Another award winning innovation from Kenya that has had tremendous application in the world is the Ushahidi platform that according to Wikipedia enables observers to hand in reports from which simultaneous creation of temporal and geospatial archive of events can be done, via mobile devices or internet. The challenge still exists on how Kenya's telecoms sector players can replicate the successes of these innovation examples to generate more world class innovations as Kenya transitions to innovation based economy from a factor based economy. Accordingly, this report is for the study of the influence of various institutional factors on innovation of technological products and processes in the telecommunications sector in Kenya. Knowing which factors or a combination of factors that have the most impact can shape further policy interventions for increased growth and development of successful innovations.

1.2 Statement of the Problem

Tucker postulates that given the torrid pace of change, the rapid commoditization of products and services and even business models, organizations that rely on today's ideas, today's product and today's assumptions are clearly vulnerable (Tucker,2002). According to Morris, Ma and Wu the market is becoming brutally competitive. It is much like a war and to survive, organizations must be proficient in innovation. They further say that given the accelerating rate of change, there is really no other option but innovation (Morris, Ma, & Wu, 2014). Therefore, the importance of Innovation to the transformation of the Kenyan economy into a knowledge based economy cannot be over emphasized. Despite of this, there is little research into factors that influence innovation in Kenya. In fact, Kenya commissioned its first and only National Innovation Survey in 2012 undertaken by the Ministry of Higher Education, Science and Technology in collaboration with Kenya National Bureau of Statistics covering the period 2008-2011.

The Kenya National Innovation Survey Report (2012), 34% of the innovative enterprises indicated they had abandoned innovation projects at the conceptual stage, while 31% indicated that they had stopped innovation projects that were in progress and 50% reported that their innovation activities were seriously delayed. These statistics show that innovation is difficult to execute. In addition, the ICT sector for which telecommunications belongs was found to lag behind other major sectors in percentage of firms with ongoing innovation. The manufacturing sector took the lead with 32.5% of firms with ongoing activities for process and product innovations at the end of 2011, next was education (11.7%), professional services (10.4%), financial (9.1%) and ICT which includes telecommunications sector, only had 5.2% of firms with ongoing innovation activities.

Telecommunications is one of the target priority areas by the government as far as innovation is concerned due to its ability to address socio-economic challenges in Kenya, yet it lags behind the other sectors in innovation. This calls for a deeper look into the sector, yet recent and specific research data on the state of innovation in the telecommunications sector and related influencing factors is scarce. Such research backed data is important for the design of interventions that can

improve innovation outcomes in the telecommunications sector. The study aimed to partly address this by collecting data that was analyzed to establish the influence of institutional factors on innovation of technological products and processes in the sector.

1.3 Purpose of the Study

The purpose of the study was to investigate how various institutional factors influence innovation of technological products and processes in telecommunications firms in Kenya.

1.4 Objectives of the Study

The study was guided by the following objectives:

- i. To assess how institutional structure influences innovation of technological products and Processes in the telecommunications sector in Kenya.
- ii. To analyse how employees' characteristics influence innovation of technological products and Processes in the telecommunications sector in Kenya.
- iii. To examine the influence of financial resources on innovation of technological products and Processes in the telecommunications sector in Kenya.
- iv. To determine how knowledge management influences innovation of technological products and Processes in the telecommunications sector in Kenya.
- v. To establish the influence of leadership style on innovation of technological products and Processes in the telecommunications sector in Kenya.

1.5 Research Questions

The study sought to answer the following questions:

- i. How does institutional structure influence innovation of technological products and Processes in the telecommunications sector in Kenya?
- ii. How does employees' characteristic influence innovation of technological products and Processes in the telecommunications sector in Kenya?
- iii. What is the influence of financial resources on innovation of technological products and Processes in the telecommunications sector in Kenya?
- iv. How does knowledge management influence innovation of technological products and Processes in the telecommunications sector in Kenya?

- v. What is the influence of leadership style on innovation of technological products and Processes in the telecommunications sector in Kenya?

1.6 Hypotheses guiding the study

The study was guided by the following hypotheses:

H₁ 1: Organizational structure has a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya.

H₁ 2: Employees' characteristics have a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya.

H₁ 3: Financial resource has a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya.

H₁ 4: Knowledge management has a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya.

H₁ 5: Leadership style has a significant influence innovation of technological products and Processes in the telecommunications sector in Kenya.

1.7 Assumptions of the Study

It was assumed that the respondents will agree to the survey and also cooperate during the survey to have a good response rate. In addition, it was assumed the respondents will be heads of innovation departments and Chief Technical Officers with a broad knowledge of their firms including its innovation aspects. Lastly it was assumed that the independent variables, namely: organizational structure, employees' characteristics, financial resources, knowledge management and leadership style have an influence on the dependent variable, innovation of technological products and processes.

1.8 Delimitations of the study

The study involved innovative firms with innovations department in the telecommunications sector in Kenya. The researcher has good knowledge of the sector as a telecommunications practitioner in Kenya. The study was also delimited by considering innovation data for the two year period from 2015 to 2016 since innovation processes occur over time, and so the firms must have been in operation for a minimum of three years.

1.9 Limitations of the study

For the study the challenges were constraints of time on the part of the respondents given the nature of their work and the availability of information on innovation. Innovation is a complex diversified activity with many interactions and many components, so all the information may not be obtainable from one person. To overcome these challenges the questionnaire was kept as short as possible and was self administered by heads of innovation departments and the interview schedule to a senior manager in the firm with broad knowledge of the firm.

1.10 Definition of significant terms used in the study

Innovation of Technological product and Process:

Innovation has become a common buzz word in day to day communication and therefore presents a challenge to empirical research. In the study I adopt the definition of innovation as the implementation of a new process or product and any significant improvement on existing process or product. Where, technological product includes goods and services while Technological Processes are defined as ways of organizing work or work strategies. In telecommunications sector for example introduction of LTE is a process innovation and introducing 4G data service is considered a product innovation.

Innovation Factor:

It is any dynamic factor that influences a firm and directly impacts on its ability to innovate.

Innovative Firm:

A firm that had introduced a significantly improved or new product or service in the period under consideration.

Financial Resources:

These were monetary inputs that the institution was willing and able to expend for innovation activities bearing the risk inherent in innovation activities. These financial resources are those that provided the firm with additional capability to take advantage of innovation opportunities.

Organizational culture:

These are the norms, values, assumptions and beliefs embraced by participants in the firm as far as innovation was concerned such as openness to change, risk taking and collaboration.

Organizational Structure:

How work was organized and the interaction between the various departments internally and also with external parties such as clients and suppliers to support innovation. It involved the degree of centralization or formality within the firm.

Employees' characteristics:

The skills and education, personalities, training and motivation applied in innovation process by the creative workforce composed of non-managements staff.

Knowledge Management:

The acquisition of knowledge from internal and external sources, distribution and dissemination amongst institutional members and in its interpretation and application to influence innovation by use of knowledge repositories.

Leadership Style:

How managers influenced the attitudes and behaviours within the institution to achieve innovation goals, including level of aggressiveness in exploiting potential opportunities and consultation with other employees for innovation.

1.11 Organization of the study

The study was organized into five chapters with the first chapter covering the introduction including the study background, purpose, objectives, hypotheses, assumptions, delimitations, limitations and the definition of significant terms. The second chapter provides a literature reviews that includes theoretical and conceptual frameworks that supported the study. The third chapter focuses on the research methodology including the research paradigm, design, the target population, sampling procedure, data collection and analysis techniques. The fourth chapter provides analysis, presentation and interpretation of the collected data and lastly the fifth chapter presents a summary of findings, discussions, conclusions and recommendations from the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This literature review discusses previous studies in areas related to the study. The study within this review of literature was guided by the objectives: To assess how institutional structure influences innovation of technological products and Processes in the telecommunications sector in Kenya. To analyse how employees' characteristics influence innovation of technological products and Processes in the telecommunications sector in Kenya. To examine the influence of financial resources on innovation of technological products and Processes in the telecommunications sector in Kenya. To determine how knowledge management influences innovation of technological products and Processes in the telecommunications sector in Kenya. To establish the influence of leadership style on innovation of technological products and Processes in the telecommunications sector in Kenya. By exploring the existing literature, a significant contribution was made to the study. The literature review begins by considering various aspects of innovation followed by a focus on the Factors influencing innovation and finally covers the theoretical framework for the study.

2.2 Innovation of Technological Products and Processes

The word innovation has become common in every day communication and hence for empirical research it is helpful to define it. Various experts have defined it differently but most agree that innovation has some aspects of newness. The Oslo manual defines innovation as the implementation of a new or significantly improved product or process (OECD, 2005). For the purposes of this study, the definition of innovation of technological product and processes was the implementation of a new process or product and any significant improvement on existing process or product. Where, technological product included goods and services while Technological Processes are defined as ways of organizing work or work strategies in telecommunications sector.

2.3 Institutional Structure and innovation of technological products and processes

Many literatures agree that institutional characteristics including, organizational structure have an impact on innovation. Jensen opines that the most successful institutions when it comes to product

and process innovation are those whose institutional structures foster the development of knowledge through formal research and development processes and the development of knowledge based on experience, practice, and interaction between employees, clients, and suppliers (Jensen and Beckmann, 2007). Classical organizations with strict structures, centralization and high levels of formality are not well placed in environments conducive for innovations that are uncertain, complex and turbulent. American researchers Lawrence and Lorsch take the idea of institutional structure further by stating that different kinds of overall structure are needed based on the environmental conditions but also a greater departmental differentiation is needed than in predictable environments (King and Anderson, 2002).

2.3 Employee Characteristics and innovation of technological products and processes

Employees are an organization most important asset, without employees work cannot be done and the creativity of employees is the basis on which innovation occurs. Cebon, Newton and Noble (1999) states that It is only through creating and sustaining a work force that is creative can the institution succeed in maintaining the required potential to solve difficult problems and situations (i.e. innovate) that cannot be overcome through investment in adoption of technology or research and development financing only. Sarmiento (2011) opines that the more knowledgeable employees are, the more they are creatively participative and the higher their level of idea generation. Besides knowledge and expertise, the motivation of employees to bring forth the ideas for implementation is also critical to innovation (Sarmiento, 2011; Parker, 2000; Dorenbosch, Engen and Verhagen, 2005). Employees here are defined as non-management staff of the organization and the research considers the influence of their characteristics such as skills and education, training and their motivation level to innovate.

2.4 Institutional Culture and innovation of technological products and processes

Institutional culture is the norms, values, assumptions and beliefs embraced by participants (Nystrom, 1990). Common recommendations on cultures supporting innovation emerging from research based on positivist view in mainstream psychology include risk taking, tolerance to disagreements and debates, playfulness and openness to change (King and Anderson, 2002). An

innovation culture supports collaboration, ideas contribution and also knowledge sharing. The culture should encourage team work and have recognition and reward system. Another aspect of culture is how the organization views failure and hence risk.

2.5 Financial Resources and innovation of technological products and processes

Several literature support the notion that Organizational resources will impact on an organizations ability to innovate, such as Sisaye and Birnberg (2002) who argue that the level of an organization's resources can serve to support or constrain learning and innovations in organizations. They link resources as enablers to the extent to which an organization is willing and able to accept the benefits or risk associated with innovation. Resources include tangible and intangible (Sisaye and Birnberg, 2002) such as human, financial and physical resources. For this reason the study considered financial resources that the organization can deploy on innovation see also (Nohria and Gulati, 1994). Slack financial resources are the surplus between the financial resources a firm possesses and the minimum financial resources needed for its current business (Cohen, March, & Olsen, 1972). Slack financial resources enable institutions with additional 'productive service' to explore innovation opportunities that arise. Therefore, a firm that has slack financial resources has high chances to innovate.

2.6 Knowledge Management and innovation of technological products and processes

Under knowledge management the research considers the acquisition of knowledge from internal and external resources, distribution and dissemination amongst organizational members and in its interpretation and application to influence innovation. Tucker opines that firms that achieve growth from their innovation practices are companies that encourage ideas from everybody and everywhere (Tucker, 2008). The most successful companies when it comes to product and process innovation are those whose organizational structures foster the development of knowledge through formal research and development processes and the development of knowledge based on experience, practice, and interaction between employees, clients, and suppliers (Jensen and Beckmann, 2007). Leonard (2011) emphasizes that an institution aware of its knowledge assets can undertake innovation more quickly than its rivals since it has deep customer, scientific and technical knowledge.

2.7 Leadership Style and innovation of technological products and processes

In the context of this study, leadership style is the dominant attitudes and behaviors guiding the actions of the management team. It considers aspects such as employee motivation, collaboration and aggressiveness in exploiting new opportunities. Rastogi (2009) underscores the importance of leadership style by stating that an innovation-oriented firm requires a distinctive management style. Since failure is conceived as inherent in innovation, many authors like Lee (2000) and Tucker (2008) argue that high leadership support is important for the success of innovation. The leadership team can help create an environment in which calculated risk and possibility of failure is tolerated. The leadership team can encourage innovation by coming up with a set goals and metrics for innovation. The leadership team can create reward and recognition system for successfully implemented innovation and even those that did not make it to implementation stage. This can motivate in ideas generation and collaboration in entire organization (Rasheed, 2010). The leadership team in an institution also determines resource allocation and levels of risks the institution can bear by assigning resources towards innovation. They can also unlock innovation potential in employees (Rastogi, 2009).

2. 8 Theoretical Framework

There are various theoretical views on the determinants or factors that influence innovation. Among theoretical lenses include; Upper Echelon Theory, Dynamic Capabilities Theory and Process Theory.

2.8.1 Upper Echelon Theory

Hambrick and Mason (1984), the developers of the upper echelon theory, describe an institution as a reflection of its top leadership. The theory explains that top managers act under condition of bounded rationality and take decisions that are influenced by each members experience, personality and values. The theory thus postulates that institutional innovativeness is dependent on the top management team characteristics. Empirical studies based on Hambrick and Mason's (1984) theory has shown that indeed the top leadership team matters to institutional performance. For example, Bantel and Jackson (1989) found that top leadership team demographics are related to firm performance and innovation. Kimberly and Evanisko (1981) found that tenure and educational level of hospital administrators impacted significantly adoption of innovation. However, studies such as

one conducted by Young, Charns and Shortell (2001) found that top management characteristics were more important in earlier stages of the innovation process. This finding may help to explain why Kimberly and Evanisko (1981) found leader characteristics to explain less variance in adoption of technological innovation than institutional variables because they only considered adoption of innovation.

A study of institutional innovation outcomes conducted by Meyer and Goes (1988) highlights the need to look at the top management action in addition to management characteristics. One form of managerial action is the management strategy. This theory is relevant to the fifth objective which aims to find how leadership style influences TPP innovation in telecommunication sector in Kenya. Upper echelon theory has its inadequacy as it cannot sufficiently cover organizational level and process factors. Recent researches have supported the fact that innovation is not limited to top management. For example, Tucker (2002) has discovered that institutions that have achieved growth from their innovative practices are institutions that have gone beyond traditional sources of ideas and encouraged ideas from all their employees and everywhere in the institution.

2.8.2 Dynamic Capability Theory

Dynamic capability theory was pioneered by David Teece, and he defined dynamic capabilities as the skills processes, routines, organizational structure, and disciplines that enable firms to build, employ, and orchestrate intangible assets relevant to satisfying customer needs (Teece, 2011). According to (Eisenhardt and Tabrizi, 2001) this theory is concerned with institutional resources and capabilities as factors influencing innovation in firms. Dynamic capabilities have lent value to resource based value arguments as they transform what is essentially static into one that encompass competitive advantage in a changing context (Barney, 1991). This theory is relevant to first, second, third and fourth which considers institutional structure, employee characteristics, financial resources and knowledge assets respectively as factors influencing TPP innovation. Dynamic capability theory falls short of wholly incorporating how institutional processes transform inputs into outputs, which is the realm of the organizational process theory.

2.8.3 Organizational Process Theory

Organizational process theory is concerned with how institutional processes are applied to inputs to derive outputs. Typical process theory holds that similar inputs transformed by similar processes will lead to similar outcomes; that there are certain constant necessary conditions for the outcome to be reached (Tsoukas, 1989). With respect to innovation the main processes include initiation, portfolio management, development and implementations, project management and commercialization. This theory is relevant to the moderating variable of the study which considers institutional culture and strategy as having minimal impact on the relationship under study in the five objectives. Process theory also has got its weakness as it does not consider leadership of the institution and the various capabilities a firm needs to have in order to innovate.

2.9 Conceptual Framework

Based on the literature review and the foregoing theories of upper echelon theory, Dynamic capabilities theory and Process theory, the conceptual framework of the study was developed to propose how the independent variables: organizational structure, Employees' characteristics, financial resources, knowledge management and leadership style may influence the dependent variable innovation of technological product and processes in telecommunications firms in Kenya. The moderating variables are institutional culture and corporate strategy. Figure 1 illustrates the conceptual framework.

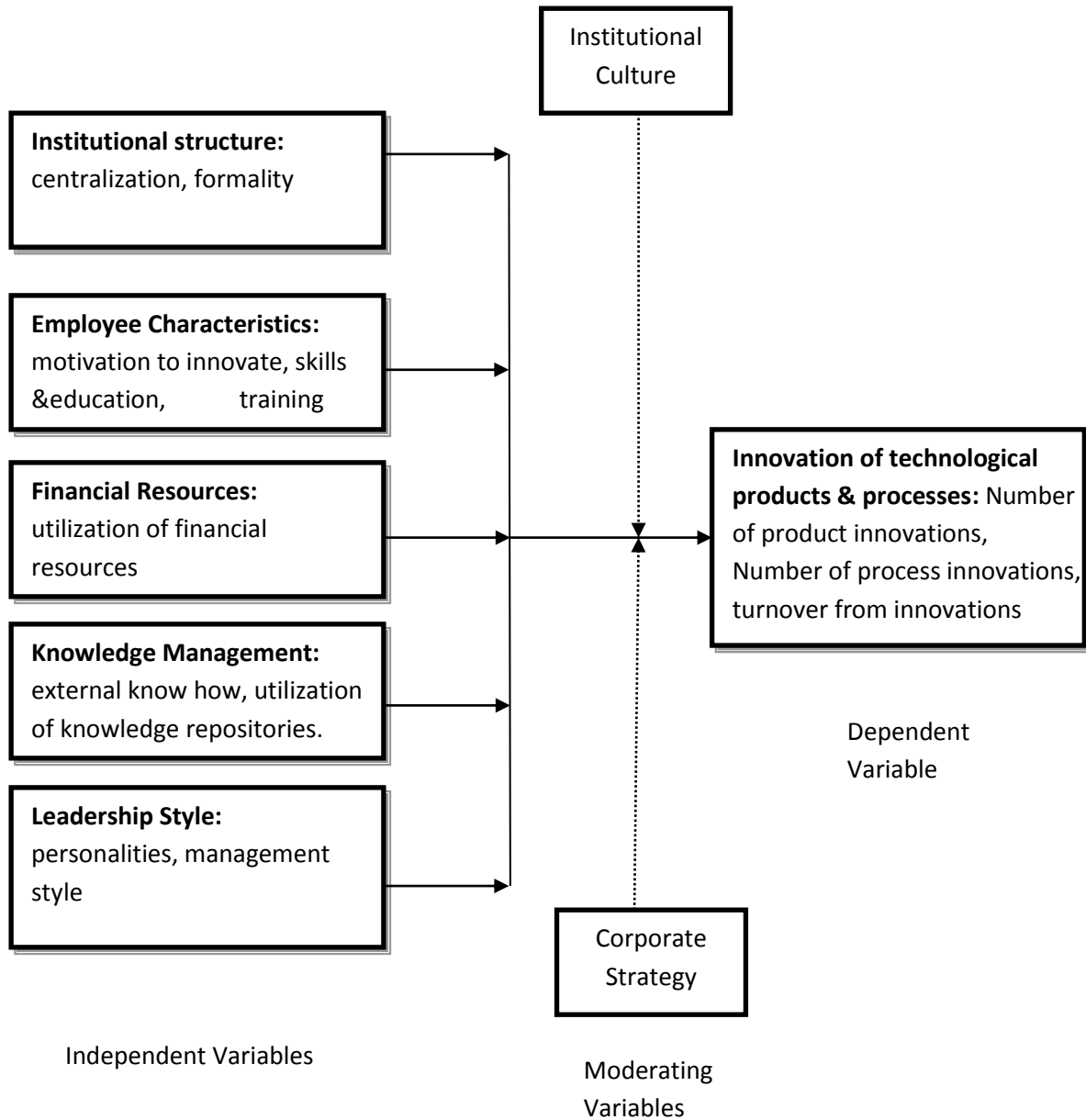


Figure 1. The Conceptual Framework.

The Conceptual framework suggests that there could be a significant relationship between innovation of technological product and processes and institutional structure in determining a firm’s innovation capability .The study considered institutional structure from the two aspects of centralization and levels of formality. Employees are the work force in an organization and are the ones who might come up with innovative ideas; therefore the framework considers employee characteristics such as motivation level and Level of education and skills as having a possible

positive impact on innovation within the firm. Motivation is a subjective matter and difficult to measure and so the study considered performance of the firm in the period under observation as a proxy to measure motivation of the employees, this is in agreement with Bargh (2001) that motivation can also be measured in terms of level of performance. Employee education was measured based on highest degree held by most employees. The framework also suggests that financial resources are enablers of innovation. The financial resources that can be utilised in innovation represent the surplus between the financial resources a firm possesses and the minimum financial resources needed for its current business (Cohen, March, & Olsen, 1972). These financial resources enable institutions with additional 'productive service' to explore innovation opportunities that arise. Therefore, an institution that has surplus financial resources has high chances to innovate. The study considered financial resources as measured by Firm's reserve operating budget as per Nohria and Gulati (1996) advice.

The research framework consider knowledge management as a likely factor to influence the firm's ability to innovate; knowledge management was considered from aspects such as using external alliances with other firms, the use of knowledge repositories within the firm and use of feedback. Lastly, leadership style will likely impact on innovation as top management commitment to innovation will ensure that there are strong leadership encouraging people to look for new ways of work. Leadership style considered the firm's leaders' aggressiveness in exploiting of new opportunities and their level of consultative management.

Firm's innovation of technological products and processes was the major dependent variable of the study. Scholars have come up with various approaches to measure innovation such as number of patents, percentage of sales from new products and also on general number of new products or processes Implemented. The number of new or significantly improved products and processes and turnover in the period were applied for this study due to ease of availability of such data. This is in line with findings that respondents to innovation researches have encountered few problems in identifying new or improved products or in providing information on the turnover of such products.

2.10 Research Gaps

Many of the literature reviewed identified the common factors shared by innovative firms and factors that can impact on the ability of firms to innovate. An observation from the review of previous studies was that little had been done to have an in depth understanding of the impact of the various factors on innovation capability in Africa. This is partially addressed by this research by analyzing the influence of the various institutional factors on innovation of technological products and processes in the telecommunications sector in Kenya. Such data was scarce from recent researches conducted in Kenya. The few researches done on innovation in Kenya had focused on the outcomes such as number of innovations and number of abandoned innovations without looking into the underlying factors leading to success or failure. By identifying the influence of the various factors on innovation of technological products and processes through research, the data can enable manipulation of the factors to achieve higher innovativeness within the sector.

2.11 Summary

The chapter has presented the literature review on factors influencing innovation in Firms. Different literatures were reviewed on influence of institutional structure, Employees characteristics, institutional culture, financial resources, knowledge management and management style and leadership influence on innovation. The chapter also presents the conceptual framework developed from the literature review and the Upper Echelon theory, Dynamic capabilities theory and process theory. The chapter concluded with research gaps that are partly addressed by the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section describes research design and methodology for the study. It outlines the research paradigm, research design, the population of the study and how the sample frame was obtained and the techniques and tools of data collection and analysis. Finally it presents the operationalization of the variables used in the study.

3.2 Research paradigm

Research paradigms are founded on varying philosophy and conception of reality (Cohen, Manion and Morrison, 2005). For the study a quantitative method was used. The quantitative methodology is based on the positivist paradigm. Positivism is the view that social research should adopt scientific method and that rigorous hypotheses testing by means of data that takes a quantitative measurement must be used (Teddlie and Tashakkori, 2009). Positivists believe that research was objective and free of the researcher's values in the way the research is conducted or the data interpreted.

3.2.1 Research Design

A research design provides a framework for the collection and analysis of data. A choice of research designs reflects decisions about the importance being assigned to a range of aspects of the research process (Bryman, 2012). The research was designed as a cross sectional study to determine the influence of various institutional factors on innovation of technological products and processes in the telecommunications sector in Kenya. According to Cooper and Schindler (2006), descriptive studies are concerned with descriptions of phenomena or characteristics associated with a subject population. These studies are also concerned with the investigation of relationships between different variables. The study applied descriptive and inferential design in examining the influence of the independent variables on the dependent variable without the manipulation of the variables. The study utilized a survey administered by structured questionnaire with a section on the firm's characteristics, innovation activity and innovation factors in five-point scales of Likert-type statements anchored on a range from strongly disagree to strongly agree. The questionnaire was

answered by heads of innovation departments who have an overall view of the institution’s innovation activities. An Interview schedule was used to get additional information from the chief technical officer for triangulation purposes.

3.3 Target Population

The population of the study was composed of heads of innovation departments and Chief Technical Officers (CTO) of the telecommunications network facilities providers listed in the Communications authority of Kenya register of Unified Licensing Framework Licensees. The list also contained contact details that were used to reach the selected sample frame for the survey. The study considered innovation at the level of the firms as a whole in line with the subject approach as defined by the Oslo manual (OECD, 2005). Therefore each firm was considered once is in line with advice from Som (1996) that the frame should be accurate, free from omissions and duplications, adequate and up-to-date, and units should be identified without ambiguity. The table 3.1 shows the network facilities providers by categories and table 3.2 summarize the population of the study grouped into various categories.

Table 3.1: Categories of Network facilities Providers registered by CAK

Category of network facilities providers	No of firms listed in Category
Network Facilities Provider Tier 1	4
Network Facilities Provider Tier 2	20
Network Facilities Provider Tier 3	15
TOTAL	39

Note. Source: CAK Register of ULF Licensees-June 2014.

Table 3.2: Population of the Study

Category of network facilities providers	Target population
Network Facilities Provider Tier 1	8
Network Facilities Provider Tier 2	40
Network Facilities Provider Tier 3	30
TOTAL	78

3.4 Size and Sampling Procedure

This section determines the size of the sample and sampling procedure applied in the study.

3.4.1 Sample Size

The study used the firm as the unit of analysis and the firms were sampled for data collection. Once the sampled firms had been selected, a questionnaire was administered to its head of innovation department and the chief technical officers. In estimating the sample size the formula provided by Black (2008) was used as below and a finite population correction factor applied to it to determine actual sample size.

Sample size for infinite population can be determined by the formula below:

$$n_0 = \frac{Z^2 p (1-p)}{E^2}$$

To determine the actual sample size, the finite population correction factor was applied as below:

$$n = \frac{n_0 N}{n_0 + (N-1)}$$

Where:

n_0 = Sample Size for infinite population.

N = Actual sample size after applying finite population correction factor

Z=Z score

P=population proportion

E=Error of Margin

N=Population.

The Z score value of 1.645 was used for a confidence level of 90% and P value of 0.5 was used to get the largest sample size. The error of margin was selected to be 0.5 to provide results that are within 0.05 of the true population proportion and firms were sampled from the 39 firms in the register of telecommunication facilities providers.

When these values are applied to the formula, a sample size of 35 firms was required leading to a sample frame of 70 respondents including the head of innovation department and the chief technical officer of each of the selected firms.

The table 3.3 shows the distribution of the sampled firms in each category.

Table: 3.3 Number of firms sampled in each category

Category	Population	Population proportion	Sample size
Network Facilities Provider Tier 1	4	10%	4
Network Facilities Provider Tier 2	20	51%	18
Network Facilities Provider Tier 2	15	39%	13
TOTAL	39	100%	35

Therefore the sample size for the study was as per table 3.4

Table: 3.4 Study sample size

Category	Population	Population proportion	Sample Size
Network Facilities Provider Tier 1	8	10%	8
Network Facilities Provider Tier 2	40	51%	36
Network Facilities Provider Tier 2	30	39%	26
TOTAL	78	100%	70

3.4.2 Sapling Procedure

The proportionate stratified random sampling techniques were used to select the sample frame. The stratification corresponded to the CAK classification of the telecommunications network facilities providers in the various categories. A simple random sample was used within each sub-population for data collection. The main advantage for choosing stratified random sampling was because it has the capacity to minimize sampling error (Black, 2008).

3.5 Research Instruments

The main instruments of data collection used were questionnaires and interview schedule.

Questionnaires:

Data collection was through an administered questionnaire. Technical terms were not be used in the structured questionnaire to avoid subjective misinterpretation. To achieve satisfactory response rate the questionnaire was kept as short as possible and questions and instructions clearly formulated (OECD, 2005). The questionnaire collected basic information about the institution and the views on innovation that were registered either on ratio or ordinal Likert's scale with short range of possible answers. The questionnaire was divided into four main sections with the first seeking background

information of the firm for the sake of categorization and comparison, the second section covers questions related to various innovation factors and section three covered the number of innovations of technological products and processes the firm has carried in the period under consideration. Close-ended questions were applied since they provided a standard set of questions for all respondents, as the information required was quantitative in nature.

Interview Schedule:

In this case data was collected by filling up the schedules on the basis of replies given by respondents (Kothari, 2004). A schedule with open and closed ended questions was used to get additional information from Chief Technical Officers (CTOs) for triangulation purposes. The interview schedules were administered by a trained assistant.

3.5.1 Pilot Testing

A pilot test was performed prior to the main study. The purpose of the pilot testing was to check the validity and reliability of the instruments. Any questions that proved to be difficult, inadequate in range of responses or that were ambiguous to respondents were to be revised to improve internal validity of the instruments. The pilot testing also helped determine best approach to access the respondents who by the nature of their work are very busy. The feedback on time taken to fill the questionnaires was also checked if appropriate for the main study.

3.5.2 Validity of Instruments

Validity of a test is a measure of how well a test measures what it is supposed to measure (Kombo and Tromp, 2006). The questionnaire was based on the objectives of the study to ensure that every question was relevant. The researcher sought the assistance of the supervisor to ascertain the validity. Based on advise received the questionnaire was revised.

3.5.3 Reliability of Instrument

The reliability of a research instrument concerns the extent to which the instrument is consistent between successive measurements. Although unreliability cannot be done away with completely, a quality instruments generally have consistent results on repeated trials done at different times. The extent to which the instrument gives consistent measurements after repeat trials is its reliability

(Carmines & Zeller, 1985). The internal consistency of the instruments was checked based on the outcome of the pilot testing.

3.6 Data Collection Procedure

To collect the data the questionnaire was administered to the head of innovation department within the sampled firms. The heads of innovation departments will have greater visibility of the whole institution's innovation activities and hence well placed to provide relevant information. An assistant was trained to administer the questionnaire and provided clarification when sought by respondents. An interview schedule was used to collect additional information that was used to triangulate the responses obtained with the questionnaire.

3.7 Data Analysis Techniques

Data analysis consisted of examination, categorization, and tabulation of the collected data. This involved a careful examination of the completed questionnaires with the objective of ensuring that collected data was accurate and consistent with other information. Descriptive statistics was used to establish the general characteristics of the population under study. To test the hypotheses, methods of inferential statistics were applied in the analysis between the dependent with each of the independent variables. ANOVA was used to analyze the data using SPSS statistical software tool. Results are presented in form of tables, graphs and texts.

3.8 Ethical Consideration

Given the nature of the sensitivity of the information to be collected, a high degree of confidentiality was maintained and the permission to collect information was sought from the firms, the university and relevant authorities before data was collected. The data was not shared or used for any other purpose except for the study. The questionnaires maintained anonymity and were destroyed after the study was completed. Participation in the survey was voluntary and informed consent was obtained from respondents.

3.9 Operationalization of variables

Table 3.5 Operationalization of variables

Objective or research Question	Type of Variable	Indicators	Measure	Data Collection	Level of Scale	Approach Analysis	Technique of Analysis
1. How does the Institutional structure influence innovation of technological products and Processes in the telecommunications sector in Kenya?	independent	Centrality Formality	Employees' degree of control over their work. Extent in which Decision Making is informal and decentralized	Questionnaire.	interval	Quantitative	Multiple regression analysis
2. How does employees' characteristic influence	independent	Education and skills	Employees Degree of skills and Qualification for innovation.	Questionnaire.	interval	Quantitative	Multiple regression analysis

innovation of technological products and Processes in the telecommunication sector in Kenya?		Motivation	Degree of use of Performance Rewards and incentives				
3. What is the influence of financial resources on innovation of technological products and Processes in the telecommunication sector in Kenya?	independent	Slack Financial resources	Degree to which annual operating budget is more than enough to meet the needs of the firm.	Questionnaire.	interval	Quantitative	Multiple regression analysis
4. How does knowledge management	independent	External Know-how	Strength of alliance with other firms with	Questionnaire.	interval	Quantitative	Multiple regression analysis

<p>influence innovation of technological products and Processes in the telecommunications sector in Kenya?</p>		<p>Knowledge repositories</p> <p>Customer Feedback</p>	<p>knowledge capabilities.</p> <p>Regular use of indexed knowledge repositories.</p> <p>Regular seeking of Customer feedback or observation on use of products.</p>				
<p>5. What is the influence of leadership and management style on innovation of technological</p>	<p>independent</p>	<p>Personality</p>	<p>Level of Management aggressiveness in exploiting potential opportunity.</p>	<p>Questionnaire.</p>	<p>interval</p>	<p>Quantitative</p>	<p>Multiple regression analysis</p>

<p>products and Processes in the telecommunications sector in Kenya?</p>		<p>Style</p>	<p>Degree of Management consultation with employees when changes are desired.</p>				
	<p>Dependent (Innovation of technological products and Processes in the telecommunications sector in Kenya)</p>	<p>Product innovations</p>	<p>Number of new goods</p> <p>Number of significantly improved goods</p> <p>Number of new Services</p> <p>Number of significantly improved Services</p>	<p>Questionnaire.</p>	<p>ratio</p>	<p>Quantitative</p>	<p>Multiple regression analysis</p>

		<p>Process Innovation</p>	<p>Number of new production methods.</p> <p>Number of significantly improved production methods.</p> <p>Number of new Delivery methods</p> <p>Number of significantly improved Delivery methods</p> <p>Percentage of sales turnover from new</p>				
--	--	-------------------------------	--	--	--	--	--

		Sales turnover from innovations	products and processes. Percentage of sales turnover from significantly improved products and processes.				
--	--	---------------------------------	---	--	--	--	--

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents information on the institutional factors influencing innovation of technological products and processes: a case of firms in the telecommunications sector in Kenya. This section includes the general information, presentation of findings and data analysis as per the study objectives. Descriptive and inferential statistics were employed.

4.2 Response Rate

Out of the 39 questionnaires that were administered, 33 questionnaires were returned fully filled representing an 84.6% response rate. Mugenda and Mugenda (2003), asserts that a response rate of 50% is adequate, while a response more than 70% is very good. Therefore the response rate was satisfactory as indicated in Table 4.1.

Table 4.1: Response Rate

Response	Frequency	Percent (%)
Responded	33	84.6
No Response	6	15.4

Source: Primary data (2017).

4.3 Number of employees

The study sought to find out the number of employees that were in the organization under study. The findings are shown in Figure 1

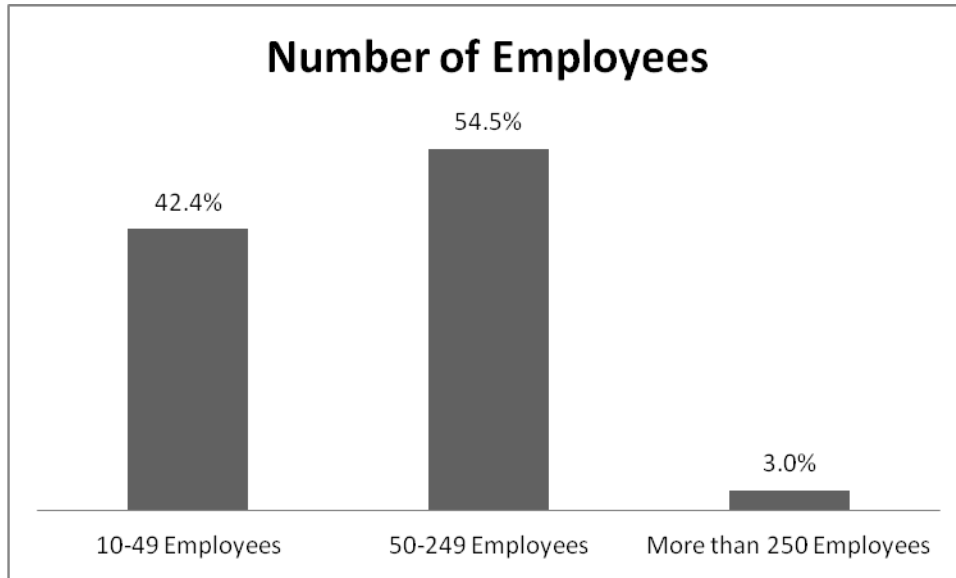


Figure 1: Number of employees

From the findings, 18 firms under study had 50-249 employees representing 54.5% followed by those 14 firms with 10-49 employees. However, there was only one firm with an employee population of more than 250 representing 3.0%.

4.4 Firm's Years in Operation

The study sought to establish the number of years which the firms under study had been in operation. The findings are shown in Figure 2

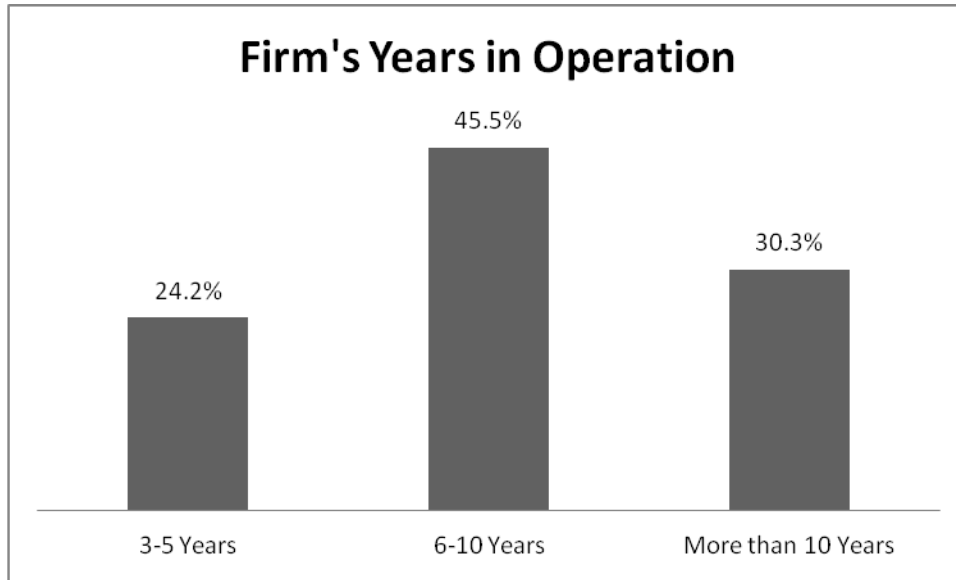


Figure 2: Firm's Years in Operation

According to the findings, 15 (45.5%) firms under study had been operational for 6-10 years, 10 (30.3%) firms had been operational for more than 10 years while 8 (24.2%) firms had operated for a period of 3-5 years.

4.5 Organizational Structure

The study sought to gather information on organizational structure of the firms that were selected for analysis.

4.5.1 Statements on Organizational structure

The respondents were asked to state the extent to which they agreed or disagreed with the following statements concerning organizational structure of their respective firms. A five point Likert scale was used to rate the responses where: 5 – Strongly Agree, 4 – Agree, 3 - Neutral, 2 – Disagree, 1 – Strongly Disagree. The findings are presented in form of mean and standard deviations are indicated in Table 4.2

Table 4.2: Statements on Organizational structure

Construct Variables	N	Mean	Std. Deviation
In my firm employees have a degree of control over their work	33	4.03	0.684
My firm's decision making process is informal and decentralized	33	3.97	0.684

From the findings, majority of the respondents agreed with the statements that their firm employees had a degree of control over their work with a mean score of 4.03. Majority of the respondents moderately agreed with the statements that their firm's decision making process was informal and decentralized with mean scores of 3.97.

4.5.2 Decision Making Process

The study sought to establish how the respondents rated their firms in the decision making process with 1 being formal and centralized and 10 being informal and decentralized. The findings are shown in Table 4.3

Table 4.3: Decision Making Process

Rate	Frequency	Percent
1	4	12.1%
2	10	30.3%
3	7	21.2%
4	6	18.2%
5	3	9.1%
6	3	9.1%
Total	33	100.0%

From the findings majority of the respondents, 27(81.8%) gave a rating of 1-4 indicating that the decision making process was both formal and centralized in their firms. However, few respondents, 3(9.1%) neutrally agreed with a rating of 5 indicating that the decision making process in their respective firms was neither formal and centralized nor informal and decentralized. The rest of the respondents, 3(9.1%) gave a rating of 6 indicating that the decision making process in their firms was tending towards being informal and decentralized. The findings indicate that most of the firms had a formal and centralized decision making process.

4.5.3 Degree of Control on Work

The study sought to establish how the respondents rated their firms on the degree of control employees in their firms had on their work with 1 being no control and 10 being full control. The findings are shown in Table 4.4

Table 4.4: Degree of Control on Work

Rate	Frequency	Valid Percent
4	5	15.2%
5	9	27.3%
6	4	12.1%
7	10	30.3%
8	3	9.1%
9	1	3.0%
10	1	3.0%
Total	33	100.0%

The findings show that the majority of the respondents, 19(57.5%) rated the degree of control from 6-10, which is an indication that there was an increasing degree of control in their respective firms. Some respondents, 9(27.3%) gave a rating of 5 indicating the degree of control was balanced between no control and full control. However, 5 respondents representing 15.2% indicated that the

degree of control of the employees tended towards no control with a rating of 4. The findings, therefore, indicate that in majority of the firms surveyed the employees had control on their work though not fully.

4.6 Employee Characteristics

The study sought to gather information on employee characteristics of the firms that were selected for the study.

4.6.1 Statements on Employee Characteristics

The respondents were asked to state the extent to which they agreed or disagreed with the following statements concerning employee characteristics of their respective firms. A five point Likert scale was used to rate the responses where: 5 – Strongly Agree, 4 – Agree, 3 - Neutral, 2 – Disagree, 1 – Strongly Disagree. The findings are presented in form of mean and standard deviations are indicated in Table 4.5

Table 4.5: Statements on Employee Characteristics

Construct Variables	N	Mean	Std. Deviation
In my firm performance reward and incentives are routinely used to foster innovation within the firm	33	4.18	0.635
Our technical staff are highly trained and qualified to be innovative	33	4.36	0.549

From the findings, majority of the respondents agreed with the statements that their firm performance reward and incentives are routinely used to foster innovation within the firm with a mean score of 4.18. Majority of the respondents agreed that technical staff are highly trained and qualified to be innovative with mean scores of 4.36.

4.6.2 Training and Qualifications

The study sought to establish how the respondents rated their employees in terms of training and qualifications for their tasks with 1 being not trained and qualified, and 10 being well trained and qualified. The findings are shown in Table 4.6

Table 4.6: Training and Qualifications

Rate	Frequency	Percent
2	1	3.0%
4	3	9.1%
5	3	9.1%
6	5	15.2%
7	6	18.2%
8	9	27.3%
9	3	9.1%
10	3	9.1%
Total	33	100.0%

The findings show that the majority of the respondents, 26(78.9%) rated their employees as trained and qualified with a ratings from 6-10, which is an indication that most of the employees in these firms were qualified in the positions they occupied. Some respondents, 3(9.1%) gave a rating of 5 indicating that the trainings and qualifications of the employees were balanced between those who were trained and qualified and those who were not trained and qualified. However, 12% of the respondents provided a rating of below 5 indicating that some employees were not trained and qualified for their work positions. The findings, therefore, indicate that in majority of the firms surveyed the employees were trained and qualified in performing their tasks.

4.6.3 Rewards and Incentives

The study sought to establish how the respondents rated their firms in terms of rewards and incentives for their tasks with 1 being rarely used, and 10 being often used. The findings are shown in Table 4.7.

Table 4.7: Rewards and Incentives

Rate	Frequency	Percent
3	1	3.0%
4	2	6.1%
5	3	9.1%
6	6	18.2%
7	3	9.1%
8	7	21.2%
9	9	27.3%
10	2	6.1%
Total	33	100.0%

The findings show that the majority of the respondents, 27(81.9%) rated their firms in terms of rewards and incentives as being often used with ratings from 6-10. Some respondents, 3(9.1%) gave a rating of 5 indicating that the use of rewards and incentives in their firms were balanced between being rarely used and being often used. However, 9.1% of the respondents provided a rating of below 5 indicating that the use of rewards and incentives in their firms were rarely used. The findings, therefore, indicate that in majority of the firms surveyed rewards and incentives were being often used.

4.7 Financial Resources

The study sought to gather information on the financial resources of the firms that were selected for the study.

4.7.1 Statements on Financial Resources

The respondents were asked to state the extent to which they agreed or disagreed with the following statements concerning financial resources of their respective firms. A five point Likert scale was used to rate the responses where: 5 – Strongly Agree, 4 – Agree, 3 - Neutral, 2 – Disagree, 1 – Strongly Disagree. The findings are presented in form of mean and standard deviations are indicated in Table 4.8

Table 4.8: Statements on Financial Resources

Variable Constructs	N	Mean	Std. Deviation
The annual operating budget in my firm is more than enough to meet the needs of the firm	33	4.15	0.834

From the findings, majority of the respondents agreed with the statement that the annual operating budget in my firm is more than enough to meet the needs of the firm with a mean score of 4.15. This therefore implies that the firms were not constrained in terms of finances in carrying out innovations.

4.7.2 Organization Operating Budget

The study sought to establish how the respondents rated their organization’s operating budget in terms of the needs of the firm, with 1 being insufficient, and 10 being surplus. The findings are shown in Table 4.9.

Table 4.9: Organization Operating Budget

Rate	Frequency	Percent
4	3	9.1%
5	7	21.2%
6	6	18.2%
7	7	21.2%
8	5	15.2%
9	5	15.2%
Total	33	100.0%

The findings show that the majority of the respondents, 23(69.8%) rated their organization's operating budget in terms of the needs of the firm as being surplus with ratings from 6-10. Some respondents, 7(21.2%) gave a rating of 5 indicating that their organization's operating budget in terms of the needs of the firm were balanced between being insufficient and being surplus. However, 9.1% of the respondents provided a rating of below 5 indicating that their organization's operating budget in terms of the needs of the firm was insufficient. The findings, therefore, indicate that in majority of the firms that were surveyed, operating budget in terms of the needs of the firm as being surplus.

4.8 Knowledge Management

The study sought to gather information on knowledge management of the firms that were selected for the study.

4.8.1 Statements on Knowledge Management

The respondents were asked to state the extent to which they agreed or disagreed with the following statements concerning knowledge management of their respective firms. A five point Likert scale was used to rate the responses where: 5 – Strongly Agree, 4 – Agree, 3 - Neutral, 2 – Disagree, 1 –

Strongly Agree. The findings are presented in form of mean and standard deviations are indicated in Table 4.10

Table 4.10: Statements on Knowledge Management

Construct Variable	N	Mean	Std. Deviation
My firm regularly observes or obtains feedback on how customers use our products and services in meeting their needs	33	4.03	0.684
My firm regularly uses indexed knowledge repository	33	3.97	0.684
My firm has strong alliances with other firms with knowledge capabilities the firm can tap into	33	3.93	1.088

From the findings, majority of the respondents agreed with the statements that their firm regularly observes or obtains feedback on how customers use our products and services in meeting their needs with a mean score of 4.03 and the firms had strong alliances with other firms with knowledge capabilities the firm can tap into with a mean score of 3.93. Majority of the respondents moderately agreed that their firms regularly used indexed knowledge repository with mean scores of 3.97

4.8.2 Seeking and Use of Customer Feedback

The study sought to establish how the respondents rated their firms in terms of seeking and using customer feedback with 1 being rarely seeks and uses, and 10 being often seeks and uses. The findings are shown in Table 4.11.

Table 4.11: Seeking and Use of Customer Feedback

Rate	Frequency	Percent
4	3	9.1%
5	2	6.1%
6	6	18.2%
7	3	9.1%
8	4	12.1%
9	10	30.3%
10	5	15.2%
Total	33	100.0%

The findings show that the majority of the respondents, 28(84.9%) rated the seeking and use of customer feedback from 6-10, which is an indication that their respective firms often sought and used customer feedback. Some respondents, 2(6.1%) gave a rating of 5 indicating a balance between rarely seeking and using customer feedback and often seeking and using customer feedback in their respective firms. However, 3 respondents representing 9.1% indicated that their respective firms rarely sought and used customer feedback with a rating of 4. The findings, therefore, indicate that in majority of the firms' surveyed often sought and used customer feedback.

4.8.3 Application and Use of Knowledge Repositories

The study sought to establish how the respondents rated their respective firms in terms of the applications of knowledge repositories, with 1 being rarely used, and 10 being often used. The findings are shown in Table 4.12.

Table 4.12: Application and Use of Knowledge Repositories

Rate	Frequency	Percent
2	1	3.0%
4	1	3.0%
5	11	33.3%
6	4	12.1%
7	8	24.2%
8	4	12.1%
9	3	9.1%
10	1	3.0%
Total	33	100.0%

The findings show that the majority of the respondents, 20(60.5%) rated the applications of knowledge repositories as often being used with a rating from 6-10. Some respondents, 11(33.3%) gave a rating of 5 indicating a balance between rarely using knowledge repositories and often using knowledge repositories in their respective firms. However, 2 respondents representing 6.0% indicated that their respective firms rarely used knowledge repositories with a rating of less than 5. The findings, therefore, indicate that in majority of the firms' surveyed often used knowledge repositories.

4.8.4 Strength of Alliance

The study sought to establish how the respondents rated their respective organizations in terms of the strength of alliance with other firms, with 1 as having weak linkages, and 10 as having strong linkages. The findings are shown in Table 4.13.

Table 4.13: Strength of Alliance

Rate	Frequency	Percent
3	1	3.0%
5	4	12.1%
6	3	9.1%
7	11	33.3%
8	9	27.3%
9	4	12.1%
10	1	3.0%
Total	33	100.0%

The findings show that the majority of the respondents, 28(84.8%) rated their organization's strength of alliance with other firms as having strong linkages with ratings from 6-10. Some respondents, 4(12.1%) gave a rating of 5 indicating that their organization's strength of alliance with other firms were balanced between having weak linkages and strong linkages. However, 3.0% of the respondents provided a rating of 3 indicating that their organizations had weak linkages with other firms. The findings, therefore, indicate that in majority of the firms that were surveyed, strength of alliance with other firms had strong linkages.

4.9 Leadership Style

The study sought to gather information on the leadership style of the firms that were selected for the study.

4.9.1 Statements on Leadership Style

The respondents were asked to state the extent to which they agreed or disagreed with the following statements concerning leadership style of their respective firms. A five point Likert scale was used to rate the responses where: 5 – Strongly Agree, 4 – Agree, 3 - Neutral, 2 – Disagree, 1 – Strongly

Disagree. The findings are presented in form of mean and standard deviations are indicated in Table 4.14.

Table 4.14: Statements on Leadership Style

Construct Variables	N	Mean	Std. Deviation
Managers in my firm consult employees to gain commitment and buy in when changes are desired	33	4.18	1.044
Managers in my firm are bold and aggressive in exploiting potential opportunities.	33	3.79	0.893

From the findings, majority of the respondents agreed with the statements that managers in their firms consulted employees to gain commitment and buy in when changes were desired with a mean score of 4.18. Majority of the respondents moderately agreed that managers in my firm are bold and aggressive in exploiting potential opportunities with a mean score of 3.79

4.9.2 Predominant Leadership in terms of Autocracy and Consultation

The study sought to establish how the respondents rated the predominant leadership of their firms with 1 being autocratic and 10 being consultative. The findings are shown in Table 4.15

Table 4.15: Predominant Leadership in terms of Autocracy and Consultation

Rate	Frequency	Percent
3	2	6.1%
4	1	3.0%
5	3	9.1%
6	4	12.1%
7	7	21.2%
8	12	36.4%
9	3	9.1%
10	1	3.0%
Total	33	100.0%

The findings show that the majority of the respondents, 27(81.8%) rated predominant leadership of their firms as being consultative with ratings from 6-10. Some respondents, 3(9.1%) gave a rating of 5 indicating that their organizations' predominant leadership were balanced between being consultative and being autocratic. However, 9.1% of the respondents provided a rating of below 5 indicating that their organizations predominant leadership tended towards being autocratic. The findings, therefore, indicate that in majority of the firms that were surveyed, predominant leadership of their firms was consultative.

4.9.3 Predominant Leadership in terms of Ideas

The study sought to establish how the respondents rated the predominant leadership of their firms in terms of accepting new ideas with 1 being cautious, and 10 being receptive. The findings are shown in Table 4.16

Table 4.16: Predominant Leadership in terms of Ideas

Rate	Frequency	Percent
3	1	3.0%
4	2	6.1%
5	3	9.1%
6	5	15.2%
7	9	27.3%
8	8	24.2%
9	5	15.2%
Total	33	100.0%

The findings show that the majority of the respondents, 27(81.8%) rated predominant leadership in terms of accepting new ideas as receptive with ratings from 6-10. Some respondents, 3(9.1%) gave a rating of 5 indicating that their organizations' predominant leadership in terms of accepting new ideas were balanced between being cautious and being receptive. However, 9.1% of the respondents provided a rating of below 5 indicating that their organizations predominant leadership in terms of accepting new ideas tended towards being cautious. The findings, therefore, indicate that in majority of the firms that were surveyed, predominant leadership in terms of accepting new ideas was receptive.

4.10 Innovation

The study sought to gather information on the innovation activities of the firms that were selected for the study.

4.10.1 Number of New Goods Introduced to the Market

The study sought to establish how many new goods had been introduced by the firms into the market during the period 2015-2016. The findings are shown in Table 4.17.

Table 4.17: Number of New Goods Introduced to the Market

Number of New Goods Introduced to the Market	Frequency	Percent
1	1	3%
2	6	18%
3	12	36%
4	8	24%
5	4	12%
6	1	3%
10	1	3%
Total	33	100%

From the findings, 1 firm representing 3% and another 1 firm representing 3% had the highest number of improved goods, 6 and 10 goods introduced to the market respectively. Majority of the firms, 12(36%) followed by 8(24%) and 6(18%) had introduced 3, 4 and 2 new goods to the market respectively. However, another one firm that was surveyed had only 1 good introduced into the market during the period of 2015-2016. This represented 3% of the firms that were under study. The results indicate that as a result of innovation most firms had between 2-4 new goods being introduced into the market during the period of 2015-2016.

4.10.2 Number of Significantly Improved Goods Introduced to the Market

The study sought to establish how many significantly improved goods had been introduced by the firms into the market during the period 2015-2016. The findings are shown in Table 4.18.

Table 4.18: Number of Significantly Improved Goods Introduced to the Market

Number of Significantly Improved Goods Introduced to the Market	Frequency	Percent
0	1	3%
1	8	24%
2	9	27%
3	10	30%
4	4	12%
5	1	3%
Total	33	100%

From the findings, 4 firms representing 12% and 1 firm representing 3% had the highest number of significantly improved goods, 4 and 5 goods introduced to the market respectively. Majority of the firms, 10(30%) followed by 9(27%) and 8(24%) had introduced 3, 2 and 1 significantly improved goods to the market respectively. However, one firm that was surveyed had no significantly improved goods introduced into the market during the period of 2015-2016. This represented 3% of the firms that were under study. The results indicate that as a result of innovation most firms had between 1-3 significantly improved goods being introduced into the market during the period of 2015-2016.

4.10.3 Number of New Services Introduced to the Market

The study sought to establish how many new services had been introduced by the firms into the market during the period 2015-2016. The findings are shown in Table 4.19

Table 4.19: Number of New Services Introduced to the Market

Number of New Services Introduced to the Market	Frequency	Percent
0	3	9%
1	11	33%
2	9	27%
3	7	21%
4	3	9%
Total	33	100%

From the findings, 7 firms representing 21% and 3 firms representing 9% had the highest number of new services introduced in the market, 3 and 4 services introduced to the market respectively. Majority of the firms, 11(33%) followed by 9(27%) had introduced 1 and 2 new services to the market respectively. However, three firms that were surveyed had no new services introduced into the market during the period of 2015-2016. This represented 9% of the firms that were under study. The results indicate that as a result of innovation most firms had between 1-3 new services being introduced into the market during the period of 2015-2016.

4.10.4 Number of Significantly Improved Services Introduced to the Market

The study sought to establish how many significantly improved services had been introduced by the firms into the market during the period 2015-2016. The findings are shown in Table 4.20.

Table 4.20: Number of Significantly Improved Services Introduced to the Market

Number of Significantly Improved Services Introduced to the Market	Frequency	Percent
0	3	9%
1	12	36%
2	9	27%
3	5	15%
4	4	12%
Total	33	100%

From the findings, 5 firms representing 15% and 4 firms representing 12% had the highest number of significantly improved services, 3 and 4 services introduced to the market respectively. Majority of the firms, 12(36%) followed by 9(27%) had introduced 1 and 2 new significantly improved services to the market respectively. However, one firm that was surveyed had no significantly improved services introduced into the market during the period of 2015-2016. This represented 9% of the firms that were under study. The results indicate that as a result of innovation most firms had between 1-2 significantly improved services being introduced into the market during the period of 2015-2016.

4.10.5 Number of New Production Methods Introduced to the Market

The study sought to establish how many new production methods had been introduced by the firms into the market during the period 2015-2016. The findings are shown in Table 4.21.

Table 4.5: Number of New Production Methods Introduced to the Market

Number of New Production Methods Introduced to the Market	Frequency	Percent
0	5	15%
1	13	39%
2	9	27%
3	3	9%
4	3	9%
Total	33	100%

According to the findings, 3 firms representing 9% and other 3 firms also representing 9% had the highest number of new production methods, 3 and 4 production methods introduced to the market respectively. Majority of the firms, 13(39%) followed by 9(27%) had introduced 1 and 2 new production methods to the market respectively. However, five firms that were surveyed had no new production methods introduced into the market during the period of 2015-2016. This represented 15% of the firms that were under study. The results indicate that as a result of innovation most firms had between 1-2 new production methods being introduced into the market during the period of 2015-2016.

4.10.6 Number of Significantly Improved Production Methods Introduced to the Market

The study sought to establish how many significantly improved production methods had been introduced by the firms into the market during the period 2015-2016. The findings are shown in Table 4.22.

Table 4.6: Number of Significantly Improved Production Methods Introduced to the Market

Number of Significantly Production Methods Introduced to the Market	Frequency	Percent
0	6	18%
1	14	42%
2	7	21%
3	4	12%
4	1	3%
5	1	3%
Total	33	100%

From the findings, 1 firm representing 3% and another 1 firm also representing 3% had the highest number of significantly improved production methods, 4 and 5 production methods introduced to the market respectively. Majority of the firms, 14(42%) followed by 7(21%) and 4(12%) had introduced 1, 2 and 3 significantly improved production methods to the market respectively. However, 6 firms that were surveyed had no significantly improved production methods introduced into the market during the period of 2015-2016. This represented 18% of the firms that were under study. The results indicate that as a result of innovation most firms had between 1-2 significantly improved production methods being introduced into the market during the period of 2015-2016.

4.10.7 Number of New Delivery Methods Introduced to the Market

The study sought to establish how many new delivery methods had been introduced by the firms into the market during the period 2015-2016. The findings are shown in Table 4.23.

Table 4.7: Number of New Delivery Methods Introduced to the Market

Number of New Delivery Methods Introduced to the Market	Frequency	Percent
0	4	12%
1	16	48%
2	8	24%
3	3	9%
4	1	3%
5	1	3%
Total	33	100%

From the findings, 1 firm representing 3% and another 1 firm also representing 3% had the highest number of new delivery methods, 4 and 5 delivery methods introduced to the market respectively. Majority of the firms, 16(48%) followed by 8(24%) and 3(9%) had introduced 1, 2 and 3 new delivery methods to the market respectively. However, 4 firms that were surveyed had no new delivery methods introduced into the market during the period of 2015-2016. This represented 12% of the firms that were under study. The results indicate that as a result of innovation most firms had between 1-2 new delivery methods being introduced into the market during the period of 2015-2016.

4.10.8 Number of Significantly Improved Delivery Methods Introduced to the Market

The study sought to establish how many significantly improved delivery methods had been introduced by the firms into the market during the period 2015-2016. The findings are shown in Table 4.24.

Table 4.8: Number of Significantly Improved Delivery Methods Introduced to the Market

Number of Significantly Improved Delivery Methods Introduced to the Market	Frequency	Percent
0	2	6%
1	8	24%
2	9	27%
3	8	24%
4	2	6%
5	4	12%
Total	33	100%

According to the findings, 2 firms representing 6% and 4 other firms representing 12% had the highest number of significantly improved delivery methods, 4 and 5 delivery methods introduced to the market respectively. Majority of the firms, 9(27%) followed by 8(24%) and 8(24%) had introduced 2, 1 and 3 significantly improved delivery methods to the market respectively. However, 2 firms that were surveyed had no significantly improved delivery methods introduced into the market during the period of 2015-2016. This represented 6% of the firms that were under study. The results indicate that as a result of innovation most firms had between 1-3 significantly improved delivery methods being introduced into the market during the period of 2015-2016.

4.10.9 Percentage Sales Turnover From New Products and Services 2015-2016

The study sought to establish the percentage sales turnover from new products and services during the period 2015-2016. The findings are shown in Table 4.25.

Table 4.9: Percentage Sales Turnover from New Products and Services 2015-2016

Percentage Sales Turnover	Frequency	Percent
50%-60%	3	9.1%
61%-70%	5	15.2%
71%-80%	10	30.3%
81%-90%	12	36.4%
91%-100%	3	9.1%
Total	33	100.0%

According to the findings, majority of the firms, 12(36.4%) had a percentage sales turnover of between 81%-90% followed by 10(30.3%) that had a percentage sales turnover of 71%-80%. Some 5 firms representing 15.2% had a percentage sales turnover of 61%-70%. There were an equal number of firms, 3 representing 9.1% with a percentage sales turnover of 50%-60% and 91%-100%. The results indicate that as a result of innovation most firms had a high percentage sales turnover during the period of 2015-2016.

4.10.10 Percentage Sales Turnover From Significantly Improved Products or Processes 2015-2016

The study sought to establish the percentage sales turnover from significantly improved products and services during the period 2015-2016. The findings are shown in Table 4.26.

Table 4.10: Percentage Sales Turnover from Significantly Improved Products or Processes 2015-2016

Percentage Sales Turnover	Frequency	Percent
50%-60%	1	3.0%
61%-70%	4	12.1%
71%-80%	4	12.1%
81%-90%	16	48.5%
91%-100%	8	24.2%
Total	33	100.0%

According to the findings, majority of the firms, 16(48.5%) had a percentage sales turnover from significantly improved goods and services of between 81%-90% followed by 8(24.2%) that had a percentage sales turnover of 91%-100%. An equal number of firms representing 12.1% had a percentage sales turnover of 61%-70% and 71%-80% respectively. One firm had a percentage sales turnover from significantly improved goods and services of 51%-60%. The results indicate that as a result of innovation most firms had a high percentage sales turnover during the period of 2015-2016.

4.10.11 Innovations Undertaken in 2015-2016

The study sought to establish the innovations that the firms undertook in the period 2015-2016. The findings are shown in Table 4.27.

Table 4.11: Innovations Undertaken in 2015-2016

Innovations	Yes		No	
	Freq	Perc	Freq	Perc
Hardware	27	81.8%	5	15.2%
Artificial Intelligence	16	48.5%	17	51.5%
IoT	9	27.3%	24	72.7%
VAS services	6	18.2%	27	81.8%
Delivery Process	10	30.3%	23	69.7%
Content	11	33.3%	22	66.7%
LTE	10	30.3%	22	66.7%
Virtualization	15	45.5%	18	54.5%
Devices	13	39.4%	20	60.6%
Operations Process	16	48.5%	16	48.5%
Application	14	42.4%	19	57.6%
Financial services	13	39.4%	20	60.6%
Data analytics	14	42.4%	19	57.6%
Training/skills acquisition	15	45.5%	18	54.5%
Software development	14	42.4%	19	57.6%
R&D	14	42.4%	19	57.6%

The findings shown in Table 4.18 indicate that majority of the firms had undertaken innovations during the period 2015-2016 in hardware with a percentage of 81.8%. The findings also indicated that majority of the firms had not undertaken innovations in VAS services, IoT, delivery process,

content, LTE, financial services, application, data analytics, software development, R&D, devices, artificial intelligence, training/skills acquisition, and virtualization with percentages of 81.8%, 72.7%, 69.7%, 66.7%, 66.7%, 60.6%, 60.6%, 57.6%, 57.6%, 57.6%, 57.6%, 54.5%, 54.5% and 51.5% respectively. The findings therefore indicate that most firms had undertaken innovations in the period of 2015-2016 with most innovations being in hardware.

4.11 Category of Innovations

The study sought to establish the category of new and significantly improved products and processes.

4.11.1 Innovations New to the Firm

The study sought to determine innovations that were new to the firm. The findings are shown in Table 4.28.

Table 4.12: Innovations New to the Firm

Number of Innovations	Frequency	Percent
0	0	0%
1	11	33.3%
2	5	15.2%
3	13	39.4%
4	4	12.1%
Total	33	100.0%

From the findings, majority of the firms, 13(39.4%) had introduced 3 new innovations, followed by 11(33.3%) that had introduced 1 new innovation, 5(15.2%) that had introduced 2 new innovations,

4(12.1%) with 4 new innovations. Therefore, majority of the firms had made at least two innovations to their respective firms.

4.11.1 Innovations New to Kenya

The study sought to determine the new innovations that had been introduced to Kenya. The findings are shown in Table 4.29.

Table 4.13: Innovations New to Kenya

Number of Innovations	Frequency	Percent
0	11	33.3%
1	10	30.3%
2	4	12.1%
3	4	12.1%
4	2	6.1%
5	2	6.1%
Total	33	100.0%

From the findings, majority of the firms, 11(33.3%) had introduced no new innovations to Kenya, followed by 10(30.3%) that had introduced 1 new innovation, 4(12.1%) that had introduced 2 new innovations, 4(12.1%) with 3 new innovations, with 2 firms representing 6.1% having introduced 4 innovations and 2 other firms representing 6.1% having introduced 5 new innovations to the Kenyan market. Therefore, majority of the firms had introduced less than 3 innovations to the Kenyan market.

4.11.3 Innovations New to Africa and the World

The study sought to determine the new innovations that had been introduced to Kenya. The findings are shown in Table 4.30.

Table 4.14: Innovations New to Africa and the World

Number of Innovations	Frequency	Percent
0	17	51.5%
1	10	30.3%
2	3	9.1%
4	1	3.0%
5	1	3.0%
6	1	3.0%
Total	33	100.0%

From the findings, majority of the firms, 17(51.5%) had introduced no new innovations to Africa, followed by 10(30.3%) that had introduced 1 new innovation, 3(9.1%) that had introduced 2 new innovations, 1(3.0%) with 4 new innovations, with 1 firm representing 3.0% having introduced 5 innovations and 1 other firm representing 3.0% having introduced 6 new innovations to the Africa and World. Therefore, majority of the firms had introduced fewer innovations to Africa and the world.

4.12 Inferential Statistics

4.12.1 Hypothesi Testing

4.12.1.1 Testing of Hypothesis One

The first hypothesis of the study stated that organizational structure has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. To test significance, analysis of variance (ANOVA) was used to test if organizational structure had

significant influence on innovation of technological products and processes. The findings are indicated in Table 4.31

Table 4.31: Analysis of Variance (ANOVA) for Organizational structure

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2.943	1	3.269	41.633	.001 ^b
Residual	1.644	89	.056		
Total	4.587	90			

a. Dependent Variable: Innovation of technological products and processes

b. Predictor: centralization, formality

H₁: Organizational structure has a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya.

From the findings in the table 4.33, the ANOVA model revealed a regression connotation of 0.001 (>0.05) for organizational structure which was an indication that there was a positive and significant relationship among organizational structure and innovation of technological products and processes. This means that the more flexible an organizational structure was, the more conducive it was for innovations to take place. Therefore the null hypothesis that organizational structure has no significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was rejected and instead the alternative hypothesis that organizational structure has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was accepted.

4.12.1.2 Testing of Hypothesis Two

The second alternative hypothesis of the study stated that employee characteristics' has a significant influence on innovation of technological products and processes in the telecommunications sector in

Kenya. To test significance, analysis of variance (ANOVA) was used to test if employee characteristics had a significant influence on innovation of technological products and processes. The findings are indicated in Table 4.32

Table 4.32: Analysis of Variance (ANOVA) for Employees' characteristics

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2.112	1	3.597	76.471	.003 ^b
Residual	0.689	89	.089		
Total	2.801	90			

a. Dependent Variable: Innovation of technological products and processes

b. Predictor: motivation to innovate, skills & education, training

H₂: Employees' characteristics have a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya.

According to the results shown in Table 4.32, the ANOVA model revealed a regression connotation of 0.003 (>0.05) for employees' characteristics which was an indication that there was a positive and significant relationship among employees' characteristics and innovation of technological products and processes. This means that the more knowledgeable employees, the higher possibility of them participating creatively with an increased capacity of generating ideas. In addition, motivating employees will result in them coming up with ideas which when implemented will enhance innovations. Therefore the null hypothesis that employees' characteristics has no significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was rejected and instead the alternative hypothesis that employees' characteristics has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was accepted.

4.12.1.3 Testing of Hypothesis Three

The third alternative hypothesis of the study stated that financial resources have a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. To test significance, analysis of variance (ANOVA) was used to test if financial resources had a significant influence on innovation of technological products and processes. The findings are indicated in Table 4.33

Table 4.33: Analysis of Variance (ANOVA) for financial resource

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3.542	1	2.395	76.471	.004 ^b
Residual	0.607	89	.011		
Total	4.149	90			

a. Dependent Variable: Innovation of technological products and processes

b. Predictor: utilization of financial resources

H₃: Financial resources have a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya.

The findings in the table 4.33 revealed a regression coefficient of 0.004(>0.05) for financial resources which was an indication that there was a positive and significant relationship among financial resources and innovation of technological products and processes. This means that the more financial resources that are at the disposal of a firm, the greater the possibility of the firm engaging in innovative activities and processes. Therefore the null hypothesis that financial resources has no significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was rejected and instead the alternative hypothesis that employees' characteristics has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was accepted.

4.12.1.4 Testing of Hypothesis Four

The fourth alternative hypothesis of the study stated that knowledge management has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. To test significance, analysis of variance (ANOVA) was used to test if knowledge management had a significant influence on innovation of technological products and processes. The findings are indicated in Table 4.34

Table 4.34: Analysis of Variance (ANOVA) for Knowledge management

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	9.112	1	3.441	38.408	.002 ^b
Residual	1.689	89	.063		
Total	10.801	90			

a. Dependent Variable: Innovation of technological products and processes

b. Predictor: external know how, utilization of knowledge repositories

H₄: Knowledge management has a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya.

According to the results shown in Table 4.34, the ANOVA model revealed a regression connotation of 0.002(>0.05) for knowledge management which was an indication that the knowledge management had a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. This means that organizations which promote knowledge management practices are more likely to be innovative compared to those that do not. Therefore, the null hypothesis that knowledge management has no significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was rejected and

instead the alternative hypothesis that knowledge management has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was accepted.

4.12.1.5 Testing of Hypothesis Five

The fifth alternative hypothesis of the study stated that leadership style has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. To test significance, analysis of variance (ANOVA) was used to test if leadership style had a significant influence on innovation of technological products and processes. The findings are indicated in Table 4.35

Table 4.35: Analysis of Variance (ANOVA) for Leadership style

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	5.015	1	5.392	29.748	.004 ^b
Residual	2.448	89	.051		
Total	7.463	90			

a. Dependent Variable: Innovation of technological products and processes

b. Predictor: personalities, management style

H₅: Leadership style has a significant influence innovation of technological products and processes in the telecommunications sector in Kenya.

From the findings in the table 4.35, the ANOVA model revealed a regression connotation of 0.004 (>0.05) for leadership style which was an indication that there was a positive and significant relationship among leadership style and innovation of technological products and processes. This

means that organizations with distinctive leadership styles can promote innovation. The leadership style has an impact on how resources allocation is done and the type of risks that the organization can undertake. Therefore, the null hypothesis that leadership style has no significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was rejected and instead the alternative hypothesis that leadership style has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya was accepted.

4.13 Discussion of Findings

From the study findings, it was evident that institutional factors influence innovation of technological products and processes. The study found that institutional factors had a great impact on the innovation of technological products and processes. This impression of respondents confirms the perspective of Jensen and Beckmann (2007) who opines that the most successful institutions when it comes to product and process innovation are those whose institutional structures foster the development of knowledge through formal research and development processes and the development of knowledge based on experience, practice, and interaction between employees, clients, and suppliers.

The investigation likewise found that organizational structure has a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya. This is in concurrence with King and Anderson (2002) who posit that an innovation culture supports collaboration, ideas contribution and also knowledge sharing. The culture should encourage team work and have recognition and reward system.

Furthermore, the study found that employees' characteristics have a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya. The findings are in agreement with those of Sarmiento (2011) who opines that the more knowledgeable employees are, the more they are creatively participative and the higher their level of idea generation. Besides knowledge and expertise, the motivation of employees to bring forth the ideas for implementation is also critical to innovation (Sarmiento, 2011; Parker, 2000; Dorenbosch, Engen and Verhagen, 2005).

The investigation further found that financial resource has a significant influence on innovation of technological products and Processes in the telecommunications sector in Kenya. According to Sisaye and Birnberg (2002), the level of an organization's resources can serve to support or constrain learning and innovations in organizations. They link resources as enablers to the extent to which an organization is willing and able to accept the benefits or risk associated with innovation. Resources include tangible and intangible (Sisaye and Birnberg, 2002) such as human, financial and physical resources.

The study found out that knowledge management has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. The findings agree with a study by Jensen and Beckmann, (2007) who argue that the most successful companies when it comes to product and process innovation are those whose organizational structures foster the development of knowledge through formal research and development processes and the development of knowledge based on experience, practice, and interaction between employees, clients, and suppliers.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS AND CONCLUSIONS

5.1 Introduction

The chapter presents the main research findings as presented in the fourth chapter, a summary, conclusions and recommendations by the researcher. The findings are discussed for each objective in relation to the literature reviewed.

5.2 Summary of Findings

The major objective of this research study was the investigation of how various institutional factors influence innovation of technological products and processes in telecommunications firms in Kenya. The data for this research was collected from 39 telecommunication firms in Nairobi. A structured self-administered questionnaire was specifically administered to heads of innovation departments and Chief Technical Officers (CTO) of the telecommunications network facilities providers in Nairobi that had been identified. The questionnaire also sought to gather data that related to the innovation of technological products and processes in telecommunications firms. The first study objective sought to assess how institutional structure influences innovation of technological products and processes in the telecommunications sector in Kenya. Under this objective, it was hypothesized that organizational structure has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. The results indicated the presence of a strong positive significant correlation between organizational structure and innovation.

The second objective of the study sought to analyse how employees' characteristic influences innovation of technological products and processes in the telecommunications sector in Kenya. Under this objective, it was hypothesized that Employees' characteristics have a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. The findings revealed a strong positive correlation between employee characteristics and innovation. This implies that the right employee characteristics have a significant effect on innovation of technological products and processes in telecommunication firms in Kenya.

The third objective of the study sought to examine the influence of financial resources on innovation of technological products and processes in the telecommunications sector in Kenya. From this objective, it was hypothesized that financial resource has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. The findings revealed a strong positive correlation between financial resources and innovation.

The fourth objective of the study sought to determine how knowledge management influences innovation of technological products and processes in the telecommunications sector in Kenya. This objective hypothesized, that knowledge management has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. The findings revealed a strong positive correlation between knowledge management and innovation.

The fifth objective of the study sought to establish the influence of leadership style on innovation of technological products and processes in the telecommunications sector in Kenya. This objective hypothesized, that leadership style has a significant influence on innovation of technological products and processes in the telecommunications sector in Kenya. The findings revealed a strong positive correlation between leadership style and innovation of technological products and processes in the telecommunications sector in Kenya.

5.3 Discussion of Findings

The study found a strong relationship between organizational structure and innovation of technological products and processes in the telecommunications sector. The study revealed that employees had a high degree and control over their work and the firms' decision making processes were informal and decentralized. The high degree and control over work together with the informal and decentralized organizational structures in these firms fostered the innovation processes. The results are in agreement with studies conducted by Jensen and Beckmann (2007) who argued that the most successful institutions when it comes to product and process innovation are those whose institutional structures foster the development of knowledge through formal research and development processes and the development of knowledge based on experience, practice, and interaction between employees, clients, and suppliers.

The study found a strong relationship between employee characteristics and innovation of technological products and processes in the telecommunications sector. It found out that majority of the technical staff were highly trained and qualified and the firms routinely used performance rewards and incentives to foster innovation within their firms. These findings are in agreement with Cebon, Newton and Noble (1999) who argue that it is only through creating and sustaining a work force that is creative can the institution succeed in maintaining the required potential to solve difficult problems and situations (i.e. innovate) that cannot be overcome through investment in adoption of technology or research and development financing only. Further, Sarmiento (2011) asserts that the more knowledgeable employees are, the more they are creatively participative and the higher their level of idea generation.

The study found a strong relationship between financial resources and innovation of technological products and processes in the telecommunications sector. The study revealed that the annual operating budget of the firms was more than enough to meet the needs of the firms and thus implying that the firms were not constrained in terms of finances in carrying out innovations. The findings of the study concur with studies carried out by Sisaye and Birnberg (2002) who argue that the level of an organization's resources can serve to support or constrain learning and innovations in organizations. They further link resources as enablers to the extent to which an organization is willing and able to accept the benefits or risk associated with innovation. Resources include tangible and intangible such as human, financial and physical resources.

From the findings of the study, there was a strong positive correlation between knowledge management and innovation. The study revealed that majority of the firms regularly observed or obtained feedback on how customers used their products and services in meeting their needs. The findings obtained in this study concur with Tucker (2008) who opines that firms that achieve growth from their innovation practices are companies that encourage ideas from everybody and everywhere. Further, Jensen and Beckmann (2007) argue that the most successful companies when it comes to product and process innovation are those whose organizational structures foster the development of knowledge through formal research and development processes and the development of knowledge based on experience, practice, and interaction between employees, clients, and suppliers.

The study found a strong relationship between leadership style and innovation of technological products and processes in the telecommunications sector. According to the results, majority of the respondents reported that managers in their firms consulted employees to gain commitment and buy in when changes were desired. In addition, many of the firms had managers who were bold and aggressive in exploiting potential opportunities. The findings concurred with studies carried out by Rasheed (2010) who argued that leadership team can help create an environment in which calculated risk and possibility of failure is tolerated. The leadership team can encourage innovation by coming up with a set goals and metrics for innovation. The leadership team can create reward and recognition system for successfully implemented innovation and even those that did not make it to implementation stage. This can motivate in ideas generation and collaboration in entire organization.

5.4 Conclusion

The study concluded that knowledge management influenced innovation of technological products and processes in telecommunications firms in Kenya as indicated by a correlation of 0.643. It concluded that effective knowledge management fosters innovations in telecommunication firms. Therefore for any firm to make strides in innovation, it must ensure effective knowledge management through obtaining customer feedback, making use of knowledge repositories and forge alliances with other firms with knowledge capabilities which they can tap into which will make the firms competitive.

The study concluded that leadership style is an important factor in fostering innovation of technological products and processes in telecommunications firms in Kenya. It concluded that predominant leadership that is both consultative and aggressive in terms of accepting new ideas fosters innovation.

The study concluded that employee characteristics influences innovations of technological products and processes in telecommunications firms in Kenya. The use of performance rewards and incentives acts as a motivation to the employees thus fostering innovation within the firms. In addition, firms with highly trained and qualified technical staff experienced more innovations within their firms.

Regarding the fourth objective of the study, the study concluded that there exists a positive relationship between financial resources and innovations of technological products and processes in telecommunications firms in Kenya. The annual operating budget of the firms under study was more than enough to meet the needs of the firms. This reveals that financial resources at a firm's disposal will influence its innovation capabilities.

In regard to the last objective of the study, the study drew a conclusion that the organizational structure influences the innovations of technological products and processes in telecommunications firms in Kenya. It concluded that in firms where employees have a higher degree and control over their work there have more innovations in the firm. It also drew a conclusion that an informal and decentralized decision making process fosters innovativeness within the firms.

5.5 Recommendations

The study recommends that the telecommunication firms in Kenya in order to spur more innovation in technological products and processes should:

1. Create institutional structures that not only encourage ideas from everyone within the firms but also decentralize decision making and consultation happens across the firm.
2. Continue the use performance rewards and incentives and empowering employees through relevant training.
3. Continue to meet their operational needs in their budgets and allocate slack financial resources towards innovation.
4. Increase the use of knowledge repositories and create strong linkages with other institutions. In addition, continue seeking customer feedback on the use of firm's products and processes.
5. Encourage managers to take greater risks and become more aggressive and bold in exploiting new opportunities.

5.6 Suggestions for Further Research

The study only focused on telecommunication sector in Kenya and found that the five factors are responsible for the 88% of innovation outcome and so further study can be conducted to fully understand the influence of other factors. Since innovation in all sectors is important for Kenya's economical growth, there is need to carry out further study on different sectors such as banking and manufacturing for confirmation and comparison purposes of the research findings.

Innovation processes occur over time and hence frequent research on the institutional factors influencing innovation should be carried out by the Kenya Bureau of Statistics. This will ensure sufficient resources and time are allocated to sample more firms including those without formal innovation departments.

REFERENCES

- 2015 report - The Global Innovation Index. (n.d.). Retrieved June 13, 2016, from <https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2015-v5.pdf>
- Frascati Manual 2002. (2002). *The Measurement of Scientific and Technological Activities*. doi:10.1787/9789264199040-en
- Innovation in science, technology and industry. (n.d.). Retrieved June 13, 2016, from <http://www.oecd.org/sti/inno/>
- Bargh, J. A., Gollwitzer, P. M., Lee-Chai, A., Barndollar, K., & Trötschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology*, 81(6), 1014-1027. doi:10.1037/0022-3514.81.6.1014
- Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17(1), 99-120. doi:10.1177/014920639101700108
- Black, K. (2008). *Business statistics: For contemporary decision making*. Hoboken, NJ: Wiley.
- Bryman, A. (2012). *Social research methods*. Oxford: Oxford University Press.
- Carmines, E. G., & Zeller, R. A. (1985). *Reliability and validity assessment*. Beverly Hills, Calif.: Sage Publications.
- Cebon, P., Newton, P. W., & Noble, P. (1999). *Innovation in firms: Towards a model for indicator development*. Carlton, Vic.: Melbourne Business School, University of Melbourne.

Clegg, C., Unsworth, K., Epitropaki, O., & Parker, G. (2002). Implicating trust in the innovation process†. *Journal of Occupational and Organizational Psychology*, 75(4), 409-422. doi:10.1348/096317902321119574

Cohen, L., Manion, L., & Morrison, K. R. (2005). *Research methods in education*. London: RoutledgeFalmer.

Cohen, M. D., March, J. G., & Olsen, J. P. (1972). A Garbage Can Model of Organizational Choice. *Administrative Science Quarterly*, 17(1), 1. doi:10.2307/2392088

Damanpour, F., & Evan, W. M. (1984). Organizational Innovation and Performance: The Problem of "Organizational Lag" *Administrative Science Quarterly*, 29(3), 392. doi:10.2307/2393031

Dodgson, M., Gann, D., & Salter, A. J. (2005). *Think, play, do: Technology, innovation, and organization*. Oxford: Oxford University Press.

Dorenbosch, L., Engen, M. L., & Verhagen, M. (2005). On-the-job Innovation: The Impact of Job Design and Human Resource Management through Production Ownership. *Creativity and Innovation Management*, 14(2), 129-141. doi:10.1111/j.1476-8691.2005.00333.x

Edquist, C. (1997). *Systems of innovation: Technologies, institutions, and organizations*. London: Pinter.

Eisenhardt, K. M., & Tabrizi, B. N. (1995). Accelerating Adaptive Processes: Product Innovation in the Global Computer Industry. *Administrative Science Quarterly*, 40(1), 84. doi:10.2307/2393701

- Hambrick, D. C., & Mason, P. A. (1984). *Upper echelons: The organization as a reflection of its top managers*. S.l.: S.n.
- Hellström, C., & Hellström, T. (2002). *Highways, Alleys and By-lanes: Charting the Pathways for Ideas and Innovation in Organizations*.
- Jensen, M. B., & Beckmann, S. C. (2007). *What drives innovation and creativity in brand management?*
- Kimberly, J. R., & Evanisko, M. J. (1981). Organizational Innovation: The Influence of Individual, Organizational, and Contextual Factors on Hospital Adoption of Technological and Administrative Innovations. *Academy of Management Journal*, 24(4), 689-713. doi:10.2307/256170
- King, N., & Anderson, N. (2002). *Managing innovation and change: A critical guide for organizations*. London: Thomson.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Delhi: New Age International (P).
- Lee, C. (2000). *The Silicon Valley edge: A habitat for innovation and entrepreneurship*. Stanford, CA: Stanford University Press.
- Leonard-Barton, D. (2011). *Managing knowledge assets, creativity and innovation*. Singapore: World Scientific.
- Levine, A. (1980). *Why innovation fails*. Albany: State University of New York Press.
- Martin, M. J., & Martin, M. J. (1994). *Managing innovation and entrepreneurship in technology-based firms*. New York: Wiley.

Morris, L., Ma, M., & Wu, P. C. (n.d.). *Agile innovation: The revolutionary approach to accelerate success, inspire engagement and ignite creativity*.

Nohria, N., & Gulati, R. (1996). Is Slack Good Or Bad For Innovation? *Academy of Management Journal*, 39(5), 1245-1264. doi:10.2307/256998

Nohria, N., & Gulati, R. (1994). *What is the optimum amount of organization slack? A study of the relationship between slack and innovation in multinational firms*. Boston: Division of Research, Harvard Business School.

Nyström, H. (1990). *Technological and market innovation: Strategies for product and company development*. Chichester: Wiley.

Rasheed, H. P. (2012). *Innovation strategy: Seven keys to creative leadership and a sustainable business model*. Place of publication not identified: IUniverse.

Reichardt, C. S., & Rallis, S. F. (1994). *The qualitative-quantitative debate: New perspectives*. San Francisco: Jossey-Bass.

Sarmiento, A. (2011). *Technology for creativity and innovation: Tools, techniques and applications*. Hershey, PA: Information Science Reference.

Sawhney, M., Wolcott, R., & Arroniz, I. (2007). The 12 different ways for companies to innovate. *IEEE Engineering Management Review IEEE Eng. Manag. Rev.*, 35(1), 45-45. doi:10.1109/emr.2007.329139

Scotchmer, S. (2004). *Innovation and incentives*. Cambridge, MA: MIT Press.

Sisaye, S., & Birnberg, J. G. (2012). *An organizational learning approach to process innovations: The extent and scope of diffusion and adoption in management accounting systems*. Bingley, UK: Emerald.

Smith, M., Busi, M., Ball, P., & Meer, R. V. (2008). Factors Influencing An Organisation's Ability To Manage Innovation: A Structured Literature Review And Conceptual Model. *Int. J. Innov. Mgt. International Journal of Innovation Management*, 12(04), 655-676. doi:10.1142/s1363919608002138

Som, R. K., & Som, R. K. (1996). *Practical sampling techniques*. New York: M. Dekker.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Los Angeles: SAGE.

Teece, D. J. (2011). *Dynamic capabilities and strategic management*. Oxford: Oxford University Press.

Tucker, R. B. (2002). *Driving growth through innovation: How leading firms are transforming their futures*. San Francisco, CA: Berrett-Koehler.

Sustainable development goals - United Nations. (n.d.). Retrieved June 13, 2016, from <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Warwick, D. P., & Lininger, C. A. (1975). *The sample survey: Theory and practice*. New York: McGraw-Hill.

West, M. A., & Anderson, N. (1992). *Innovation, cultural values and the management of change in British hospital management*. London: Centre for Economic Performance, London School of Economics and Political Science.

Global Competitiveness Report 2014-2015. (n.d.). Retrieved June 13, 2016, from <https://www.weforum.org/reports/global-competitiveness-report-2014-2015>

Young, G. J., Charns, M. P., & Shortell, S. M. (2001). Top manager and network effects on the adoption of innovative management practices: A study of TQM in a public hospital system. *Strat. Mgmt. J. Strategic Management Journal*, 22(10), 935-951. doi:10.1002/smj.194

APPENDICES

Appendix 1: Consent Form

William Omondi Ouso,
Department of Extra Mural Studies
University of Nairobi,
Nairobi.

The Chief Executive Officer/Chief Technical Officer/Head of Innovation Department,

Dear Sir/Madam,

RE: RESEARCH PROJECT

I am a post graduate student at the University of Nairobi undertaking a research project as part of the requirements for degree of Master of Arts in Project Planning and Management. The topic of my study is “The influence of institutional factors on innovation of technological products and processes: A case of firms in the telecommunications sector in Kenya”

Your firm is one of the sampled Firms in which I wish to request to collect data through the attached questionnaire and Interview Schedule. The information provided will be treated with confidentiality and used only for the purpose of the academic activity. Results of the study will be reported in general statistical form without reference to any particular firm.

A copy of the research project will be availed to you upon request. Thank you in advance for consenting to participate in the research.

Yours Faithfully,



William Ouso,

Email: William.ouso@gmail.com

Tel: 0722297712/0734800438.

Appendix 2: Questionnaire for the head of innovation department

Please complete the questionnaire by answering all questions on behalf of your firm as a whole. The information you provide will be handled anonymously and therefore will be confidential.

SECTION 1: GENERAL INFORMATION OF THE FIRM:

Some questions about your firm so that I can be able to group responses and make comparisons.

Tick the appropriate box that most accurately describes your firm.

1.1 What is the number of employees in your firm?

10-49 50-249 More than 250

1.2 How many years has your firm operated in the telecommunications sector in Kenya?

3-5 years 6-10 years more than 10 years

SECTION 2 INNOVATION FACTORS

In this section please select to what level you agree to the following descriptive statements based on your firm in the period 2015-2016.

1. INSTITUTIONAL STRUCTURE	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
In my firm employees have a high degree and control over their work.					
My firm’s decision making process is informal and decentralized.					
Total Score					

Average Score	
----------------------	--

On a scale of 1-10 rate your firms decision making process with 1 being formal and centralized and 10 being informal and decentralized

On a scale of 1-10 rate the degree of control employees in your firm have on their work , with 1 being no control and 10 being full control

2. EMPLOYEES' CHARACTERISTICS	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
In my firm performance Rewards and incentives are routinely used to foster innovation within the firm.					
Our technical staff are highly trained and qualified to be innovative.					
Total Score					
Average Score					

On a scale of 1-10 rate your firms employees in terms of their training and qualifications for their tasks , with 1 being not trained and qualified and 10 being well trained and qualified

On a scale of 1-10 rate your firm in terms of use of rewards and incentives with 1 being rarely used and 10 being often used

3. FINANCIAL RESOURCES	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
The annual operating budget in my firm is more than enough to meet the needs of the firm.					
Total Score					
Average Score					

On a scale of 1-10 rate your organization's operating budget in terms of the needs of the firm, with 1 being insufficient and 10 being surplus

4. KNOWLEDGE MANAGEMENT	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
My firm regularly observes or obtains feedback on how customers use our product & services in meeting their needs.					
My firm regularly uses indexed knowledge					

repository.					
My firm has strong alliances with other firms with knowledge capabilities the firm can tap into.					
Total Score					
Average Score					

On a scale of 1-10 rate your firm in terms of seeking and using customer feedback with 1 being rarely seeks and uses and 10 being often seeks and uses customer feedback

On a scale of 1-10 rate the application and use of knowledge repositories, with 1 being rarely used and 10 being often used

On a scale of 1-10 rate the strength of alliance with other firms by your organization with 1 as having weak linkages with other firms and 10 as having strong linkages

5. LEADERSHIP STYLE	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Managers in my firm consult employees to gain commitment and buy-in when changes are desired.					
Managers in my firm are bold and aggressive in exploiting potential					

opportunities.					
Total Score					
Average Score					

On a scale of 1-10 rate the predominant leadership of you firm with 1 being autocratic and 10 being consultative

On a scale of 1-10 rate the predominant leadership of your firm in terms of accepting new ideas with 1 being cautious and 10 Receptive

SECTION3: INNOVATION

These questions relate to **new or significant improvements in technological products or processes** introduced in the firm in the period 2015-2016. Significant improvements are those that had a formal process outside of the daily routine improvements. *Example: introduction of LTE is considered a technological process innovation and 4G service is a technological product (service) innovation.*

2.1 During the period 2015-2016

INNOVATION	
How many new goods did your firm introduce in the market?	
How many significantly improved goods did your firm introduce in the market?	
How many new improved Services did your firm introduce in the market?	
How many significantly improved Services did your firm introduce in the market?	
How many new production methods did your firm introduce in the market?	
How many significantly improved production methods did your firm introduce in	

the market?	
How many new delivery methods did your firm introduce in the market?	
How many significantly improved delivery methods did your firm introduce in the market?	
On a scale of 1-10 rate how new products or processes have contributed to sales turnover in the period.	
On a scale of 1-10 rate how significantly improved products or processes have contributed to sales turnover in the period.	
Total Score	

What innovations did your firm undertake in the period 2015-2016, please tick from list below

- 1 Technology
- 2 Hardware
- 3 Artificial intelligence
- 4 IoT
- 5 VAS services
- 6 Delivery Process
- 7 Content
- 8 LTE
- 9 Virtualization
- 10 Devices

11 Operations process	
12 Applications	
13 Financial services	
14 Data analytics	
15 Training/skills acquisition	
16 software development	
17 R&D	
18 other (please Specify)	

.....

.....

SECTION 4: CATEGORY OF INNOVATIONS

In this section, please indicate the number of new and significantly improved products and processes by category

INNOVATION	Number of innovations
New to the firm	
New to Kenya	
New to Africa and the world	

Thank you for taking time to answer the Questions.

Appendix 3: Interview Schedule for the Chief Technical Officer

My name is William Ouso. I am a student at the University of Nairobi pursuing a Master's Degree of Arts in Project planning and management. I am undertaking a research for academic purposes on the influence of various factors on innovation in the telecommunications industry in Kenya. Given your position in your organization I believe you have a wealth of information on your firm's handling of innovation.

1. May I ask your opinion on the following factors' influence on your firm's innovative activity between 2015 to 2016

A) Your institutional Structure

In what ways would you say that your organization structure has supported or not supported innovation within your firm?

B) Your Employees' Characteristics

In terms of skills, qualifications and motivation how have your employees influenced your firm's innovativeness?

C) Availability of financial resources

Do you feel that you had enough financial resources to direct towards innovative activity?

D) Knowledge management

What are the sources of information that your firm taps into for innovation?

How this knowledge is made available to employees within the firm?

E) The leadership style in your firm

How would you describe the leadership style mostly demonstrated within your firm?

2. How would you rank your firm in term of innovativeness on a scale of 1-5 with 1 being less innovative and 5 being most innovative?

Thank you very much for your time and cooperation.

Appendix 3: Project Time Frame

Table 3.6: *Project time frame*

ACTIVITY	June 2016	Jan 2017	Feb 2017	March 2017	April 2017
Proposal development/presentation	√	√	√		
Proposal correction					
Training of Research assistants			√		
Pre-testing and correction of questionnaire			√		
Data collection			√	√	
Data analysis			√	√	
Report writing				√	√
Report submission					√