RISK MANAGEMENT AND PERFORMANCE OF INFORMATION TECHNOLOGY PROJECTS BY COMMERCIAL BANKS IN KENYA

OUMA FREDRICK OKONG'O

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN BUSINESS (PROJECT MANAGEMENT) OF KENYATTA UNIVERSITY.

JUNE, 2022

DECLARATION

This thesis is my original work and has not been presented in any other University for any academic award.

Signature…… Date……

Fredrick Okong'o Ouma

D86/CTY/PT/27680/2018
Department of Management Science,
School of Business,
Kenyatta University.

We confirm that the work in this thesis was done by the candidate under our supervision:

Dr. Paul Sang (PhD)

Senior Lecturer,

Department of Management Science,
School of Business,
Kenyatta University.

Signature…… Date…….

Dr. Franklin Kinoti Kaburu (PhD)

Senior Lecturer,

Department of Management Science,
School of Business,
Kenyatta University.

Signature…… Date…….

DEDICATION

I dedicate this thesis to the Almighty God for giving me knowledge, wisdom and strength to fulfil this lifetime ambition. Indeed it's 'not by might nor by power, but by His Spirit'. To my wife Sarah and daughter Gianna, thank you for your unwavering support .My father Daniel and mother Teresa, you are my source of inspiration.

ACKNOWLEDGEMENT

I would like to specially acknowledge my supervisors Dr. Paul Sang (PhD) and Dr. Frankline Kinoti (PhD) for the resourceful guidance and contribution while writing this thesis. My appreciation also goes to my Lectures from Kenyatta University School of Business that enabled me to undertake the coursework's foundation. The knowledge was very instrumental in developing this thesis. I also wish to thank my employer, Development Bank of Kenya Limited for giving me a favourable environment to undertake my studies.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

OPERATIONAL DEFINITION OF TERMS

Commercial Bank : A company licensed by the Central Bank of Kenya to undertake banking services.

Project : A temporary information technology undertaking that is conducted to develop a one-of-a-kind service or product.

Project Complexity : Feature of the project that shows the degree of difficult to comprehend or deal with.

Project Performance: It entails meeting the project's target standard of quality, budget, scope, and schedule parameters.

Risk Analysis : Process of prioritizing itemized project risks for further action by measuring their probability of occurrence and impact in a project.

Risk Culture : Common goals, shared values, interests, experience, attitudes, and understanding about risk.

Risk Identification: The procedure of finding out risks that might inhibit a project from meeting its purposes.

Risk Management : Identification, analysis, responses and monitoring and control of risk in a project.

Risk Monitoring and Control: The process of checking the implementation of set out risk response plans and assessing risk process effectiveness in the project

Risk Responses : The strategies for handling negative risks (threats) of avoid, transfer, mitigate, escalate or accept of risks in a project.

ABBREVIATIONS AND ACRONYMS

CBK	Central Bank of Kenya
ERM	Enterprise Risk Management
ICPAK	Institute of Certified Public Accountants of Kenya
ISACA	Information System Auditors and Control Association
ISD	Information System Development
ISO	International Organization for Standardization
I T	Information Technology
KBA	Kenya Bankers Association
NACOSTI	National Commission for Science and Technology & Innovation
PMBOK	Project Management Book of Knowledge
PMI	Project Management Institute
RAM	Risk Management Agency

ABSTRACT

Undertaking an information technology project in a banking environment is a complex task. Studies globally and locally indicate a problem of high failure rate of information technology projects. Standish group report 2019 states that 83.9 percent of information technology projects partially or completely fail. Majority of the projects, 52 percent were over budget, overdue, or lacked promised functionality. Previous studies indicate information technology projects by commercial Banks in Kenya experience the same project performance variations, as projects are either delayed, over budget or have issues with functionality. Risk is a factor that challenges project performance. Project risk management includes risk identification, analysis, response, and monitoring and control of risk in a project. The goal of project risk management is to reduce the likelihood and/or severity of unfavourable risks. The overall goal of this study was to examine the relationship between risk management and performance of information technology project by commercial banks in Kenya, taking into account the moderating effect of project complexity and the mediating effect of risk culture, both of which had been largely overlooked in previous research hence filling a research vacuum. Unit of analysis was thirty six selected IT projects. Questionnaires were used to collect the data from the targeted one hundred and eight respondents. The instrument was tested for reliability by use of Cronbach's alpha coefficient of internal consistency test and validity by use of selected information technology project professionals' review. Based on a survey, the research used both descriptive and explanatory research designs. The influence of risk management on performance of information technology projects by commercial banks in Kenya was analyzed using multiple regression analysis. Quantitative data was analyzed using multiple regression analysis model software tool SPSS Version 25. The study adopted empirical model of least squares method while testing the hypotheses. The researcher conducted diagnostic tests of Normality, Linearity, Homoscedasticity and Multicollinearity to see if the data conforms to the basic assumptions of linear regression. The findings were presented using statistical parameter estimates.Tables and figures were used to present data, and supported by explanatory annotations. The results indicated that risk analysis, risk responses and risk monitoring and control had significant effects on the performance of information technology projects in the banking sector. Risk identification was not significant. The study also found out that project complexity had a moderating effect on the relationship between dependent and independent variables. The results indicated that risk culture had no mediating effect on the relationship between risk management practices and performance of information technology projects. The study recommends that banks should consider implementing and fully operationalize risk management practices in information technology projects. The Central Bank of Kenya should also consider putting in place an information technology projects risk policy framework to aid the banks in project undertakings.Knowledge gap is addressed by scholarly work and findings that has resulted from this research by providing statistical data analysis and explanations given on the relationship between risk management and Information Technology project performance undertaken by commercial banks in Kenya.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The performance of IT projects has interested scholars in the last two decades(Pimchangthong & Boonjing, 2017). Mandal and Pal (2015) states that there are several examples of failed software projects. The study presents the Standish group international statistics, European service strategy unit and KPMG survey that indicate that up to 70% of all IT projects fail to meet their objectives. Most IT projects ran 45 percent over budget and 7% behind time in 2012 and delivering 56 percent less value than expected according to the McKinsey Global Institute (MGI).

The (Project Management Institute, 2017) reported that 14% of IT projects fail. That number, however, only includes total failures. In the projects that didn't fail outright, 31% failed to accomplish their objectives, 43% went over budget, and 49% were late. IT project implementation is a complex task. One aspect that directly influences the performance of IT project is the inherent risks within the Project. Despite the fact that management of risk is critical to IT project accomplishment, its acceptance and implementation are inconsistent in many organizations. Furthermore, due to financial constraints, a number of project managers have opted not to practice risk management. This is depicted in the paper by (Kutsch & Hall, 2009).

Information technology (IT) is critical to economies, and the performance of IT projects is seen as critical (Javani &Rwelamila, 2015). This is true to the banking sector in Kenya. Organizations like Banks rely on computer-based systems to remain competitive hence IT projects have become a vital feature of most companies (Jiang et al., 2002). The Kenyan banking sector has gone under a massive digital transformation in the last decade. This initiatives are undertaken through IT related projects. Cracknell (2019) study states that the young generation, mobile money, smartphones and fintech are driving forces in the banking sector's disintermediation, which necessitates more IT projects.

1.1.1 Project Performance

To be deemed satisfactory, an IT project must be completed at a cost that is equal to the budgeted amount, on time, and with all of the necessary functionalities delivered(Alami, 2016) In today's economy and industry, information technology (IT) is critical. Banks consider the progress of IT projects to be equally significant. The implementation of IT projects has become a crucial feature of most companies, according to Jiang et al. (2002).This is due to the organizational dependence on digital systems to remain strategic. Several companies are working on IT ventures as part of their ongoing strategy to stay on the cutting edge of competition. The broad nature of a project in terms of its impact, esteem among recipients, execution adequacy, quality, and sustainability is referred to as project performance (Gemuenden & Lechler, 2010).

The high failure rate of IT projects is well-known. Baccarini et al (2015) conducted a detailed interview of IT specialists from leading companies in Australia in the study of management of risks in information technology projects to check the way IT risks were handled in respective projects. 27 IT risks were rated in terms of probability and implications in order to classify the most significant risks affecting the Projects' results. The method of risk reduction was used by the vast majority of respondents. Furthermore, rather than being technological systems, these methods were largely project management processes.

Akrofi (2017) notes that a project is taken as effective if it is concluded on time, on budget, and with deliverables that meet the requirements. This is the conventional viewpoint; however, there are a variety of ideas about what constitutes a successful project, especially an IT project. Also for the projects that are accomplished on schedule, on budget, the majority struggle to achieve planned business results, according to the project database (Gulla, 2011). This clearly demonstrates that completing IT projects on time and on budget does not guarantee success. Other aspect of consumer satisfaction and uptake of the service comes into play.

Karlsen (2017) notes that an IT project is rarely a complete success or failure, according to the author. Instead, the performance of the IT project would be calculated in degrees of success. This research looked at risk management and its effects on performance of IT projects. Measuring the project performance indicators such as scope, schedule, budget,

and quality can serve as baseline pointers of success (PMI, 2018). According to project management institute, six ways to measure project performance are scope, budget, schedule, team satisfaction, client satisfaction and Quality. In this Study performance was evaluated on four lines of quality, budget, schedule and scope aspects of the project and whether the project attained its overall objective.

1.1.2 Risk Management

Meyer (2015) states that Project risk management is a well-defined field of study with numerous books and papers on the topic. “In the best interests of accomplishing project objectives, project risk management is the art and science of recognizing, investigating, and responding to risk throughout the life of a project”(Schwalbe, 2012). Alhawari et al.(2012) note that “project risk management entailed analysing and comprehending possible risks that might arise during the project, as well as how they could obstruct project efficiency. Improper risk management was found to be common reason of project issues like delays in many studies. Risk management plays a critical element of effective IT project execution and performance.”

Varajão and Amaral (2020) notes that risk management in projects assists project managers in defining and prioritizing risks in line of their occurrence with actionable information. As the scale, complexity, dimension, and level of creativity needed are greater, risk management becomes much more important. There are compelling factors

for incorporating risk management processes into information technology project management on a regular basis.

According to the (10th global project management survey, 2018) of the institute of project management, a question was posed in the survey on how often organizations use risk management practice .The results indicated that 27 percent always, 35 percent often, 25 percent sometimes, 11 percent rarely and 3 percent never. This shows that the use of risk management is not standard across organizations globally. Shrivastava (2012) notes that project risk management is least well-known yet most successful tools project managers can use to improve the chances of a project's success.

Risks are described as those uncertainties that will have an effect on the project if they arise(Weaver, 2008).A research done by ISACA and the Risk Management Society RIMS in 2019 states that risk management ought to be part of technology implementation from the start of a project and across its life cycle in order to achieve maximum value. IT and risk management experts will recognize the best opportunities for cooperation by considering the technology life cycle.

Banking and financial services are fundamentally conservative because they are heavily regulated. It's the one sector where a dedication to innovation is counterproductive and, in the case of failure, poses a major risk to the institution. The Central Bank of Kenya (CBK) has released a cyber-security guidance note to resolve technology and cyber

threats, as well as the related reputational harm, that have arisen as outcome of the growing digitization in financial services.

Risk management is divided into four categories in several research to explore the connection between risk management and IT project performance. The four categories are risk identification, risk analysis , risk response , and monitoring and control (Didraga, 2013). According to the findings, the project's subjective success was unaffected by risk detection, risk mitigation, reliability, easiness, versatility, satisfaction and quality.

According to analyst prep (2018) there has been an intense change in the role of risk management in the years. Moreover, in the last decade, the work of risk management has not just involved the purchase of insurance but also expanded beyond its limits and evaded financial exposure to cater to various risks. There are two ways in which corporations can manage their risks: tackling risks at a time in a systematic and devolved manner or operating from all points of view in a systematic and corresponding manner enterprise risk management (ERM) .It notes that ERM is more robust and should be adopted by organizations.

Shields et al. (2010) notes that usage of risk-aligned project management strategies was uncommon. It brings to focus the actual interphase between the theory of risk management and actual practice. Kutsch and Hall (2009) indicates that few studies show

what project managers really do in relation to risk management. In this study, focus was on actual practice of risk management and its linkage to performance of IT Projects.

PMBOK 6th edition outlines Project risk management as “risk identification, analysis, response, monitoring and Control of risk in a project. The goals of these elements are to raise the probability / impact of positive risks while lowering the likelihood / impact of negative risks in order to maximize project success prospects”. This study intended to analyses the risk management on risk identification, risk analysis, risk responses and risk monitoring and control and their influence on IT projects performance by commercial Banks in Kenya.

1.1.3 Risk Culture

In this study, risk culture was analysed as a mediating variable due to its influential role in the determination of project performance. Risk culture defines the shared beliefs, values, skills, behaviours and risk perceptions of a group of people. This is a subset of organizational culture that extends to all organizations. Risk culture refers to an organization's set of core values and attitudes that affect risk-taking actions and business decisions. The higher up in an organization an individual is, the more correct (or strict) this principle must be instilled in their behaviour.

Academics have increasingly focused their attention on cultural impact because of its important role in the progress or failure of projects(Tams & Hill, 2015).It's difficult to describe an culture (Hopkin, 2010). It is widely agreed that it reflects the overall mind-set

of any member of a company's management team. Individuals' behaviour in specific situations is determined by an organization's culture. It will determine how a person feels obligated to act in all situations. Person and community beliefs, as well as behaviours and patterns of action, can all contribute to a positive risk culture. This will result in a contribution to the organization's risk management goals.

Risk Management Agency (RMA) and Protiviti conducted a survey (2013) of sixty five financial firms that generated stimulating results on how they observe risk culture. The Study notes that risk culture is extensively accepted as important for successful governance of cooperates and risk management. The financial facilities sector struggles to translate the risk culture into actionable outcomes. The practice of assessing risk culture was also found to be limited in the survey, with just 37 percent of respondents saying they do so.

The study on role of culture on project performance, (Tams & Hill, 2015) a total of 199 finished construction projects in Vietnam were examined, with specific data collected through questionnaires. A list of cultural traits was compiled after reviewing organizational culture models. The results show that contractor devotion to contract treaties is the most important cultural factor impacting project success. Labour efficiency is enhanced by contractor commitment and cooperative orientation, while learning success is ensured by target alignment, confidence, and contractor commitment. Standard of a risk-aware culture by UK Health and Safety Executive (HSE) was applied in this

study: leadership, involvement, learning, accountability and communication. This is summarized in the abbreviation (LILAC).

1.1.4 Project Complexity

The project's complexity is one of the most difficult characteristics to overcome. This justify the need to incorporate the contingent effect of project complexity in this study. Project Complexity was analysed as a moderating variable. Yugue and Maximiano (2012) says the advent of a rising number of methods, technologies, and procedures has aided in the evolution of project management competence. Project variables such as objectives, properties, and setting are utilized to determine which of these tools can be used to fulfill project goals in the most efficient manner.

There is a lack of agreement about what complexity is in project contexts. There appears to be no single description of project complexity that encompasses the entire term. (San Cristóbal et al., 2018). Complexity is described by the intricate structure of several interrelated components and units, as well as the fact that the situation is difficult to comprehend or deal with. Carvalho & Junior (2015) elucidates four conceptual dimensions – technology, innovation, complexity, and speed – to form a "diamond" that can be used to describe an enterprise's features. The technology element is divided into four levels based on the strength and complexity of advancement: low, medium, moderate, and super high.

Another suggested factor of project complexity is the degree of difficulty in developing the project's output. This research aimed to determine the connection of risk management and IT project performance while accounting for the moderating consequence of project complexity. The project complexity model adopted in this study is robust, as developed by Hass (2007) it includes the goals highlighted in the Standish group's recipe for project progress, as well as the best practices outlined in the PMBOK's nine information areas. Aspects of complexity included in this study were: project budget size, team size, project duration, project impact on the business of the bank and project impact on organizational change.

1.1.5 Performance of IT projects by Commercial Banks in Kenya.

Mangare and James (2017) indicate an empirical study by Onsogo (2008). According to the findings of an IT investment study of commercial banks in Kenya, 56 percent of the banks assessed have had more than two (2) failed IT projects owing to failure to achieve originally set targets, project failure to be within budget, and fail to be completed within the prescribed time. According to Onsogo (2008) small banks (tier III) experienced the greatest number of project failures, accounting for 41 percent of all failures compared to 25 percent for big banks (tier II and I).

According to the CBK 2019 banking supervision annual report, uptake of technology in the banking sector has resulted in a significant shift in the strategies of banks. According to the 2018-2019 Innovation Survey conducted by CBK, 94 percent of Kenyan banks

introduced a fintech product between January 1, 2015 and December 31, 2019. Moreover, according to the 2019 Innovation Survey, 80 percent of the banks and 86 percent of Micro-Finance Banks (MFBs) introduced a new Fintech product between January 1, 2019 and December 31, 2019.

The Kenyan Banking sector has gone under a massive digital transformation in the last decade. One of the leading contributing factors to this scenario is the digital transformation. This transformation is driven by Information Technology based Projects. These projected indicate varied performance. The growth of the younger generation, the smartphone, mobile money, and fintech are all driving forces in the banking sector's disintermediation.(King, 2012)

Cracknell (2019) notes that Kenya deserves its fair share of credit. The Kenya Mobile money transformation started with the introduction of M- PESA in 2007. In the spirit of the ‘financial inclusion for all' agenda, the Central Bank of Kenya (CBK) enabled MPESA to function on a ‘test and learn' basis. The digital transformation and data on the Projects being undertaken by the Banks is less reported due to the competitive nature of the Sector.

The transformations projects includes revamping the Core Banking systems, Mobile money applications projects, Internet Banking projects, agency Banking projects and lately mobile applications projects. Other developments include those in payments, which

see everyone paying bills straight through their mobile payment wallets or traditional bank accounts, as well as the upsurge of digital Micro -credit and MShwari.

According to the CBK Annual Banking Report, 2017 saw a number of Kenyan Banks engage it on licensing financial technology use cases. e.g. Block chain Technology, Chat bots, Video Teller Machines (VTMs, Psychometric credit scores) .This is an indication to increased uptake of IT related platforms for business performance. These emerging disruptive technologies Projects bring with them, various forms of challenges in project performance with regards to budget overruns, project delays and technical functionality lapse.

Some of the Major undertaken projects in the sector involves setting up of the Core Banking system. With the Covid-19 pandemic, Banks have been urged to digitize to build resilience and sustain progress. Banks in Kenya have introduced a number of core banking system initiatives, including: Flexcube system by DBK and DTB, the Mysys Bank fusion Universal Banking_ (Co-op Bank), Finacle10 (ABSA & Equity Bank), Temenos' T24 (CBK, KCB), Fusion Banking Essence (FBE), eBBS (Standard Chartered Bank).

The number of projects vary with each Bank and practices of risk management in these projects is not certain and was evaluated in this study. The level of project complexities and risk culture in these projects also vary and the contingent effect was analysed in the

study results. In this Study performance was evaluated as per aspects of PMBOK 6th edition on four indicators of quality, budget, schedule and scope aspects of the project and impact of project on business and organization.

1 .2 Statement of the Problem

Undertaking an IT project in a Banking environment is a complex task and experiences high failure rates. Major projects like changing the Core Banking System is equated to changing the engine of an Airplane mid-air (Arumugam, 2017). According to a study published by the PMI in 2017, 14 percent of IT projects fail. Usmani (2015) notes that it's truly amazing that in this age and time, so many system implementations still fail, that it is baffling. Randell et al. (2014) notes that 70 percent of software projects fail owing to poor requirements, resulting in an annual rework expense of slightly about Usd 45 Billon. Jenner (2015) expounded on disheartening IT project underperformance rates amid 50 to 70 percent. Lehtinen et al. (2014) elaborates that software project failures are common.

Mandal and Pal (2015) argues that there is a sufficient amount of proof of software project failures. Studies have been done in various jurisdictions to analyses the place of risk management practice in performance of IT related projects (Ziemba& Kolasa 2015; Javani & Rwelamila 2016; Akofi 2017). This has contributed to varied results as to the influence of risk management practices on projects performance. (Baccarini et al.; Kutsch & Hall, 2009; Tams& Hill 2015). According to a global survey conducted by the Standish Company, 83.9 percent of IT projects fail partially or entirely.

In the Kenyan context, though limited in published survey, several examples can be highlighted in the IT project performance failures in one aspect or another. Core Banking System (Flexcube) Development project by a Bank that was to be implemented in two years from 2015, took over five years to implement with numerous vendor and technical challenges. National Bank's 2018 report identifies failure of integrating the In Duplum Rule (section 44A (1) (b) of the Banking Act) into the core banking system which makes it impossible to operationalize the rule on interest accrued on the non-performing loans over and above the outstanding principals .In 2015 Equity Bank had to upgrade its System to a new version Finacle Version 10, to deal with a public relations crisis following widespread IT system breakdown.

(Mangare & James, 2017) indicate an empirical study by Onsogo (2008) according to a research on IT projects evaluation of commercial banks in Kenya, 56 percent of the banks studied had more than two failed IT projects owing to failure to meet initial set targets, budget, and completion within the prescribed timeframe. Onsogo (2008) recognized that the uppermost number of project failures happened in smaller banks accounting for 41 percent of the total, while big banks accounted for 25 percent.

With this challenges in implementing IT projects and high failure rate, a study is necessary to evaluate the risks management practices and how it affects performance of

the IT Project. There is research gap in evaluating risks management practices in IT projects in the banking sector in Kenya. Mutua and Kirui (2020) notes that risk management in finance and banking has been less explored hence creating research gaps in performance of core banking systems in Kenya's banking industry. Studies reviewed have been conducted in other jurisdictions and are in other sectors. Results generated may not be in context with the commercial banking in Kenya scenario.

On the other hand methodology applied in various studies have largely ignored the measurement improvement of mediating and moderating variables that influence risk management on IT projects. A potent way of enhancing this research designs, and thus providing more functional, realistic and accurate findings, is introducing mediating and moderating variables relating to the study. This research aimed to assess risk management and project performance of IT projects by commercial banks in Kenya, noting the moderating control of project complexity and the mediating effect of risk culture.

1.3 Objectives

1.3.1 General Research Objective

The study's overall goal was to evaluate the influence of risk management on performance of information technology projects by commercial Banks in Kenya.

1.3.2 Specific Research Objectives

The study's specific objectives was to:

i. Examine the influence of Risk Identification on IT Project performance by commercial Banks in Kenya.

ii. Evaluate the influence of Risk Analysis on IT Project performance by commercial Banks in Kenya.

iii. Evaluate the influence of Risk Responses on IT Project performance by commercial Banks in Kenya.

iv. Evaluate the influence of Risk Monitoring and Control on IT Project performance by commercial Banks in Kenya.

v. To determine the moderation effect of Project Complexity in the relationship between Risk Management and Performance of IT projects by commercial Banks in Kenya.

vi. To determine the mediating influence of Risk Culture on the relationship between risk management and IT Project performance by commercial Banks in Kenya.

1.4 Research Hypotheses

The null hypotheses tested in this Study, resulting from the research objectives, were as follows:

H_{01}: Risk Identification doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya.

H_{02}: Risk Analysis doesn't have a significant influence on performance of IT projects by the commercial Banks in Kenya.

H_{03}: Risk Response doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya.

H_{04}: Risk monitoring and control doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya.

H_{05} Project complexity do not moderate the relationship between risk management and performance of IT projects by commercial Banks in Kenya.

H_{06}: Risk culture do not mediate the association between risk management and performance of IT projects by commercial banks in Kenya.

1.5 Significance of the Study

The findings of this research will be of importance to the Central Bank of Kenya (CBK).As a regulator of the Banking sector, this study will enable operationalization of risk management in IT projects, and contribute to policy formulation. The findings of the study will also enhance risk management knowledge and practice within the banking sector IT projects and contribute to employees and its stakeholder's knowledge base on the implementation of IT Project.

The results of this research will be valuable source of inferential and descriptive statistics for operations and strategy implementation, support and drive of management in other related entities like Kenya Bankers Association (KBA). The banking industry will benefit from the study in knowledge enhancement in business system development. The findings of this study will also provide improvement to knowledge base to academics and scholars

in IT projects implementation and risk management within the banking sector and other related financial institutions such as micro finances and Saccos. Project managers and project teams will also benefit from the findings on how to implement performing projects.

1.6 Scope of the Study

Risk management is a wide field and is embraced in all sectors. This research looked into risk management and project performance of IT projects by commercial banks in Kenya. Commercial banking in Kenya is selected due to increased number of the failed IT projects undertakings. The study narrowed down to four elements of risk management namely risk identification, risk analysis, risk responses and risk monitoring and controlling. Moderation effect of project complexity and mediating effect of Risk culture are analysed.

The specific scope reference of this study was the IT projects undertaken by commercials Banks licensed by Central Bank of Kenya as per the banking supervision report 2019 and excluding the projects in banks under receivership. The study was conducted in Nairobi County where the head offices of the Banks are domiciled. Selected projects were Projects undertaken during three years period between 2017 and 2019 not taking into account their performance. The projects in the study were the ones undertaken in Banks as per the 2019 bank supervision report of the Central Bank of Kenya (CBK) which

captures 43 banking institutions, three of which were under receivership hence omitted in the study.

1.7 Limitation of the Study

Reviews indicated limited related studies in line with risk management practices and performance of IT projects in the commercial Banks environment, therefore a challenge of literature was experienced. This study ventured into a dynamic and evolving field. In this study, questionnaires were used as the principal research data collection instruments. This implies that responses depended on individual responder cognition and perceptions.

The primary respondents drawn from IT and project management professionals were constrained by time and interest, as banking is a service intensive industry. The researcher endeavoured to target the responded through professional association links such as Kenya Bankers association, the regulator Central Bank of Kenya and professional bodies such as ISACA, ICPAK and PMI to interest their participation.

This study was undertaken during the COVID -19 Pandemic when most Bank employees were working from home and social distancing was encouraged. This posed a challenge in distribution and collection of questionnaires. The researcher used a combination of digital platforms to administer an online web based questionnaire as well as physical questionnaires to improve on the response rate.

1.8 Organization of the Study

This thesis is arranged in this order; background of the study, problem statement, objectives of the study, hypotheses of the research, significance of the study, study limitations and scope of the study and organization of the study are in chapter one.

In chapter two theoretical literature anchoring this study is highlighted. The chapter also including extant empirical literature, with a view of highlighting knowledge and research gaps. A conceptual framework is also included in chapter two to reflect what the researcher depicts to be the associations amongst the variables in this study.

Chapter three highlights the methodology in the study comprising of research philosophy, design of research to be adopted, empirical model, hypotheses testing, the target population, size of sample and study sampling procedure and techniques, data collection instruments, reliability and validity of the research instruments, operationalization of variables, data analysis, the data collection procedure, diagnostic tests and the ethical aspects of the research.

Chapter four outlines research findings and discussions. It covers response rate and demographic characteristics of the respondents by age, gender, education level and respondents' work experience as a banker, function area, number of years in current role and project type. It also covers descriptive statistics on performance of IT projects and the inferential statistics. The chapter also gives the findings of the study using tables and statistical parameter estimates.

The study's summary, conclusion, and suggestions are presented in Chapter five. The study's contribution to knowledge and suggestions for further research is also outlined. Thereafter chapter five is followed by annexures of research instrument, research authority and approval, research permit, research programme, research budget and list of projects in the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

A comprehensive overview of the theories that are central to this research are discussed in this chapter. Theoretical underpinnings of the research, as well as empirical literature related to the study variables of risk management: identification, risk analysis, responses strategies and risk control and monitoring and how these variables affects the performance of information technology project by commercial banks in Kenya are discussed. Literature on mediating and moderating variables of risk culture and project complexity has also been reviewed. The research gaps that the study addressed have also been outlined and the chapter concludes by presenting the conceptual framework that portrays the association of the variables in the study. The reviews entailed extensive research from risk management standards, textbooks, peer reviewed journals, and reputable professional bodies research reports and online resources.

2.2 Theoretical Literature

This section discusses the theories that support this research study. Lederman and Lederman(2015)notes that the theoretical structures are critical to all work, whether they are quantitative in nature or qualitative or even a mixed methods. Research publications should contain a clear theoretical framework to explain the work's rationality and importance. Theoretical framework is the construct that retains or supports a research study's theory or theories; it outlines and explains the theory or theories that justify why

the research issue under investigation occurs. Review of theories is an important undertaking in social science research as knowledge generated from social science research studies should be seen to be relating to existing theory (Saunders et al., 2008).

Kawulich (2012) explains that a theory is used to construct and explain phenomena isn't the same as saying that it's an dependable law that exists outside of space and time and comes before anything else. This study was built on the following theories to investigate risk management in performance of IT projects in the Commercial Banks in Kenya; Enterprise Risk Management theory, System theory, and Contingency theory, Critical Success Factor theory of Information Technology.

2.2.1 Enterprise Risk Management Theory

Initial scholarly articles of enterprise risk management theory were written by Nocco and Stulz (2006). The authors argue in the context of well-designed ERM program, where all significant organizational risks are treated and handled within one framework, can provide long-term competitive advantage and value by affecting both the company-wide and the business unit level. Outside pressure, resulting from corporate scandals involving huge risks, has had a significant impact on this growth.(Gates, 2006). Jankensgård (2019) explains that ERM quickly established as the mainstream theory of corporate risk management.

The ERM theory of project risk management includes the agency problem of undertaking risk management under the risk governance pillar that includes “the processes of conducting risk management planning, risk identification, risk analysis, response planning, response implementation, and monitoring risk on a project”. Nocco and Stulz (2006) according to the study, corporate risk management has grown further than insurance and financial liability hedging in the last years to include other types of risk, including reputational risk, operational risk and strategic risk. Eaton (2015) expounds that “ERM is a relatively new all-inclusive and strategic approach for handling risks in today’s organizations.” As a result, ERM theory builds on conventional corporate risk management theory, which focuses on removing the impact of external frictions like the taxation or contractual issues amid the company and other business stakeholders(Smith & Stulz, 1985).

ERM is distinguished by the fact that the theory reflects risk management in line with the viewpoint of the company's top leadership and board of directors, including risk governance, which governs risk management activities. The focus is on how to handle the entire enterprise's net, consolidated risk exposures, as well as framing the firm's ability and capacity to embrace the risks. Bogodistov and Wohlgemuth (2017) states that a firm's risk management efforts should be directed toward maintaining and improving the firm's core competencies, as part of a resource-based view and complex capacity structure.

Galer (2015) highlights the main critics of ERM that it cannot identify and protect an organization from all significant uncertainties, ERM tends to focuses on the negative aspects of risk rather than the positive and that implementing an ERM model is expensive to organizations. As a key theory in risk management, the enterprise risk management theory has vast relevance in this study. This is because the study evaluates the practice of and the application of risk management and performance of IT projects. The theory thus anchors the hypotheses relating to risk identification, risk analysis, risk responses and risk monitoring and control. The research objectives i, ii, iii, iv, was illumined by this theory.

2.2.2 System Theory

The need for a collection of systemic theoretical constructs to address the empirical world prompted the development of systems theory in the 1950s. (Boulding, 1956; von Bertalanffy, 1951) The study of culture as a dynamic arrangement of objects, including individuals and their values, as they relate to one another, is known as systems theory in social science. The interdisciplinary analysis of systems is known as system theory. Lai and Lin (2017) according to publications, system theory has its origins in biology and was established in the 1950s in response to a need for a collection of systematically theoretical constructs to discuss the empirical world(Bertalanffy, 1972).

For more than 60 years, the theory has served as a basis for organizational science, representing a conceptual framework of organizational theories. Each system is defined by its structure and purpose, is constrained by space and time, is influenced by its

surroundings, and articulated by its behaviour. If a system exhibits synergy or emergent behaviour, it's more than the sum of its parts. This study focused on Information systems project. Greene (2017) notes that another explanation for the theory's utility in social work undertakings is that systems theorists have provided a required means of taking into consideration continuity and variation within and across different social systems.

While problem-solving and evaluating action and change options, it's important to remember social networks are ever changing, and rather purposeful, with a directed goal, and in continuous states of interaction with their surroundings. Deshpande (2011) states that projects are complex because everything, from people, businesses and environments, is interrelated and are affected by both inside and exterior factors. Criticism of system theory is that it is ambiguous in nature as the relations between the variables are not stated with rigour and that complicates its application in real studies.

This theory is therefore construed to have relevance in this study as IT projects are complex systems and dynamic in nature. This study analyses how IT projects performs in relation to the various environments, in this context, risk management .IT projects are part of more complex interrelations that can be part of programs that can, in their turn, be part of portfolios. This theory anchors the study area on IT projects as they are complex and interconnected in nature.

2.2.3 Contingency theory

The contingency theory explains that there are specific situational factors that can affect the direct relationships between independent and dependent variables in the study of organizational behaviour. In his seminal 1964 paper, Austrian psychologist Fred Edward Fiedler suggested the contingency theory of leadership. For at least two reasons, contingency theory is generally accepted. To begin with, the reasoning that underpins it was extremely convincing. That makes sense; there is one way that fits all approach to management. Second, Lawrence and Lorsch (1967), Woodward (1965) and Bums and Stalker (1961) showed what appeared to be convergent findings at first glance.

Preliminary studies on contingency theory shows that variables such as the leadership style employed, the role design and the way decisions are made in a firm, and the organizational arrangement are crucial in determining what will lead to a successful complete managerial outcome. Hoagland and Shepard (1978). In the dictionary of management, a more recent classification of contingency theories divides them into two groups: external contingencies and internal contingencies (Helms, 2000). Internal contingencies are concerned with issues such as an organization's scale, culture, and form.

According to Tosi and Slocum (1984), as with any theoretical model, subsequent research revealed some flaws that needed to be addressed. Contingency theory's philosophical framework has been criticized for a variety of reasons. Perrow (1980) criticizes the idea of efficacy as well as its deterministic premises. Schoonhoven (1981) identified the flaws

as a result of a hazy understanding of the variables and a lack of detail in the relationships between them. Culture's results must be incorporated into contingency theory, according to Child (1981).

Carvalho and Junior(2015) expounds on the contingent effect of project complexity as they discuss the impact of soft skills. Quain (2018) states that using the contingency theory of management allows managers to remain vigilant and avoid making decisions based solely on laws, regulations, or tradition. Managers must appreciate the value of contingency theory and its positive effects in the workplace to increase efficiency and employee morale. This research aimed to figure out how risk management affects IT project performance by commercial banks in Kenya, bearing in mind the contingent effect of project complexity as a moderating variable and risk culture as the mediating variable. The mediating and moderating variable were anchored on this theory.

2.2.4 Critical Success Factor theory of Information Technology.

Grunert (1992) states that the idea that there's a few factors that are critical to the company's performance, and they are determinable, was initially brought to fore by Daniel (1961) and then largely expounded by Rockart (1979; Bullen & Rockart, 1981) in the context of undertaking management information systems. From the 1960s, there have been authors (e.g. Ingram, 2000; Wright, 1997; Turner, 1993) who have specified that success in project undertaking is a result of three constraints in the sets of time, cost and specification, this has been the indication of project success.

Milis & Vanhoof (2006) conducted a research on success criteria for ICT projects. According to the findings, the triple constraints have a minor effect on performance evaluation. Other factors, such as customer satisfaction and financial or commercial performance, matter even more. This theory anchors the dependent variable, Project performance. Adzmi and Hassan (2018) points out that businesses have made substantial investments in ICT projects in the hopes of gaining competitive advantages, development, and productivity improvements. On the top of debates in the project management field is the project's progress and shortcomings.

Chiemelie (2014) states that for a high-potential ICT project, the project manager must recognize the parameters by which project performance is assessed, and meeting these criteria ought to be the project manager's top priority. In regards to ICT project, the determination of whether a project is successful or not is different from the normal projects and more compound thing to do (Belassi &Tukel, 1996). The Major criticism of this theory is the alignment of success factors. When the rest of the company is focused on putting new systems in place quickly to meet market changes, information technology departments in large organizations may concentrate on a collection of success factors such as system reliability and the need to follow project management methodology.

As noted in Chiemelie (2014) although the success factors for ICT projects are less certain than for other types of projects, the author do identify some predetermined factors

that affect success, which include: Time – when it comes to assessing the likelihood of success in ICT project management, time is also crucial. Specification – every project has a set of specifications that it is built to follow, with the expectation that by following these specifications, the project would have a greater chance of meeting the requirements for which it was created.

Under budget–The project's ability to be accomplished within the budget allotted would mean progress and the company will operate efficiently. Happiness of stakeholders – in an ICT project, stakeholders include management, employees, and end users. The level of satisfaction achieved by these stakeholders is used as a direct indicator of an ICT project's success. In this study aspects considered included: desired quality, project within budget, project within schedule and project undertaken within scope. This theory anchors the dependent variable, project performance.

2.3 Empirical Literature Review

This section covers published research, reports from peer-reviewed journals, documents reports and materials from the internet, library websites and databases, and other related publications on the topic covered in this study. This study examine the core structures, variables, and viewpoints that underpin risk management practice and is comprised of risk identification, analysis, responses strategies and risk monitoring and control. Moderating variable project complexity and risk culture a mediating variable are also discussed.

2.3.1 Risk Identification and Project Performance.

PMI defines risk identification as the procedure of identifying risks that might inhibit a program, company, or venture from meeting its purposes. It entails recording and relaying the problem. The process that comes before the risk identification is the planning phase of risk management. The risk management plan is generated at this phase. Boehm (2007) in the study Software Risk Management: Principles and Practice notes that identifying and addressing risks early in the production process lowers long-term costs and helps avoid disasters,

Mutua and Kirui (2020) in a study conducted in Kenya examined the degree to which project risk identification affects core banking system projects output in selected Kenyan banks. The study employed the use of descriptive research design. A total of 80 respondents, with ten project managers from each bank. The study revealed that defining risk allows for maximum risk analysis and risk mitigation, and that risk identification has a significant impact on the performance of Kenyan commercial banks' core banking systems, as shown by the study mean score of 4.35 and SD of 0.627.This relationship had however no contingent variables.

Kinyua et al.(2015) undertook a study to analyses the risk management strategies on project performance, conducted in Nairobi Kenya on small and medium information technology enterprises. The study used descriptive research design. The target population in the study was 48 ICT SMEs. The sample size included in the study of project workers

in the population targeted was determined using a random sampling method .The primary data was collected by the use of questionnaire that was self-administered to a sample of employees employed in ICT SMEs through drop-and-pick questionnaires. To find out the effects of risk management tactics on project performance of ICT SMEs, multiple regression model was applied. According to the findings, there was positive association in project risk identification and project performance of Kenyan ICT SMEs, with project risk identification affecting IT project performance positively through risk porting, registration, allocation, control, and checklist.

Carvalho and Junior(2015) undertook a research on the impact of risk management on Project performance, whose aim was to study the effect of risk management on project success, and in view of the contingent effect of project complexity. Survey was used for experimental evidence in the Brazilian analysis, which used structural equation modelling. The theories were put to the test in a study that included 263 projects from eight different firms. Risk detection stands out in recent research, as per the results of the study. The study found a strong association that elucidates 25.3 percent of the impact of the hard side on project performance, indicating that the soft side of risk management practice, which includes risk identification, supports the hard side. The enactment of risk management practices has a substantial impact on the project's performance, according to the report.

In the study undertaken by Bakker, Boonstra, and Wortmann (2012), a majority of stakeholders (above 75 percent) indicated that risk identification is the greatest most important element. Bakker, Boonstra, and Wortmann (2012) directs that the main worries of stakeholders include risk reports, risk records, risk allocation, risk control and risk analysis. Reeves et al.(2013) argue that inadequacies in the procedure of identifying risks in the building of complex information systems are the cause of let-downs.

Bakker et al. (2010) says the issue of whether risk management leads to the project performance has been debated by academics and practitioners for quite some time. This paper provides a meta-analysis of scientific evidence that supports or refutes the argument that risk management helps IT projects succeed. Raz and Michael (2001) notes that risk management is among the most important project management methods, according to the author. There are a variety of resources available to assist with the phases of the risk management process. The paper discusses the risk preparation and recognition methods that are available.

2.3.2 Risk Analysis and Project Performance.

Risk analysis, according to the PMBOK 6th edition, entails "performing qualitative risk analysis. This is the process of prioritizing itemized project risks for further analysis or action by measuring their probability of occurrence and impact, as well as other feature. The other step is quantitative risk analysis. This process entails mathematically analysing

the combined effect of identified individual project risks and how it affects the project as a whole”

Pimchangthong and Boonjing (2017) undertook a study in Thailand on the effects of risk management practices on the success of IT Project. The study's goals were to appraise how risk management strategies affect the progress of IT projects. Data was obtained via questionnaires from two hundred project managers, IT leads, and IT analysts in IT companies, and was evaluated using the, One-way ANOVA, independent Sample t-test, and multiple linear regression and at 0.05 statistical significance level. Risk analysis and risk response preparation were found to have a positive effect on product results, while risk analysis had a negative impact. This implies that the lesser risk analysis is done, the better the product's output ought to be. Business ought to prudently consider undertaking risk management due to time and financial details as reinforced by Didagra (2013) that, from the application point, a number of project leaders choose not to adopt any risk management owing to financial motives.

Reeves et al. (2013) notes qualitative evaluation may be continued into a quantitative study if it is considered necessary for the project. It is the only stage of the technique that is not required to be used because it has drawbacks when applied to a live, interactive project . Raz et al.(2002) states that all projects have risks and that many project managers assume that there projects will be successful without analysing risks. The paper notes that only limited projects undertake risk analysis.

Raz, Dvir and Dor (2002) conducted a study in Israel on over 100 projects across varied industries. To ensure accuracy of outcomes, descriptive analysis of variables was combined with a Pearson correlation coefficient of risk practice variables'-test. Cronbach alpha level greater than 0.7 were used to test multiple scale risk management items. The findings revealed that risk analysis techniques such as probabilistic risk analysis are not commonly used, but when they are, they tend to contribute to project progress in terms of budget and timeliness, rather than requirements and product quality. The study's conclusion, risk management is commonly used in high-risk ventures, but that it is still in its infancy, and that more knowledge, resources, trainings, and studies are needed.

2.3.3 Risk Responses and Project Performance.

Firmenich (2017) in the paper customizable framework for project risk management ,risk mitigation options were presented in a study conducted in Switzerland as risk avoidance, elimination, insurance, the transfer of risk and risk acceptance. The study's goal was to highlight the importance of efficient and successful project risk management methods, as well as to assist project leaders in increasing project cost by introducing a new project risk management system. Risk reduction, according to the findings, is the phase that entails assessing and acting to change the project founded on the preceding risk analysis. To control the efficiency of the risk mitigation actions, risk controlling closes the circle by comparing the current project situation to the initial project schedule.

Didraga (2013) risk management activities were divided into four categories in a study of Romanian IT projects. The approach used was based on a survey of documentary studies and an interpretation of the literature's concepts. The thesis looked at literature from major IT project management journals and articles published between 1978 and 2012. Risk management is a critical component of the project undertaking process, and it is implicitly believed to function in support of project performance, according to the findings. Risk response preparation is associated with subjective perceptual risk, according to the hypothesis. The subjective performance of the IT project, was not accepted, since the significance level was 0.120 (>0.05). The correlation association between the risk response mechanisms and the subjective performance of IT projects was not significant from a statistical point of view.

Baccarini (2004) states that the handling of risk encompasses the involvement of the most aligned strategies for handling the incidences. There are four key methods for dealing with project risks: avoidance (doing nothing about the risky activity), mitigation (doing something about the risky activity), and adaptation (doing something about the risky activity). Reduce the likelihood of a risk event happening, as well as the effects of that event. The most popular risk-handling strategy is risk mitigation. Shift – the transfer of all or part of a danger to another entity. Accept the risk and, as a result, the consequences if the risk occurs.

Dey & Ogunlana (2004)the carrying out of risk management in projects is demonstrated in the study “collection and application of risk management methods and techniques for build-own-transfer projects”. The research focused on the use of risk management approaches and strategies in projects, and it developed a model for choosing risk management processes for build-own and transition projects based on reviews of applicable literature. The research looks at risk response allocation and handling in practice, among other things. The findings revealed that only a small risk response framework was being used in projects. Wallmuller (2010) states that after a risk has been assessed, one or more strategies for how team participants can manage and react to the risk should be identified.

When risks have been defined, assessed, and evaluated, ISO 31000 states that the required risk treatment should be used to minimize, eliminate, or maintain each risk based on a variety of factors. If a risk is unavoidable, inevitable, or falls below the agreed risk tolerance limit, an entity may opt to keep it. The risk tolerance and appetite of an organization may have a significant effect on risk treatment, as some organizations can prefer to retain more significant risks than others if the possible benefits outweigh the risks.

2.3.4 Risk Monitoring and Control and Project Performance.

“This is the process of monitoring the implementation of set out risk response plans, following identified risks, recognizing and analysing new risks, and assessing risk process

effectiveness throughout the project" (PMBOK 6th edition). The aim of risk monitoring is to keep up with the risks identified and tracking new ones. It includes ensuring that the company put in place the risk response measures, determining the continuing efficacy of risk response measures, and identifying any adjustments that would affect the risk levels.

Pimchangthong and Boonjing (2017) in a study carried out in Thailand, notes risk monitoring and control is rated as being of moderate importance to project success. Teklemariam and Mnkandla (2017) highlights that a limited proportion of organizations, about 27 percent completed the steps from discovery to review and prioritization, as well as the preparation of mitigation plans and ongoing monitoring.

Teklemariam and Nkandla (2017) in a study of software project risk management practice in Ethiopia, discovered that risk detection was normal, but that risk analysis and production of mitigation or response plans, tracking, and control were not. It investigates the connection between project performance and risk management practices in Addis Ababa, Ethiopia. Insurance companies, 45 banks and United Nations agency offices participated in the survey. The use of structured risk management models was found to be extremely rare in this research. It was also discovered that some project managers were unsure if risk management processes had been implemented in the projects they were working on.

This is in agreement with (Adeleye et al., 2004)in the study on risk management practices in IS outsourcing: The investigation was undertaken in Nigerian commercial Banks where 48.5 percent of the respondents were involved in risk identification in their projects and prepared response and monitoring approaches. A similar outcome is detected in a South African research, “evaluation of software project risk management in South Africa” (Wet & Visser, 2013). The study examined if the performance rate of software projects in South Africa is also low, and if risk management may improve these success rates. A questionnaire with nine questions was used to assess the respondents’ sentiments on features of risk management in South Africa IS projects in. Just 40 percent of 35 IS projects adopted one or several of the measures defined by the standard for software risk management, according to the findings.

2.3.5 Risk Management, Risk Culture and Project Performance

Deloch (2015) notes efficient risk management does not operate in a void, and it rarely can withstand a leadership failure. Risk culture represents the shared principles, urgencies, practices, and strengthening ways that integrate risk into a firms decision-making mechanisms and risk management into its operationalized processes in an organization. Risk culture is the link that holds all elements of risk management substructure together. When faced with decisions in their daily lives, employees employed in an organization with a strong risk culture can maintain a constant sense of equilibrium, consciousness, and risk management acumen. This applies to all staff, with a deep sense of being the "first line of defence."

Roslan and Dahan (2013) in the study, Enterprise Risk Management (ERM) has developed as a new mainstream concept for managing firms risk in totality. ERM has been lauded by business leaders and business around the world. According to the report, there are deficiencies in the exercise of ERM among Malaysian organizations, as evidenced by various studies. The study's target population was eight industries listed on Bursa Malaysia's main board. Up to 767 organizations were encompassed in the study. Senior management who had direct dealings with ERM activities in the company received questionnaires measuring a seven-point Likert scale with a range from "strongly disagree (1)" to "strongly agree (7)." Finally, the conceptual structure of the paper describes the significant relationship that exists between risk culture and the enterprise’s risk management strategy, as well as its effect on firm’s success.

Hopkin (2010) defining an organization's culture as challenging. However, it is widely agreed that it reflects the overall mind-set of any member of a company's management team. Individuals' behaviour in specific situations is determined by an organization's culture. It will determine how a person feels obligated to act in all situations. The system of core values and behaviours present in an organization that affect risk taking positions or business decisions is known as risk culture. The higher up in an organization a person is, the more precise (or strict) this principle must be instilled in his behaviour.

Risk management association conducted a combined survey of 65 financial institutions in June 2013 titled “risk culture: from theory to emerging practice”, which was published in the RMA journal between the months in January 2014 and yielded interesting outcomes of how organizations view risk culture. While risk culture is largely renowned as important for successful corporate governance and risk management, the sector of financial services continues to find it difficult to translate into actionable results, according to the study. The practice of assessing risk culture was also found to be underused in the survey, with just 37% of respondents saying they do so. Not more than one-third of respondents trust risk culture is completely integrated into their business in terms of integration.

Measuring risk culture in a company can be challenging. However, since the organization's risk culture is so critical, measurements must be taken (Hopkins, 2010). The Health and Safety Executive (HSE) of the UK has identified the components of a risk-aware society. Leadership, engagement, learning, responsibility, and communication are proposed as components. LILAC acronym is formed as a result of this. This research used this model to assess risk culture in commercial banks in Kenya, as well as its role as a mediator in the relationship amid project success and risk management practices.

2.3.6 Risk Management, Project Complexity and Project Performance.

Hash (2007) notes that according to the 2001 Webster's encyclopaedic dictionary, complexity is described as a difficult or involved arrangement of many interconnected

sections, units, or other elements, and the situation is so complicated or intricate that it is difficult to understand or deal with. Some of the aspects that attribute to project complexity include: details include the number of variables and interfaces, as well as the number of independent variables and interfaces; lack of knowledge of events and causality; ambiguity uncertainty; failure to assess behaviour ahead of time.

Hartono et al.,(2019) in the study titled “project risk management maturity (PRMM) for project based organizations” investigated using complexity as a moderating variable. The study was for project-based organizations. The model proposes that the average degree of "complexity" of projects usually completed by organizations positively moderates the relationship between the two main variables. A self-administered cross-sectional survey of managers representing their particular firms in the construction, ICT, and Telco industries was administered.

The findings indicate that PRMM's effectiveness is measurable through organizations in general, but that it’s worth decreases for firms with lower aggregates of "project difficulty." The moderation model is empirically supported in this analysis. The discovery aids in the theoretical refinement of research on project risk maturity. The result emphasizes the significance of contextual variables (project complexity) when modelling organizational maturity from a functional standpoint.

Carvalho and Junior (2015) studied contingent effect of project complexity is examined in the analysis on the impact of risk management on project performance. The study was primarily on the role of soft skills. The aim of this research was to determine the relationship between risk management and project performance while accounting for the contingent influence of project complexity. The study included 263 projects from eight different industries. Interviews were conducted with the identified project managers and the firms risk managers, as well as an examination of internal company records pertaining to the projects' results.

Technical complexity, length, the size of the team and project complexity was assessed by documented review. Industry and complexity were nominal moderating variables, as a result, they were operationalized in the operational model as dummy variables. The report concludes that, in addition to the complexity of the project and business variables explored in the study, other moderating and control variables, such as life cycle stages and the size of company should be investigated in future studies.

Hash (2007) indicates that majority of 21st-century projects are extremely complicated, requiring numerous interconnections, nested systems within systems, and constantly evolving requirements. Using a good project complexity model to diagnose the level of complexity on a project and making management decisions based on that information will significantly improve the project's chances of success. This study adopted the project complexity model framework as proposed Hass (2007) in the article introducing the new

project complexity model, to assess the moderating effect between risk management processes and the IT project performance.

2.4 Summary of Empirical Literature Review

From the reviews on influences of risk management, it is evident that studies on the impacts of risk identification, risk analysis, risk responses and risk monitoring and control and performance of IT projects have yielded varied results. This provided impetus to empirically analyse the relationship between risk management in performance of IT projects by commercial banks in Kenya. Moderating variable project complexity in included as well as risk culture as a mediating variable in studying the relationships between risk management and the performance of IT projects by commercial banks in Kenya as suggested in (Carvalho and Junior, 2015). The table below depicts research gaps summary and literature review.

Table 2.1: Summary of Previous Studies and Research Gaps

Author Year Journal	**Title**	**Key issues being addressed**	**Key variables (Dependent &Independent Variables)**	**Key findings**	**Research Gaps and how Addressed.**
Varajão & Amaral, (2020) "International Journal of Project Management and Productivity Assessment January-June 2021"	*"*Risk Management in Information Systems Projects: It Can Be Risky Not To Do It"	Information Technology projects continue to show a poor track record, and problems related to project management performance persists.	DV Performance of IS Projects IV: Risk management : Plan risk management Identify risk Risk analysis Risk responses Risk control	The obtained results show low levels of risk management processes implementation and reinforce the idea that "it can be risky not to do risk management," demanding more research in this area.	Majority of participants are from Europe (62.6%) and North America (23.4%), and further research is advisable in other countries to expand results. Addressed by expanding respondents from other units and doing the study in Kenya.
Augustus Nzili Mutua & Dr. Kirui Caleb 2020 "International Journal of Research and Innovation in Social Science"	"Effects of Project Risk Identification on the Performance of Core Banking Systems in Commercial Banks of Kenya"	Examine how project risk recognition affects the efficiency of core banking system projects in Kenya's selected banks.	DV Performance of Core Banking system Projects IV Risk Identification variables	When risk is identified, it is possible to conduct a thorough risk analysis and resolve the problem. The efficiency of core banking structures in commercial banks is influenced by project risk recognition.	Risk Identification is the initial step in the maturity model of ERM framework. Addressed by examining all components of Risk management in projects including moderating and mediating variables.
Andreas G.M. Nachbagauer Iris Schirl-Boeck (Nachbagauer & Schirl-Boeck, 2019) *"Emerald Insight International Journal of Managing Projects in Business"*	"Managing the unexpected in megaprojects: riding the waves of resilience"	Organizations and project managers are not in a position to anticipate or plan for the unexpected Risks – but the unexpected cannot be avoided.	DV: Unexpected Risks IV Management, Factual dimension Social Temporal Intervening Human factors Organizational	Although the unpredictable cannot be predicted, organizations and managers should intend for it.	Grounded on constructionism and systems theory more research based on other theoretical perspectives is needed. Addressed by including other relevant theories in the study.

(Hartono et al., 2019) "International Journal of Engineering Business Management Volume 11: 1–16 [a] The Author(s) 2019"	"The impact of project risk management maturity on performance : Complexity as a moderating variable"	Utility of project risk management maturity (PRMM) in the project-based firms.	DV Project Performance IV PRMM Moderating variable Project Complexity	The utility of PRMM can be seen across organizations, but it is less effective for those with a lower degree of "project difficulty." This study backs up the moderation model with empirical evidence.	Due to the low answer rate, there could be prejudices. Second, the selected sampling method (convenient) may raise some questions about the true representation of the population. Addressed by increasing respondents and using probability sampling
Mohamad Anisur Rahma (Rahman & Qi, 2018) "Journal of Administrative and Business Studies Vol 2(4): 209-215"	"Core Banking Software (CBS) implementation challenges of e-banking: An exploratory study on Bangladeshi Banks"	CBS Projects have difficulties; study seeks to evaluate why.	DV CBS Challenges IV Nine Identified Risk factors from Literature.	The sources of hindrances for CBS undertaking project are management, software and vendors according to this report.	Research Gaps Gap on how factors influence CBS Performance. Enhanced by descriptive research design adoption.
Jennifer Firmenich (Firmenich, 2017) "Emerald *Insight Construction Innovation Vol.17No.1,2017"*	"Customizable framework for project risk management"	Project risk management is a method of assisting project participants in identifying, assessing, and minimizing project risks while maximizing cost certainty.	DV Risk Management Framework IV identification assessment classification mitigation controlling	The author offers a comprehensive and adaptable project risk management system that is based on both experience and academic research.	The framework makes no mention of the project participants' possible unwillingness implement project risk management mechanism. The proposed structure has yet to be scientifically checked. Addressed by testing the framework empirically in a survey study.

Daranee Pimchangthonga, & Veera Bonjingb (Pimchangthong & Boonjing, 2017) Science Direct	"Effects of Risk Management Practice on the Success of IT Project."	IT project failure rates were high because they were ompleted above budget, delayed in schedule, and without meeting specifications	DV: IT project Success IV Identification Analysis. Response Planning Monitoring and Control Types and sizes of organization	The findings revealed that variations in organizational styles had an impact on IT project success.	The sample size was kept small by limiting it to IT projects at Thailand IT companies. More testing should be performed on a larger sample. Addressed by improving on study sample size
Blessing Javani Pantaleo Mutajwa (Javani & Rwelamila, 2016) Emerald *Insight*	"Risk management in IT projects – a case of the South African public sector."	The associated risks have risen in tandem with the increasing sophistication of IT projects, according to the study.	DV Risk Management in IT. IV Recognition of Risk Application Of Risk and Understanding of Risk	According to the results, which are statistically important, Risk management is in use in current IT programs.	The study was applicable to public sector in south Africa. Study could be replicated in other Nations and Industries. Addressed by conducting the study in the Banking sector in Kenya.
De Carvalho and Roque Junior, 2015 "International Journal of Production Research, 53:2, 321-340"	"Impact of risk management on project performance : the importance of soft skills"	The aim of this research was to better understand the relationship between risk management and project performance while taking into account the contingent effect of project complexity. This method incorporates both soft and hard skills.	DV: Project Performance IV: Risk Identification Risk Analysis Risk Responses Risk monitoring Soft approach Intervening Variable: Complexity of Project.	Risk management soft side stands out the most, accounting for 10.7% of the impact on project performance. Furthermore, the soft side supports the hard side, a strong association that accounts for 25.3 percent of the hard side effect.	Using a non-probability sample of people, this study exposed the inherent weaknesses of the methodological choices made. Addressed by use of probability selected projects that is representative.

Stefan Tams & Kevin Hill (Tams & Hill, 2015) "Journal of Organizational and End User Computing, 27(4), 43-60, October-December 2015"	"Information Systems Project Management Risk: Does it Matter for Firm Performance ?"	While studies have significantly improved our knowledge of the network of ISD risk and progress, the documentation on the effect of these concepts on firm results is still lacking.	DV Firm Performance IV Coordination Uncertainty	According to the paper, ISD risk can have an effect on firm efficiency by reducing ISD success.	This study opens up the gaps to better understand the impact of ISD projects on firm results. Addressed by analysing the research results on influence of risk management to project performance.
(Kinyua et al., 2015) International Journal of Economics, Commerce and Management United Kingdom Vol. III, Issue 2, Feb 2015	"Effect of Risk management strategies on Project performance on small and medium Information Technology Enterprises in Nairobi	The study's main goal was to see how risk management techniques affected the project performance.	DV IT project performance IV Project risk assessment Project risk Identification	The study found a positive relationship between risk management techniques and project performance.	The study lacked any moderating and mediating variables in the relation. Addressed by including mediating and moderating variable.
Jan Neˇmecˇek, (Hynek et al., 2014) Emerald Insight Vol.37No.10,2014	"An exploratory study investigating the perception that ICT capital projects are different Evidence from the Czech Republic"	Capital projects involving information and communication technology (ICT) are seen as distinct from non-ICT projects, making project appraisal more difficult.	D V: ICT project Difference IV (1) Cash flow (2) project risk; (3) strategic relevance; (4) appraisal difficulties	ICT ventures are riskier than more conventional capital investments.	The comparatively low response rate of 15 % also contributes to the concern about drawing broad conclusions. Addressed by ensuring high response rate.
John Bowers Alireza Khorakian (Bowers & Khorakian, 2014) Emerald Insight International Journal of Managing Projects in Business Vol. 6 No. 3, 2016	"Integrating risk management in the innovation project"	Risk management that is more transparent could aid in the success of innovation projects.	DV: Risk management integration in the innovation project IV (1) Response (2) Familiarity (3) explicit risk management (4) Risk management and organizational learning.	Innovation ventures are known by a high rate of failure and the need to stimulate creativity.	Risk management must be used selectively, according to the report. How much of risk analysis should be done in Innovation projects is not quantified. Addressed by correlating risk management and performance of projects.

Sam Thomas, & Bhasi Marath (Thomas & Marath, 2013) HAL	"An Integrative Model Linking Risk, Risk Management and Project Performance : Support from Indian Software Projects"	The high rate of project failures is causing concern among software development companies all over the world. Risk and risk assessment are two frameworks that are thought to have a direct effect on project outcomes.	DV: Project Risk Management IV Outcome Measures Time outlay Budget overrun Quality Intervening Dimensions	Risk management and the integrated relationship had a positive association with the quality of the software produced, but risk had a negative relationship with it.	The study's small number of variables may have resulted in a non-conclusive analysis of risk management and project success. Addressed by adding more variables in the study.
Otniel Didraga 2013 "Informatica Economică vol. 17, no. 1/2013"	"The Role and the Effects of Risk Management in IT Projects Success"	In the current literature, the study stresses the role of risk management and its importance to project success.	DV Identification ,analysis, Response and Monitoring independent V project performance	Risk management leads to project success.	Reduced size of the population (106 answers from 72 companies) .Addressed by increasing the number of respondents.
Frank Lefley (Lefley, 2013) International Journal of Managing Projects in Business Vol. 6 No. 3, 2013	"The appraisal of ICT and non-ICT capital projects *A study of the current practices of large UK organizations"*	It's unavoidable to revisit information technology (IT) specifications on a regular basis. However, valuing such investments is not without its difficulties. Traditional valuation approaches are insufficient since ICT investments vary from non-ICT investments in several ways.	DV Project appraisal IV (1)Types (2) Formal appraisal (3)Differences in appraisal	This study shows how professionals use financial and risk management models in the evaluation of the ICT and other types of capital projects.	The methodology or models used to evaluate strategic problems were not identified in this study. Low response rate to the survey of 15% Addressed by ensuring high response rate

B. de Wet1 & J.K. Visser 2013 South African Journal of Industrial Engineering May 2013 Vol 24(1), pp 14-28	"An Evaluation of Software Project Risk Management in South Africa."	Software projects in South Africa relatively low as well, and whether risk management could help.	DV Success of Software Projects IV Risk assessment Risk control	Software project success rates in South Africa are still poor. Projects with risk management yield better outcomes than projects without risk management.	The conclusion that software project threats are essentially the same in South Africa as they are in the emerging world has yet to be empirically confirmed. Addressed by conducting an empirical study in Kenya to compare with other Nations.
"Kutsch & Hall, 2009" Project Management Journal, Vol. 40, No. 3, 72–81	"The Rational Choice of Not Applying Project Risk Management in Information Technology Projects"	The Project Management Institute and the Association for Project Management also consider risk management to be a critical discipline. However, knowing what needs to be done does not always translate into behaviour that is compatible with that understanding. Risk management is also neglected by IT project managers.	DV Project Risk Management IV 1. hindsight 2. ownership 3. cost justification 4. Lack of expertise 5. anxiety problem	Cost justification is a major issue for IT project managers.	The paper did not outline if the costs of implementing project risk management are offset by reducing risks that contains negative implication on project performance. Addressed by analysing risk management on the performance of projects.
Bakker, Boonstra, and Wortmann. 2009 International Journal of Project Management 28 (2010) 493–503	"Does risk management contribute to IT project success? A meta-analysis of empirical evidence".	This paper provides a meta-analysis of empirical risk management helps in IT projects success.	DV Risk management Practice IV IT project success.	The empirical expertise is still subjective and mainly focused on how risk management is thought to function rather than how it is currently applied in project practice, according as described in publications from 1997 to 2009.	The traditional time and budget variables of project success is used .Other metrics of project success, Addressed by adding variable other than meeting time and budget constraints, into account in this study.

Mihret Abeselom Teklemariam and Ernest Nkandla 2007 "The Electronic Journal of Information Systems in Developing Countries"	"Software Project Risk Management Practice in Ethiopia."	In developing countries, researchers looked into the connection between risk management practices and project performance.	DV Project success IV Projects Risk management practice identification, analysis, mitigation, response, monitoring and control steps	It was also discovered that risk detection was normal, but that risk analysis and the creation a response plan were not. According to the findings, there is a high rate of project failure.	The study used purposive non-probabilistic sampling, with banks, insurance firms, and united nations agencies in Addis Ababa as the research population. Addressed use of probability sampling
Dey and Ogunlana 2004 "Industrial Management & Data Systems Volume 104 · Number 4 · 2004· pp. 334-346"	"Selection and application of risk management tools and techniques for build-operate-transfer projects"	Via reviews of related literatures, this paper investigates the use of risk management methods in BOT programs.	DV Risk Management Practice IV BOT project performance	This research led to the creation of a risk management mechanism for BOT ventures.	The main focus of this research is on identifying RATTs' application in order to improve their suitability for projects. Addressed by caring out a survey of risk management and not only literature review
"Baccarini et al., 2004" Emerald Insight	"Manageme nt of risks in information technology projects"	The high failure rate of information technology (IT) projects is well known. Just 34% of IT projects were completed on time.	DV Management of Risk. IV legal relationships Economic circumstances Human behaviour Political state technical issues Management activities Individual activities	Risk management is critical to the effective completion of IT programs. To mitigate risks, the vast majority of respondents used the risk mitigation treatment plan.	While the literature review identifies 27 risks in IT ventures, it is not definitive. It's hard to keep track of all potential dangers. Magnitude and Impact risk scoring is extremely subjective. Addressed by undertaking a sector wide research.
Tzvi Raz Aaron Dvir & Dor Dvir 2002 Research and Development journal 32.2.2002	"Risk management, Project success and Technology Uncertainty".	Examine the degree in how risk management practices are used in Israel and how they affect project performance.	DV Project Success IV Risk Identification Probabilistic risk analysis Uncertainties planning Trade off analysis	Risk management isn't commonly practiced, but when it is, it tends to lead to project progress in terms of budget and timeliness, rather than requirements and product quality.	There are many risk management methodologies available; however, further research is needed to determine which ones function best in different environments and circumstances. Addressed by widening the scope of study and research design

Source: Researcher (2020)

2.5 Conceptual Framework

Varpio et al. (2019) theoretical framework is a systematically constructed and linked collection of concepts and premises that a researcher develops to scaffold a thesis. It is a means by which a researcher presents a systematic and hypothetical proposition on presumed relationships among variables(Cohen et al., 2017).The conceptual framework hereby presented is squarely derived from the analysis of the literature review done by the researcher. It illustrates the relationship of variables in this study.

The independent variables include risk identification, risk analysis, risk response and risk monitoring and control. Moderating variable is project complexity while the mediating variable is Risk culture. Information system projects performance in the commercial banks in Kenya is the dependent variable and conceptualized as quality of the project, time taken to budget elements of the project, schedule of the project and project scope attainment.

The independent variables of risk identification, analysis, response and risk monitoring and control was analysed under hypothesis H01, H02, H03 and H04 to directly and positively influence Information Technology project performance by commercial Banks in Kenya. Under H05, Risk culture was hypothesized to be mediating the relationship of risk management and performance of IT Projects. Additionally, project complexity was under H06 to be hypothesized a positively moderating variable in the association between risk management and performance of IT projects by commercial Banks in Kenya.

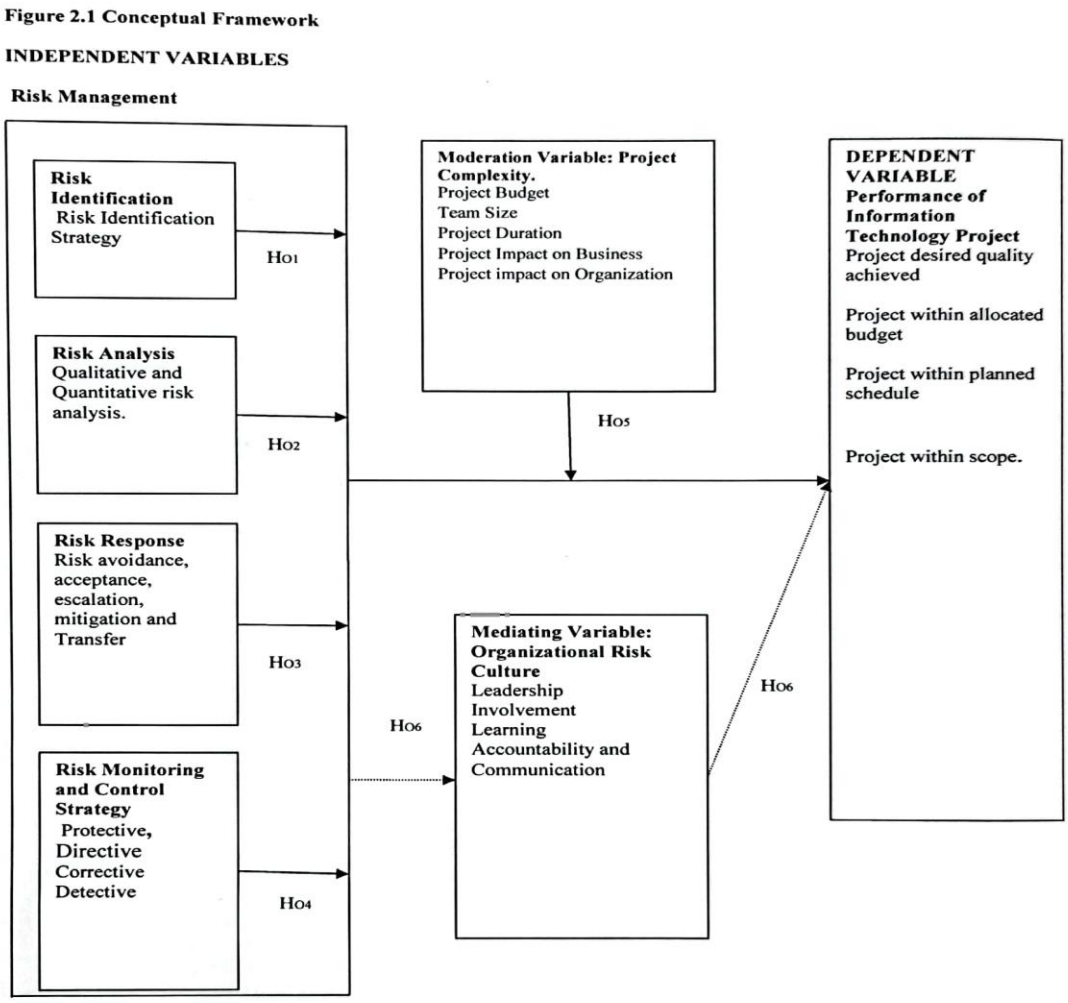

Figure 2. 1 Conceptual Framework

Source: Author, 2021

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Under this chapter, research design with its philosophical underpinning, empirical model, hypotheses testing, the target population, the sample size and sampling procedure, the data collection instruments used, validity and reliability of the research instruments are discussed. The data collection procedure, operationalization of variables, data analysis methodology and presentation, diagnostic tests and ethical concerns of the research are also covered.

3.2 Research Philosophy

By definition, research philosophy refers to the research paradigm adopted by a researcher(Saunders et al., 2008) and is an interpretive framework used by the Researcher . This Study's philosophical approach is Positivism. Positivism affirms that the social world can be objectively interpreted. The scientist is a neutral observer in this research theory, and that basis, he separates himself from personal views and works with independence(Zukauskas et al., 2018). Positivism has an extended and recognized history.

It is so deeply entrenched in our culture that science arguments that are not grounded on positivist thought are easily categorized as scientifically unsound. It could be argued that this is the most visible in research that follows an inherently positivist tradition (Mufleh,

2016).Cooper and Schindler (2017) posits that in social sciences, research philosophies can be classified as phenomenology and positivism which can be looked at from either qualitative or quantitative angle.

Positivism enables the researcher to gather factual evidence premised on values of reasons, obtained via direct experience and observations and which is empirically measured using quantitative methods and statistical analysis. Positivism in this study enabled the tests of hypothesis that are based on existing theories. Choice of positivist research philosophy is strengthened by the fact that the study entails gathering of empirical data, to be subjected to scientific quantitative methods of analysis, upon which generalizations are made.

3.3 Research Design

Descriptive and explanatory design is used in this study. Information obtained is illuminated as part of results attained in the study. The research design is described as the study's whole strategy for incorporating the various modules of the study in a consistent and organized manner, ensuring that the research issue is well addressed (De Vaus, 2001). This study employs the descriptive and explanatory research design on a survey to ascertain the consequence of risk management on performance of IT projects in the commercial Banks in Kenya.

Saunders et al. (2007) noted that using multiple approaches yields the best study results. Descriptive research design allows the person undertaking the research a chance to capture a population’s elements and then test hypothesis (Cooper & Schindler 2014). On

the other hand, the researcher does not have power over the control of the variables like being able to influence them, which protects the analysis from bias. The explanatory research design examines the cause-effect relationship between set variables and searches for hypotheses on the existence of such relationships. (Saunders, 2009).

3.4 Target Projects of the Study

Siruri (2019) notes that the target population is a group of all elements or objects under analysis from which a conclusion is to be drawn in a research project. The target projects in this study was forty (40) projects in forty commercial Banks licensed in Kenya as per the indication of the published 2019 banking supervision report. For each project, three (3) respondents were targeted. Staff in the project departments, IT department and risk management departments were the respondents. A list of projects selected in commercial Banks is captured in Annexure VI.

3.5 Sample Design

Sampling of the respondents was by random sampling which is considered the most effective probability sampling method where the target populations are not homogeneous(Kothari & Garg, 2019). The stratification was done using the bank's tier, then the project at each commercial banks. Yamane (1967) formulae to recognize a representative sample was used.

$n = N / 1 + N (e) 2$

n= represent the required sample size

N= the total population

e = donates accuracy level required.

The Standard error = 5%

Derived from the targeted population of 40 projects, the sample was:

$n = 40 / 1 + 40 (0.05)^2$

n= 36 projects

Table 3. 1Sample Frame

Banks	**Selection**	**Projects**	**Respondents**	**Target participants**
36 Baking Institutions.	One(1)IT project in each Institution	36 IT projects	Three (3) respondents for each project.	108

3.6 Test of Hypotheses

The study adopted empirical models as depicted in Table 3.2 while testing the hypotheses.

Table 3. 2 Test of Hypothesis

Objective & Hypothesis	**Statistical Approach(Model)**	**Research Questionnaire Part**	**Interpretation Criteria**
1.0 Determine the effect of Risk identification on Performance of IT projects by Commercial Banks in Kenya. **H01**: Risk Identification doesn't have a significant influence on Performance of IT projects in the commercial Banks in Kenya.	PIT = β_0+ β_1I+ β_2A + β_3 R+ β_4 MC + ε Where; PIT = Composite Index for Performance of IT projects in the commercial Banks in Kenya. β_0=Constant and an Intercept β_0, β_2, β_3 and β_4 = Beta Regression coefficients I= Composite Index for Risk Identification A= Composite Index for Risk analysis R= Composite Index for Risk Response MC= Composite Index for Risk monitoring and Control ε = Error term	Section B(i)	Observe β_1, Reject Ho_1 incase p < 0.05.

2.0 Establish the effect of Risk Analysis on IT Project Performance by Commercial Banks in Kenya. **H02**: Risk analysis doesn't have a significant influence on Performance of IT projects in the Commercial Banks in Kenya.	PIT = β_0+ β_1 I+ β_2 A + β_3 R+ β_4 MC + ε Where; PIT = Composite Index for Performance of IT projects in the commercial Banks in Kenya. β0=Constant and an Intercept β_0, β_2, β_3 and β_4 = Beta Regression coefficients I= Composite Index for Risk Identification A= Composite Index for Risk analysis R= Composite Index for Risk Response MC= Composite Index for Risk monitoring and Control ε = Error term	Section B(ii)	Observe β_2, Reject Ho_2 incase p < 0.05,

3.0 Determine the effect of Risk Responses on IT Project Performance by Commercial Banks in Kenya. **H03:** Risk Responses do not have a significant effect on Performance of IT projects in the commercial Banks in Kenya.	PIT = β_0,+ β_1 I+ β_2 A + β_3 R+ β_4 MC + ε Where; PIT = Composite Index for Performance of IT projects in the commercial Banks in Kenya. β0=Constant and an Intercept β_0, β_2, β_3 and β_4 = Beta Regression coefficients I= Composite Index for Risk Identification A= Composite Index for Risk analysis R= Composite Index for Risk Response MC= Composite Index for Risk monitoring and Control ε = Error term	Section B(iii)	Observe β_3, Reject Ho_3 if $p < 0.05$,

4.0 Establish the effect of Risk Monitoring and Control on the Performance of IT projects by Commercial Banks in Kenya. **H04**: Risk Monitoring and Control doesn't have a significant effect on Performance of IT projects by Commercial Banks in Kenya	PIT = $\boldsymbol{\beta_0}$+ $\boldsymbol{\beta_1}$ I+ $\boldsymbol{\beta_2}$ A + $\boldsymbol{\beta_3}$ R+ $\boldsymbol{\beta_4}$ MC + ε Where; PIT = Composite Index for Performance of IT projects in the commercial Banks in Kenya. β0=Constant and an Intercept $\boldsymbol{\beta_0}$, $\boldsymbol{\beta_2}$, $\boldsymbol{\beta_3}$ and $\boldsymbol{\beta_4}$ = Beta Regression coefficients I= Composite Index for Risk Identification A= Composite Index for Risk analysis R= Composite Index for Risk Response MC= Composite Index for Risk monitoring and Control ε = Error term	Section B(iv)	Observe of $\boldsymbol{\beta_4}$,. If $p < 0.05$, Reject Ho_4

5.0 Establish the Moderating effect between of project complexity in the Relationship between Risk management and Performance of IT projects by Commercial Banks in Kenya. **H05**: Project Complexity do not moderate the relationship in Risk Management and Performance of IT Project by Commercial Banks in Kenya.	$P = \beta 0+\beta 1\ RM\ +\beta 2\ C + \beta 3\ RM.C$ Where P – Project Performance RM – Risk management C – Project Complexity β0 – Constant β1, β2, β3 - Coefficients/regressors RM composite index for Risk Management and C composite index of indicators of Project Complexity.	Section D	If β_3 is significant then Project Complexity is a significant factor of Performance of IT projects by commercial Banks in Kenya.

6.0 Establish the Mediating effect of risk culture on the association between risk management and IT Project Performance by Commercial Banks in Kenya. **H06** Risk Culture does not mediate the association between risk management and the performance of IT projects by the Commercial Banks in Kenya.	PIT= β_0 + β_1 RM + e….. step 1 RC= β_0 + β_1 PM +e……step 2 PIT= β_0 + β_1 RC +e ……..step 3 PIT = β_0 + β_1 RM+ β_2 RC +e step 4 In equations PIT is the dependent variable, performance of IT projects by commercial banks in Kenya: RM, Risk Management being the independent variable, RC is the mediator variable, Risk Culture, β_0 being the constant or intercept term, β_1 is the effect of the mediator variable on the dependent and e is the error term.	Section C	If one of the β_1 in the models in step 1, 2 and 3 are not significant, then mediation is not possible. If they are significant, we proceeded to step 4.

Source: Researcher, (2020)

3.7 Operationalization of Variables

Because not all variables can be easily measured, operationalization of variables is critical. (Tariq, 2015). Subjective factors are more difficult to quantify than objective factors. It also aids in defining the precise variable, thereby improving the variable's quality and design efficiency. Operationalizing the hypothesis also strengthens, clarifies, and standardizes the variables used in the study. In social research, operationalization refers to the development of concrete techniques for measuring variables. It has to do with defining variables in such a way that they can represent concepts.

The dependent variable in this study was performance of IT projects by commercial Banks in Kenya whereas risk identification, risk analysis, risk responses and risk monitoring and control were the independent variables. The study also sought to investigate whether risk culture and project complexity mediate and moderate effect respectively in association between risk management and performance of IT projects in the commercial Banks in Kenya. The variables operationalization has been summarized in the table here below:

Table 3. 3 Operationalization and Measurement of Variables

VARIABLE	**NATURE OF THE VARIABLE**	**OPERATIONALIZATION**	**MEASUREMENT CRITERIA AND LEVEL**
Risk Identification	Independent Variable	Presence of an approved risk management plan and a complete risk register	Section B. Appendix II Aggregated items on a 1-5 Likert Scale. Ordinal. Questions 1-40 (10 questions of each category)
Risk analysis	Independent Variable	Completion of Qualitative and quantitative risk analysis	
Risk responses	Independent Variable	Application of risk responses (avoid, share ,escalate ,transfer and mitigate)	
Risk monitoring and Control	Independent Variable	Application preventive, corrective, directive and detective mechanisms.	

Risk culture	Mediating Variable	Leadership: Strong organizational leadership in terms of the strategy applied, projects undertakings, and its operations.	Appendix II- Section C Aggregated items on a 1-5 Likert Scale. Ordinal. Questions 41-45
		All stakeholders are involved in the risk management programs at all stages.	
		Training in risk management procedures and learning from events are prioritized.	
		There is no culture of automatic blame. There is accountability and actions. Communication and openness of risk maters	
Project Complexity	Moderating Variable	Project Budget	Appendix II- Section D Aggregated items. Likert Scale On a 1-5. Ordinal. Questions 46-50
		Project Team size	
		Project Duration	
		Impact of project on Banks business	
		Project Impact on organization change	
Performance of Information Technology Projects by Commercial Banks in Kenya	Dependent Variable	Attainment of IT performance project that is within budget, completed on schedule has the desired quality and attain planned scope.	Section E .Appendix II Aggregated items on a 1-5 Likert Scale. Ordinal. Questions 51- 57

3.8 Data Collection Instruments.

The response rate when using questionnaires is highly variable (Saunders and Lewis, 2012). The key data gathering tool in this study was semi-structured questionnaires. Data was collected on the targeted 108 professionals that entailed project Leads, IT managers, the IT analysts in the risk management departments in the commercial Banks in Kenya then analysed. The questionnaire was used for collecting reliable and quantifiable data in this study.

Given that the questionnaire items were designed to measure different aspects of the study, the instruments was logically sequenced. As such, section (A) targeted respondent's bio data and particular information about projects in the Banking sector. Section (B) targeted responses on the independent variables which also constitutes composite variable of Part (Bi) which targeted responses on risk identification, part (B ii) which targeted responses on risk analysis, part (B iii) which targeted responses on risk responses and part (B iv) which targeted risk monitoring and control. Section (C) items targeted responses on risk culture, which is the Mediating variable while Section (D) items targeted responses on project complexity, which is the moderating variable. Finally, section (E) had items which targets responses on performance of IT projects in the commercial Banks licensed in Kenya.

3.9 Pilot Study

A pilot study was carried out in Nairobi by engaging ten project management institute (PMI) and ISACA professionals' members who have vast technical experience in IT

project risk management and working within the projects under study. The respondent's feedback on the instrument was ideal for the study and fit for purpose.

3.9.1 Validity of the Research Instrument

In this study face and content validity was checked by engaging a selected number of PMI and ISACA members in a pilot study who had a vast experience in IT projects risk management. They were each given a questionnaire and asked to rate each question based on how well it measures what respondents intended and understand. The experts were chosen in accordance with (Lynn, 1986). Following the validity tests, the research instrument was revised and updated. The questionnaire was built based on advice of the experts to ensure face and criterion validity as per (Pimchangthong & Boonjin, 2017)

Questionnaire's aspects were pretested including wording, question content, sequence, instructions, questions' difficulty, layout and form so as to determine content validity. The feedback gathered helped in aligning and to revise and update the instrument. Construct validity in this study was ensured by using a five point Likert Scale as proposed by(Likert, 2017). The Likert Scale goes a long way into ensuring that the researcher collects data that is objective. Construct validity was also ensured by operationalizing all the study's underlying variables.

3.9.2 Reliability of the Research Instrument

Because it offers a unique quantitative assessment of a scale's internal consistency, the Cronbach's alpha coefficient applied in the internal consistency was utilized to test the

study's reliability. An application of Cooper and Schindler (2014), who argued that Cronbach's alpha value of more than 0.50 is regarded as a good indication of research instrument reliability and is acceptable in most social science research, was used. A research instrument's reliability is measured by its coefficient. The rule of thumb, the higher the coefficient, more reliable it is. Cronbach Alpha was used in this study, and a reliability alpha value of above 0.70 was used because it provides a quantitatively unique estimate.

3.10 Data Collection Procedure

The consent to obtain information from study respondents was requested from the national commission for science, technology and innovation. The collaboration was necessary as it gave the research the much required boost. Drop and pick method of administering questionnaires was used, as well a targeted online version on Google forms so as to allow respondents enough time to go through the questionnaires and give their responses. The questionnaires were administered and received by the researcher in a span of two weeks.

3.11 Data Analysis and Presentation

The contents of the returned questionnaires were coded and referred to in order to make data entry easier. After reviewing for errors, the descriptive statistics like frequencies, mean score, percentages, and standard deviation were computed and interpreted, followed by graphs and tables for presentation. To define the features of the variables of interest in the study, the descriptive statistics such as mean, percentages, frequencies, standard

deviations and variances were calculated. Descriptive statistics revealed the fundamental characteristics of the data obtained on the variables under investigation and provided the motivation for further analysis (Mugenda, 2008).

Regression analysis was done to determine the type and magnitude of the interactions between the study variables, as well as to test the hypothesized connections. To make regression analysis easier, the totals of Likert scale items were used to create a composite index for each independent variable. Quantitative data was explored using multiple regression analysis by aid of software tool SPSS Version twenty five. Using statistical software tool in the processing of research data facilitated faster dispensation (Preacher et al., 2007). Inferential statistics in this case was employed in establishing the magnitude and nature of the relationships among variables and in testing the relationships that have been hypothesized.

The study assumed a regression model of the form $P = \beta_0 + \beta_1 I + \beta_2 A + \beta_3 R + \beta_4 MC + \varepsilon$ where P= Composite Index for Performance of IT projects by commercial Banks in Kenya, I = Composite Index for risk identification, A=Composite Index for risk analysis, R= Composite Index for risk responses, MC= Composite Index for risk monitoring and control, $\boldsymbol{\beta_0}$=constant, $\boldsymbol{\beta_1}$, $\boldsymbol{\beta_2}$, $\boldsymbol{\beta_3}$, $\boldsymbol{\beta_4}$ are Beta Coefficients while ε=Error Term. The regression model was then be modified so as to test the mediating and moderating influences of risk culture and project complexity respectively as recommended by Barron and Kenney (1986) and used by (Siruri, 2019)

The P-values aided much in making decisions pertaining hypotheses and was set at 0.05, a level that is often used in social and business research (Mugenda, 2011). R^2 which indicates the coefficient of determination measured the magnitude to which the change (variation) in performance of IT projects by commercial banks in Kenya was explained by the variations in risk management.

3.12 Diagnostic Tests

The researcher conducted diagnostic tests to determine whether the underlying assumptions of linear regression model are attained by the data. The diagnostic tests performed were as follows:

3.12.1 Normality Test

The Shapiro Wilk one sample test was used to determine testing normality of the error terms and residuals. If the p-value is greater than 0.05, the null hypothesis was not rejected by the researcher and assumed that the data originated from a population that is normally distributed (Saunders et al., 2009).

3.12.2 Multicollinearity Test

Multicollinearity is a data matter that can cause serious limitations with the accuracy of model parameter estimates (Alin, 2010). Kothari (2014) says that as the degree of association between the independent variables increases, regression coefficients in multiple regression model analysis become less and less accurate. Multicollinearity was

determined in this analysis by use of variance inflation factor (VIF) techniques. A VIF greater than 10 implies an issue with multi-collinearity, according to a rule of thumb (Field, 2009).

3.12.3 Homoscedasticity Test

Hair et al. (2010) asserts that homoscedasticity is the assumption that there are similar variances recorded by the dependent variable across a range of values of a predictor variable. The one-way Anova method was used to compute the (Levene, 1960) test for equality of variance, where the p-value greater than 0.05 level of significance to demonstrate homogeneity of variances.

3.12.4 Linearity Test

The Pearson correlation coefficient methodology was applied to measure the linearity of the relationship between the variables, as recommended (Benesty et al., 2009). A correlation that has a positive value shows a direct influence while one with a negative value shows an inverse relationship. In this study ,the decision rule was that if p-value is less than 0.05, we it inferred that the regressors and regressand variables have a linear relationship as postulated by (Pearson Correlation, 2018).

3.13 Type I and Type II Errors Control

The rejection of the null hypothesis when true is Type I error whereas the type II error is not rejecting null hypothesis when it is false (Mugenda, 2011). Type I errors was controlled by picking a smaller level of significance before doing a test .Establishing an Alpha level of 0.05 which is the common one in researches on social sciences and business. This Alpha level helps in making statistical inferences by serving as a cut-off upon which decisions are being made (Siruri, 2019).

The way of controlling Type II errors is by increasing the sample size which determines the statistical power of a test. This study had target respondents equal to 108 respondents in 36 IT projects which is a sample large enough given that 30 informants is the mark in establishing whether a sample is adequate. A representative sample is arguably needed in positivist quantitative analysis, with representatives from each of the sub-categories identified in the total population to be studied (Boddy, 2016).

3.14 Empirical Model

This research used multiple regression model because it allows the researcher to control other variables that have consequence on the dependent variable at the same time (Gujarati & Porter, 2009) . The multiple regression is used to build appropriate models to predict the dependent variable(Gujarati & Porter, 2009). Adding more variables to the model leads to multiple regression models; model in which the dependent variable Y depends several explanatory variables, or regressors. The advantages of this approach is that it leads to more accurate and precise understanding of the association of each individual independent variable with the dependent variable.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_i$$

This is specified and represented in model 3.4.1

3.14.1. Empirical Model for Direct Relationship

The uses multiple regression to evaluate the association of risk management and performance IT projects in the commercial Banks in Kenya. Multiple linear regression model (3.1) is used to test objectives one through to four.

$P = \beta_0 + \beta_1 I + \beta_2 A + \beta_3 R + \beta_4 MC + \varepsilon$ …… (3.4.1)

Where;

P= Composite Index for Performance of IT projects in the Commercial Banks in Kenya

β_0=Constant and an Intercept

$\beta_1, \beta_2, \beta_3$ *and* β_4 = Beta Regression coefficients

I= Composite Index for Risk Identification

A= Composite Index for Risk Analysis

R= Composite Index for Risk Responses

MC= Composite Index for Risk monitoring and Control

ε = Error term

The mean aggregate for each of the variables was used to establish composite indices.

3.14.2 Empirical Model for Mediated Relationship

The connection between dependent and independent variables can be explained by a mediator variable. The aim of the study was to seek if risk culture had a mediating influence on the association between risk management and IT project performance by commercial banks in Kenya by applying Baron and Kenny mediation test (1986). Zhao, Lynch and Chen (2014) states that Baron and Kenny's method for deciding whether an independent variable influences a dependent variable through a mediator is so well-known that it is almost reflexively used by writers and demanded by reviewers. Several regression analyses are conducted in the four steps outlined below. At each step the coefficients significance was examined:

Step 1

A regression analysis with Risk Management (RM) predicting performance of IT projects (PIT) was undertaken to test whether RMP was a significant predictor of PIT as specified:

The model will be: PIT= $\boldsymbol{\beta_0}$ + $\boldsymbol{\beta_1}$ RM.....Model 3.4.2 .1

If β1 is of significance then risk management is a significant element of PIT.

Step 2

A regression analysis with risk management forecasting risk culture (RC) was undertaken to test whether RM is a significant predictor of RC as indicated in path b.

The model will be: RC= $\boldsymbol{\beta_0}$+ $\boldsymbol{\beta_1}$ RM.....Model 3.4.2.2

If β1 is of significant in the model, then risk management is significant factor of RC.

Step 3

A regression analysis with Risk Culture predicting Performance of IT projects performance was undertaken as indicated by path c.

PIT= $\boldsymbol{\beta_0}$+ $\boldsymbol{\beta_1}$ RC+ ε.....Model 3.4.2.3

If one of the β1 in the models in step 1, 2 and 3 aren't significant, then mediation isn't probable. If they are significant, we progress to step 4.

Step 4

Multiple regression with RM and RC predicting PIT was conducted.

PIT = $\boldsymbol{\beta_0}$ + $\boldsymbol{\beta_1}$ RM+ $\boldsymbol{\beta_2}$ RC + ε.....Model 3.4.2.3

In the event that the effect of RC remained significant when RM is controlled, it indicates some form of mediation. If RM isn't significant when RC is controlled, then this indicates

full mediation. If both RM and RC significantly predicts PIT, then this would point to partial mediation.

3.4.3 Empirical Model for Moderating Association

The typical moderation relationship between the dependent and the independent variables was used in this analysis, as depicted by Baron and Kenny (2015) is outlined below:

$$P = \beta 0 + \beta 1\ RM + \beta 2\ C + \beta 3\ RM.C$$

Where

P – Project Performance

RM – Risk management

C – Project Complexity

β0 – Constant

β1, β2, β3 – Coefficients of regressors

At a 95% confidence level, the study tests the hypothesis that project complexity has no moderating influence on the relationship between risk management and the performance of IT projects by commercial banks in Kenya. When both the direct and moderated relationship models are evaluated and both models are significant, then moderation is taking place. However, full moderation has occurred if together the predictor and the

moderator are not significant in the moderated model. If the key effects are also significant, moderation has occurred if the predictor and moderator are significant in the moderated model.

3.15 Variable Composite Indices

The study included Likert scale items in each of the structured research instrument's sections. The sum was used as a proxy for a variable. The extent to which each individual variable item affects the magnitudes of the overall index is often different from the nominal weight assigned to it. (Schlossarek et al., 2019)

$$I = \frac{\sum_{i}^{N} q_i}{I-1}$$

Where, *I* is the index for respective groups of risk management (risk identification, risk analysis, risk response and risk monitoring and control), qi is a Likert item in each one of the research tool's sections, and N donates the number of Likert items in each one of the research tool's sections.

3.16 Ethical issues

The five guidelines of the science directorate principles was used in this analysis to help researchers avoid ethical dilemmas(Smith, 2003) .These applied by openly discussing intellectual property, being aware of various positions, respecting confidentiality and privacy, and using ethics tools. An authorization was sought prior to data collection in the

field and granted from NACOSTI by first obtaining a letter of introduction from Kenyatta University's graduate school. The researcher also sought consent from the potential respondents before the questionnaires are administered and interviews conducted. The informants were informed that the research was conducted solely for academic purposes.

The informants' identity and the information they provide were held confidentially and was employed only for the purpose for which it was intended. Data was recorded electronically using a secured computer in a bid to avert any access that is unauthorized. The findings of the study was stated objectively and with a high degree of integrity (Kothari, 2010).Applicability limits was stated, and absolute confidentiality of all information and participant anonymity was maintained at all times as a matter of principle. Moreover this research work was for advancement of knowledge to humanity and endeavoured to follow the guidelines on ethical conducts during research.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the data results, interpretation and discussions of the research. The data was collected from risk managers, IT project managers and IT project leads in commercial Banks in Kenya in the month of September 2021 in each project under study. The Statistical Package for Social Sciences Version 25 enabled data analysis. It covers the general background information on the respondents' gender, age bracket, educational level, working experience in the bank, current functional area, number of years in current role and project type. The descriptive statistics on performance of IT projects and inferential statistics are also presented and discussed. The results of the hypothesis testing are also presented in this chapter, with the presentation of the results being made according to the study research objectives and hypotheses. Tables have been used to present quantitative data with a brief description of what the tables present.

4.1.1 Response Rate

In this study, the required sample size was one hundred and eight respondents, and to cushion against low response rates, the targeted respondents had an option of filling physical questionnaires through drop and pick or an online version on Google forms. Out of the 108 questionnaires distributed to the respondents, 87 were filled out correctly and

returned. This represented a response rate of 80 percent. Ochenge (2018) quotes Bayman and Bell (2007) that argued that a response rate of 50 percent is good for most academic studies while a response of 70 percent is very good. The response in this study was therefore considered sufficient for conducting data analysis and drawing conclusions and recommendations (Saunders et al, 2007).The computation of the response rate was as follows:

$$\frac{\text{Valid Questionnaires}}{\text{Questionnaires Issued}} \times 100 = \frac{87}{108} \times 100 = \mathbf{80\%}$$

4.1.2 Reliability Analysis

The administration of the questionnaires was undertaken after having tested for the questionnaire instrument reliability. This was done using the Cronbach alpha coefficient which is a popular measure of instrument reliability (Siruri, 2019). Each section covered in the questionnaire had its Cronbach alpha coefficient determined during the pilot phase and the results are shown below under table 4.1:

Table 4. 1 Instrument Reliability Analysis Results

Variable	**Cronbach's Alpha**	**No. of Items**	**Comment**
Risk Identification	.934	10	Reliability established
Risk Analysis	.926	10	Reliability established
Risk Responses	.858	10	Reliability established
Risk Monitoring and Control	.915	10	Reliability established
Risk Culture	.878	5	Reliability established
Project Complexity	.787	5	Reliability established
Information System Project Performance	.850	5	Reliability established
Overall	**.981**	**65**	**Reliability established**

Source: Survey data, 2021

According to the results of the reliability testing indicated in table 4.1 , the overall questionnaire instrument reliability co-efficient score, for the pilot study, as measured by the Cronbach alpha co-efficient, was 0.981. Cooper and Schindler (2014) argues that more than 0.50 of Cronbach's alpha is considered a good indicator of research instrument reliability and is acceptable in most social science studies. Therefore the research instrument was reliable for the study.

4.2 Respondents Demographic Characteristics

The relevance of demographic information is to provide data regarding research participants and is necessary for the determination of whether the participants in this study are a representative sample and fit to represent the target population for generalization purposes.

4.2.1 Distribution of Respondents by Gender

The study pursued to find out the distribution of respondents by gender. Results show that 69 percent of the respondents were male while 28.7 percent were female. Two respondents did not indicate there gender. This implies that majority of the people working in the IT projects within the banking industry are Male. Table 4.2 presents the distribution of the respondents by gender.

Table 4. 2 Gender Distribution Results

Gender					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Male	60	69.0	70.6	70.6
	Female	25	28.7	29.4	100.0
	Total	85	97.7	100.0	
Missing	System	2	2.3		
Total		87	100.0		

Source: Survey data, 2021

4.2.2 Age of Respondents

The study also strived to find out the age of the respondents that worked in the IT projects in the Banking sector in Kenya. Age of the respondents was an important factor in this study in determining the contributors in IT projects in Commercial Banks in Kenya. Table 4.3 presents the distribution of the respondents by age.

Table 4. 3 Age of Respondents Results

Age					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	20- 30 yrs.	11	12.6	12.8	12.8
	31-40 yrs.	59	67.8	68.6	81.4
	41 –50yrs.	11	12.6	12.8	94.2
	51 yrs. and over	5	5.7	5.8	100.0
	Total	86	98.9	100.0	
Missing	System	1	1.1		
Total		87	100.0		

Source: Survey data, 2021

The results show that many of the respondents were aged between 31 and 40 years (67.8 percent). It was also noted that 5.7 percent were older than 51 years, 12.6 percent were between 20 to 30 years, 12.6 percent were between 41 and 50 years, one respondent did not indicate their age. These results implies that majority of the people who work in the IT projects in the Banking Sector were between 31 to 40 years old. This group comprises of technology savvy and experienced employees.

4.2.3 Respondents' Education Level

The study sought to find out the respondents' education level. This factor was of importance because it could point at the respondent's ability to accurately respond to the questionnaires given that risk management in IT projects is a technical field of study. The results are presented in Table 4.4

Table 4. 4 Education Level Results

The Education Level					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Diploma	2	2.3	2.3	2.3
	Bachelor's degree	28	32.2	32.2	34.5
	Master's Degree	55	63.2	63.2	97.7
	Doctoral degree	2	2.3	2.3	100.0
	Total	87	100.0	100.0	

Source: Survey data, 2021

Table 4.4 indicates that 2.3 percent of the respondents had basic education, 32.2 percent were holders of Bachelor's degree, 63.2 percent attained Master's degree level and 2.3 percent of the respondents had Doctoral degree. This demonstrates that the majority of the respondents had a high level of education with 97.7 percent having Bachelor's degree and above. This implies that respondents were well informed on the study subject of risk management and performance of IT projects in the banking sector in Kenya.

4.2.4 Respondents' Work Experience

The study sought to find out the respondents' work experience in the banking environment. Experience of the respondents in the banking sector was important in enabling the respondents assess the performance of IT projects within the sector. Table 4.5 presents the respondents' work experience results.

T**able 4. 5Working Experience at the Bank Results**

Working Experience at the Bank					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	1-6 Years	16	18.4	18.8	18.8
	7-10 Years	23	26.4	27.1	45.9
	11-15 years	19	21.8	22.4	68.2
	15 years and above	27	31.0	31.8	100.0
	Total	85	97.7	100.0	
Missing	System	2	2.3		
Total		87	100.0		

Source: Survey data, 2021

On work experience of the respondents, 18.4 percent had worked in the banking sector for between 1 to 6 years, 26.4 percent between 7 to 10 years, 21.6 percent between 11 to 15 years and 31 percent above 15 years. This implies that most respondents (52.8 percent), who had more than 11 years of work experience, had wide knowledge in the operations of a bank and specifically on risk management applications and performance of IT projects. Respondents' work experience was useful in explaining the competence of the respondents in IT projects in the Banking Sector.

4.2.5 Respondents' Functional Area

The study sought to find out the respondents' functional area .The functional area indicated the units within a Bank where risk management activities are domiciled. Table 4.6 presents the respondents' functional area.

Table 4. 6 Functional Area Results

Current Functional Area					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Risk Management	44	50.6	50.6	50.6
	Projects Office	5	5.7	5.7	56.3
	Information Technology Department	23	26.4	26.4	82.8
	Others	15	17.2	17.2	100.0
	Total	87	100.0	100.0	

Source: Survey data, 2021

From the responses 50.6 percent of the respondents were from risk management departments of the banks, 5.7 percent were working at the banks project management office and 26.4 percent were working in the information technology department. 17.2 percent were in other interrelated department such as internal audit and digitization and innovation functions. With 77 percent of respondents from key study areas of risk management and IT projects performance, the responses of this study captured the study overall target group.

4.2.6 Respondents' Years of Experience in the Role

The study strived to find out the respondents' experience in their current role .The years of experience indicated the level of professional understanding of the subject matter of risk management. Table 4.7 presents the respondents' years of experience.

Table 4. 7 Number of years in Current Role Results

Number of years in current role					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	< 1Year	9	10.3	10.3	10.3
	1-3Years	10	11.5	11.5	21.8
	4-5 years	22	25.3	25.3	47.1
	6 years and above	46	52.9	52.9	100.0
	Total	87	100.0	100.0	

Source: Survey data, 2021

From the response a majority of the respondents, 52.9 percent had more than five years of on job experience, 25 percent between 4-5 years of experience, 11.5 percent of between 1-3 years and 10 percent of under one year of experience. Respondents' work experience was useful in explaining the competence of the respondents in IT projects in the banking sector. With a majority of respondents (52 percent), the respondents were largely competent to respond to the study questions.

4.2.7 Project Type

The study sought to find out IT project types distribution undertaken in the banking sector within the three years 2017 to 2019 .This was an indicator of the IT projects that the Banks are investing in. Table 4.8 presents the IT project types from the study.

Table 4. 8 Project Type Results

Project Type					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Core banking system	42	48.3	48.8	48.8
	Digitalization (Internet /Mobile)	14	16.1	16.3	65.1
	hardware & infrastructure	10	11.5	11.6	76.7
	others	20	23.0	23.3	100.0
	Total	86	98.9	100.0	
Missing	System	1	1.1		
Total		87	100.0		

Source: Survey data, 2021

Majority of the Banks 48.3 percent, undertook a core banking related project, 16.1 percent participated in digitalization projects, and 11.5 percent undertook a project in hardware and infrastructure development projects and 23 percent were involved in other IT related projects such as payments solution interfaces and mobile applications projects. This is indicated from the results in table 4.8

4.3 Descriptive Analysis

In this section the descriptive statistics on responses got from the questionnaire items regarding the study variables of interest are presented. The significance of presenting the descriptive statistics is to help summarize the big data sets got from the survey by using summarized tables. In these tables, data have been condensed to also display statistical measures of central tendency as well as statistical measures of dispersion. The section also details how responses were specified to each item of the questionnaires.

The questionnaire instrument was structured to collect data on what the respondents felt concerning risk identification, risk analysis, risk responses, risk monitoring and control, risk culture and project complexity and performance of their IT projects in the banks. Responses to these questions were expressed using five point Likert-type scale, with responses ranging from strongly agree, which had a score of five, to strongly disagree, which had a score of one. The results on these responses is made in a consistent flow, starting from responses on the independent variables, that risk identification, risk analysis, risk responses, risk monitoring and control to the mediating variable, that is, risk culture, to the moderator variable, that is project complexity and finally to the dependent variable, performance of IT projects by commercial banks in Kenya.

4.3.1 Risk Identification

Risk Identification as part of risk management practice was the first independent variable in the study. The questionnaire items in this section sought to measure responses touching on what respondents felt in the risk identification activities undertaken in the IT project. The questionnaire items were adapted from the project management book of knowledge (PMBOK) 6^{th} edition and PMI Risk Management practice guide thereby addressing concerns on IT project performance. The presentation on the responses to the items have been made using table 4.9 with brief discussions of the descriptive statistics being made below the table.

Table 4. 9 Risk Identification Descriptive Statistics Results

	N	Mean	Std. Dev
The project had a risk strategy	87	3.9425	0.9807
Stakeholders risk appetite was outlined.	87	3.8506	0.95879
The project team developed a risk management plan.	87	3.9425	0.94446
The project allocated funds for carrying out risk management.	87	3.4483	1.05388
Project team considered risk to determine the course of action.	87	3.8966	0.88966
The project undertook risk identification	87	3.9425	0.9807
Project conduct risk identification meetings	87	3.8391	1.02155
Data gathering techniques were employed to identify risks	87	3.5057	1.05515
Data analysis techniques were used in risk identification.	87	3.3908	1.02703
Project team developed a risk register and reports.	87	3.7356	1.07249
Aggregate Scores		**3.749**	**0.998**

Source: Survey data, 2021

As indicated in Table 4.9, the aggregate scores to the questionnaire items risk identification was 3.749, with standard deviation of 0.998. This indicated that the respondents agreed that risk identification elements were being undertaken in the projects .The mean response on the question “on whether the project hard a risk management strategy” was 3.94 with standard deviation of 0.98 implying that on average, the respondents agreed with the statement. The analysis also indicates that that the mean

response on the question "The project team developed a risk management plan" was 3.942 with standard deviation of 0.944 and variance of 1.11 implying that on average, the respondents agreed to the proposition that the projects had developed a risk management plan.

On the question on whether "data analysis techniques were used in risk identification", the analysis indicates that the mean response was 3.39 with a standard deviation of 1.02 and a variance of 1.055 which implies that on average, the respondents were neutral to whether data analysis techniques were used in risk identification . Likewise the respondents on average were neutral on whether the project allocated funds for carrying out risk management with mean of 3.44 and standard deviation of 1.053.

Generally, examination of the above responses indicates that the respondents indicated that the project undertook risk identification process. Allocation of funds for risk identification and use of data analysis tools during risk identification had the lowest mean, indicating that they didn't apply in IT projects generally in the Banks.

4.3.2 Risk Analysis

Risk analysis as part of risk management practice was the second independent variable in the study. The questionnaire items in this section sought to measure responses on what respondents felt were risk analysis activities undertaken in the IT project. The questionnaire items were adapted from the project management book of knowledge (PMBOK) 6th edition and PMI risk management practice guide thereby addressing

concerns on IT project performance. The first five questions tested qualitative risk analysis while the last five tested quantitative risk analysis. The presentation on the responses to the items has been made using table 4.10 with brief discussions of the descriptive statistics being made below the table.

Table 4. 10 Risk Analysis Descriptive Statistics Results

	N	Mean	Std. Deviation
Qualitative Risk Analysis			
The project used experts to conduct risk analysis.	87	3.5747	1.226
Interviews were carried out to analyses risks	87	3.4368	1.05325
Risk probability and impact assessment were conducted	87	3.6667	1.08549
Risk categorization was done in the project	87	3.7241	1.04202
Updates were conducted on project documents after analysis.	87	3.7241	1.0308
Aggregate Score		**3.62528**	**1.087512**
Quantitative Risk Analysis			
Overall project risk analysis was conducted.	87	3.908	0.94785
Risk facilitation workshops are were carried out.	87	3.2069	1.05806
Project uncertainty representation was conducted.	87	3.1724	1.17342
Data analysis tools like Simulations, sensitivity analysis, decision tree were used.	87	3.1609	1.26559
Project documents were updated after analysis	87	3.6092	1.06046
Aggregate score		**3.41148**	**1.101076**
Overall Aggregate Score		**3.51838**	**1.094294**

Source: Survey data, 2021

The results depicted on Table 4.10 indicates that the aggregate scores to the questionnaire items risk analysis was 3.51, with standard deviation of 1.094. The aggregate mean score for qualitative risk analysis components was 3.411 and a standard deviation of 1.10, this mean was lower than the mean of qualitative risk analysis components of 3.625 and standard deviation of 1.08. This indicates lesser of quantitative risk analysis components than qualitative risk analysis are practised in the IT projects within the Banks.

The mean response on the question on whether risks categorization was done in the project and updates were conducted on project documents after analysis hard mean score of 3.72 and standard deviation of 1.04 indicating that most respondents agreed to the practice.On whether the project's uncertainty representation was conducted and data analysis tools like simulations, sensitivity analysis, decision tree were used, the respondents were neutral in their responses with a lower mean score of 3.1 and standard deviation of 1.2 and 1.0 respectively. These two activities received the lowest mean score, followed closely with whether risk facilitation workshops were carried out during the projects, this had a mean of 3.20 and standard deviation of 1.05.

4.3.3 Risk Responses

Risk Responses as part of risk management practice was the study's third independent variable. The questionnaire items in this section sought to measure responses on what respondents felt were risk responses activities undertaken in the IT project. The questionnaire items were adapted from the project management book of knowledge

(PMBOK) 6th edition and PMI risk management practice guide thereby addressing concerns on IT project performance. The presentation on the responses to the items has been made using table 4.11 with brief discussions of the descriptive statistics being made below the table.

Table 4. 11 Risk Responses Descriptive Statistics Results

	N	Mean	Std. Deviation
Some parameters of the project were changed to avoid risks.	87	3.6782	0.97043
Project team ensures improved communication to avoid risks.	87	3.8506	0.98274
Project transferred risks by taking insurance covers.	87	2.7126	1.25668
Performance bonds, warranties, and guarantee were used in the project.	87	2.8851	1.18543
Redundancy system were incorporated in the project.	87	3.2989	1.0243
Several tests were conducting in the project to ascertain functionality	87	4.1149	0.85488
The project had established a contingency reserve to deal with risks.	87	3.5862	1.11597
Periodic reviews of the threat were done to ensure that they do not change significantly.	87	3.6092	0.95669
Threats outside the project scope were escalated.	87	3.7471	1.02547
Each project risk was assigned a risk owner.	87	3.6207	1.14365
Aggregate Score		**3.51035**	**1.051624**

Source: Survey data, 2021

Results from Table 4.11 shows that the aggregate scores to the questionnaire items risk responses was 3.51, with standard deviation of 1.05. This indicated that the respondents agreed that risk responses elements were being undertaken in the projects. The mean score that scored the lowest in this category was whether the project transferred risks by taking insurance covers (mean of 2.71 and standard deviation 1.25) .This indicates that most respondents disagreed to the fact that risks were insured in the projects as a response strategy. The respondents also disagreed with the fact that performance bonds, warranties, and guarantee were used in the project as a risk mitigation option (mean of 2.88 and standard deviation of 1.18).

Most respondents agreed to the question on whether several tests were conducting in the project to ascertain functionality of the systems, with mean of 4.1 and standard deviation of 0.85. This indicates that testing during the project life cycle was the most practised risk response strategy. This strategy was followed closely with project team ensuring improved communication to avoid risks, scoring a mean of 3.85 and a standard deviation of 0.98. And escalation of threats outside the project scope, which scored a mean of 3.74 and a standard deviation of 1.02.

4.3.4 Risk Monitoring and Control

As part of risk management practice, risk monitoring and control activities was the fourth independent variable in the study. The questionnaire items in this section sought to measure responses on what respondents felt were risk monitoring and control activities undertaken in the IT project. Questionnaire items were adapted from the project

management book of knowledge (PMBOK 6th edition) and PMI risk management practice guide hence addressing concerns on IT project performance. The presentation on the responses to the items has been made using table 4.12 with brief discussions of the descriptive statistics being made below the table.

Table 4. 11 Risk Monitoring and Control Descriptive Statistics Results

	N	Mean	Std. Deviation
Risk response plans were monitored.	87	3.8276	1.0024
Identified risks were tracked	87	3.931	0.96199
Identification of new risks were done continuously.	87	3.8851	1.02781
Analysis of new risks was conducted.	87	3.8621	1.01354
Evaluation of risk process effectiveness was done throughout the project.	87	3.6667	1.11717
Risk audit was carried out in the project.	87	3.8391	1.05515
Change requests were conducted in line with project risks.	87	4.046	0.91382
Technical performance analysis was done in the project.	87	3.954	0.84782
Reserve analysis was done in the project.	87	3.1954	1.16977
Assumption logs were updated after monitoring	87	3.3218	1.07286
Aggregate Score		**3.75288**	**1.018233**

Source: Survey data, 2021

The results in Table 4.12 indicates that the aggregate scores to the questionnaire items on risk responses was 3.75, with a standard deviation of 1.01. This indicated that the respondents agreed that risk monitoring and control elements were being undertaken in

the projects. The mean score that scored the highest value in this category was whether change requests were conducted in line with project risks, with mean of 4.0 and standard deviation of 0.913. Indication is that most respondents agreed to the fact that change requests were used in the project to control and monitor risks. This was followed closely with tracking of identified risks that scored a mean of 3.93 and standard deviation of 0.96. This indicated that most respondents agreed that risks that were identified in the projects were being tracked. On the contrary, on whether reserve analysis was done in the project and assumption logs were being updated after monitoring, the respondents were neutral on the applications (Mean of 3.19 and 3.32, standards deviation of 1.16 and 1.07 respectively).

4.3.5 Risk Culture

Risk culture in this study was the mediating variable and the inclusion thereof was justified by the fact that scholars have alluded to the proposition that risk cultural influence has lately received weighty attention from academics due to its critical role in the success or failure of a project(Tams & Hill, 2015) in their study on role of culture on project performance, (Tams & Hill, 2015). The presentation on the responses to the items has been made using table 4.13 with brief discussions of the descriptive statistics being made below the table.

Table 4. 12 Risk Culture Descriptive Statistics Results

	N	Mean	Std. Deviation
In terms of strategy, projects, and operations, the project had strong leadership.	87	4.1379	0.95446
All stakeholders were included in the risk management process at all levels.	87	3.7931	1.01315
Training in risk management methods and learning from incidents were prioritized.	87	3.4253	1.10635
There was no blame culture, yet there was adequate accountability for actions.	87	3.2989	1.05781
On all risk management challenges and lessons learned, there was communication and openness.	87	3.6897	1.05995
Aggregate Score		**3.66898**	**1.038344**

Source: Survey data, 2021

As indicated in Table 4.13 above, aggregate scores to the questionnaire items on risk culture was 3.66, with a standard deviation of 1.03. This results indicate a mature risk culture within the IT projects by commercial banks in Kenya. The mean score that scored the highest value in this category was that in terms of strategy, projects, and operations, the projects had strong leadership, with a mean of 4.13 and standard deviation of 0.95. This was scored closely by the inclusion of all stakeholders in the risk management process at all levels, with mean of 3.79 and standard deviation of 1.01 .This pointed to respondents generally agreeing to the strong leadership of the projects and the involvement of stakeholders in risk management.

On whether there was no blame culture, yet there was adequate accountability for actions the respondents were neutral in their responses with mean of 3.2 and standard deviation of 1.05. The respondents also neither agreed nor disagreed to the prioritization of training in risk management methods and learning from incidents during the projects, with a mean score of 3.42 and a standard deviation of 1.10.

4.3.6 Project Complexity

Project complexity was introduced in the study as a moderating variable as literature indicates that project complexity moderate a number of IT project outcomes(Carvalho and Junior , 2015). The project complexity model adopted in this study is robust, as developed by Hass (2007) it includes the goals highlighted in the Standish group's recipe for project progress, as well as the best practices outlined in the PMBOK's nine information areas. Aspects of complexity included in this study' include aspects of: project budget, team size, project duration, project impact on the business of the Bank and project impact on organizational change. The presentation on the responses to the items has been made in table 4.14 with brief discussions of the descriptive statistics being made below the table.

Table 4. 13 Project Complexity Descriptive Statistics Results

	N	Mean	Std. Deviation
Project Budget	87	3.5862	1.42692
Project team size	87	3.6437	1.24804
Project duration	87	4.0345	1.08315
Project impact on business change in the bank	87	4.2989	0.73318
Project impact on organization change in the bank	87	4.1954	0.74458
Aggregate Score		**3.9517**	**1.047174**

Source: Survey data, 2021

As depicted in Table 4.14 above, the aggregate scores to the questionnaire items on project complexity was 3.95, with a standard deviation of 1.04. This indicates that most respondents perceived and agreed to the IT projects as complex. The contributors to the complexity was driven by: longer project duration (mean of 4.0 and standard deviation of 1.08), high project impact on business change in the bank that scored a mean of 4.29 and standard deviation of 0.73 and the high project impact on organization change in the bank that was scored as mean of 4.19 and standard deviation of 0.74. Higher project budget value and bigger project team size also indicated complex nature of the project. With a mean score of 3.5, standard deviation 1.42, and mean 3.6, standard deviation 1.42 respectively.

4.3.7 Performance of IT projects

This section sought to measure respondent's perceptions concerning the performance of their IT projects. The measure of IT project performance entailed the application of project management institute, six ways to measure project performance: scope, budget, schedule, team satisfaction, client satisfaction and Quality. In this study performance was evaluated on four lines of quality, budget, schedule and scope aspects of the project on which the questionnaire items touched on. The overall perception of project performance was also analysed. Table 4.15 below presents the descriptive statistics depicting the findings on these measures of IT performance.

Table 4. 14 IT Project Performance Descriptive Results

	N	Mean	Std. Deviation
IT Project completed within cost and budgetary allocations.	87	3.2874	1.21911
IT Project met the targeted quality of the System	87	3.6897	0.85332
IT Project completed within the stipulated timeframe.	87	2.9195	1.29595
IT Project attained within scope.	87	3.7816	0.90766
The project attained its overall objective	87	3.908	0.84402
Aggregate Score		**3.51724**	**1.024012**

Source: Survey data, 2021

As depicted in Table 4.15, the overall aggregate score on the variable of IT project performance in the banks was 3.51 and a standard deviation of 1.02 meaning that most respondents indicated that their IT projects performed as per expectations. The response to the question on whether IT Project were completed within the stipulated timeframe was

scored the lowest with mean of 2.91 and a standard deviation of 1.29 implying that on average, the respondents indicated that IT projects delayed. On attainment of the project scope, respondents indicated that they agree that the project attained the required scope with the highest score in performance, mean 3.78 and standard deviation 0.90. Overall, looking at the project in totality, respondents agreed that the projects attained their intended objective with a mean of 3.908 and standard deviation of 0.84.

4.4 Diagnostic Tests

The researcher conducted diagnostic tests to determine whether the underlying assumptions of linear regression model are attained by the data as the models in this study were to be tested using regression techniques. The diagnostic tests performed were as follows:

4.4.1 Linearity Test

The Pearson correlation coefficient methodology was applied to measure the linearity of the relationship between the variables, as recommended (Benesty et al., 2009).Results are captured in table 4.16 .

Table 4. 15 Linearity Test Results

Correlations		
		Project Performance
Risk Identification	Pearson Correlation	.902**
	Sig. (2-tailed)	0.000
	N	87
Risk Analysis	Pearson Correlation	.857**
	Sig. (2-tailed)	0.000
	N	87
Risk Responses	Pearson Correlation	.867**
	Sig. (2-tailed)	0.000
	N	87
Risk Monitoring and Control	Pearson Correlation	.912**
	Sig. (2-tailed)	0.000
	N	87
Risk Culture	Pearson Correlation	.917**
	Sig. (2-tailed)	0.000
	N	87
Project Complexity	Pearson Correlation	.854**
	Sig. (2-tailed)	0.000
	N	87
Information Technology Project Performance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	87
**. Correlation is significant at the 0.01 level (2-tailed).		

Source: Survey data, 2021

Correlation coefficients of risk identification was 0.902, risk analysis was 0.857, risk responses was 0.867 ,risk monitoring and control was 0.912 , risk culture was 0.917 and project complexity was 0.854 .This positive values of above 0.50 indicated a high degree of positive correlation to performance of IT projects in the Banks. In this study ,the decision rule was that if p-value if less than 0.05, we inferred that the regressors and regressand variables have a linear relationship as postulated by (Pearson Correlation, 2018).All P –values were less than 0.05 hence correlation was significant at the 0.01 level (2-tailed) indicating linearity.

4.4.2 Multicollinearity Test

Multicollinearity was determined in this analysis by applying variance inflation factor (VIF) techniques. A VIF greater than 10 implies an issue with multi-collinearity, according to a rule of thumb (Field, 2009).The results are captured in table below 4.17.

Table 4. 16 Collinearity Statistics Results

Model		Collinearity Statistics	
		Tolerance	VIF
	Risk Identification	.249	4.012
	Risk Analysis	.220	4.542
	Risk Responses	.375	2.667
	Risk Monitoring and Control	.179	5.582
	Risk Culture	.254	3.939
	Project Complexity	.859	1.165
a. Dependent Variable: Information Technology Project Performance			

Source: Survey data, 2021

Depicted in Table 4.17 above, all the VIF values were less than ten hence the absence of multicollinearity .Since all the tolerance values are greater than 0.1(VIF values less than 10) The conclusion is that there is no problem of Multicollinearity in the data set hence ordinary least squares regression techniques can be applied to analyse the data.

4.4.3 Homoscedasticity Test

Hair et al. (2010) asserts that homoscedasticity is the assumption that there are similar variances recorded by the dependent variable across a range of values of a predictor variable. The one-way Anova method was used to compute the (Levene, 1960) test for equality of variance. P-value greater than 0.05 level of significance was used to demonstrate homogeneity of variances. Results are indicated in table 4.18.

Table 4. 17 Homogeneity of Variance Test Results

Test of Homogeneity of Variances : All variables vs. Dependent Variable				
	Levene Statistic	**df 1**	**df 2**	**Sig.**
Risk Identification	0.753	15	36.585	0.717
Risk Analysis	1.773	15	40.614	0.074
Risk Responses	0.786	15	31.031	0.683
Risk Monitoring and Control	0.952	15	30.274	0.523
Risk Culture	1.755	15	44.354	0.074
Project Complexity	0.351	15	38.583	0.984

Source: Survey data, 2021

Analysis of table 4.18 above shows statistics for Levene test (based on median with adjusted degree of freedom) P- values for performance of IT projects by commercial banks in Kenya based on the following indicators; risk identification (0.753, p=0.717), risk analysis (1.773, P= 0.074), risk responses (0.786, p=0.683), risk monitoring and control (0.952, P =0.523), risk culture (1.755, P=0.74) and project complexity (0.351, P=0.984). As recommended by Gujarati and Porter (2009), all P-values were greater than 0.05(P>0.05) which indicated that the variance of the independent variables were constant hence fulfilled the assumption of homogeneity hence equality of variances (homoscedasticity) could be assumed thereby implying that ordinary least squares regression techniques could be used to analyse the data.

4.4.4 Normality Test

Normality test was undertaken as recommended by Razali and Wah (2011). This study used Shapiro-Wilk to test for the variables normality .The rule of thumb was that for the data to be normal the P-value ought to be greater than 0.05 (P>0.05). Table 4.19 presents results for the normality test.

Table 4. 18 Test of Normality Results

Tests of Normality			
	Shapiro-Wilk		
	Statistic	df	Sig.
Risk Identification	0.981	87	0.221
Risk Analysis	0.975	87	0.096
Risk Responses	0.984	87	0.369
Risk Monitoring and Control	0.99	87	0.743
Risk Culture	0.978	87	0.137
Project Complexity	0.977	87	0.116
Information Technology Project Performance	0.977	87	0.119

Source: Survey data, 2021

From table 4.19 the variables had the following P-values; risk identification (0.221> 0.05), risk analysis (0.96 >0.05), risk responses (0.369 > 0.05), risk monitoring and control (0.743 >0.05), risk culture (0.137>0.05), project complexity (0.116>0.05) and performance of IT project (0.119 >0.05) .All p-value were greater than 0.05, hence all the variables satisfied the threshold for normality of data. Consequently, normality was assumed for the data set and the use of parametric tests in analysis of the data here-in was considered acceptable (Saunders et al., 2009). The results indicated show that the variables in the study were normally distributed.

4.5 Test of Hypotheses

Multiple regressions were applied in this study to evaluate the hypothesis of independent variables namely; risk identification, risk analysis, risk responses and risk monitoring and control on dependent variable performance of IT projects in the commercial Banks in Kenya. The hypothesis was tested using data collected in the field. Interpretation of data

was at 95% level of significance .Adjusted R2 and Beta values were used. The study sought to test hypothesis for the six variables under study, where the first four sought to determine the direct effect on the performance of IT projects.

The other two sought to determine the moderating and mediating effects of project complexity and risk culture on the relationship between risk management and performance of IT projects. The study conducted Anova test by calculating F statistics and P-values to determine the model significance as recommended by Gratine (2007) and applied by Gathongo (2021). The criteria for comparing P values was used with significance value of 0.05 where value less than 0.05 indicated that the study was significant.

4.5.1 Test of Direct Effect Hypotheses

Hypotheses I, II, III and IV sought to test the direct effect of risk identification, risk analysis, risk responses and risk monitoring and control on independent variables and performance of IT projects by commercial banks in Kenya as the dependent variable. Statistical Package for Social Sciences version 25 was used to run the regression analysis on the model and to test H_{01}, H_{02}, H_{03} and H_{04} .Tables 4.20, 4.21 and 4.22 show the outputs obtained in the effects of risk identification, risk analysis, risk responses and risk monitoring and control on performance of IT project.

Table 4. 19 Model Summary Results

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.930[a]	.866	.859	.25154
a. Predictors: (Constant), Risk Monitoring and Control, Risk Analysis, Risk Responses , Risk Identification				

Source: Survey data, 2021

The model summary table 4.20 indicates that the Correlation coefficient R is a measure that quantifies the strength of the linear relationship .At 0.930 this implies a strong positive relationship between the predictors and the dependent variable. Ccoefficient of determination R^2 was 0.866 and adjusted R^2 was 0.859 implying that 85.9 % of the total variation in IT project performance by commercial banks was accounted for by the four predictors namely risk identification, risk analysis, risk responses and risk monitoring and control. Other variables other than those discussed in this study accounted for by the 14.1%.Table 4.21 shows the results of ANOVA that was used to test the overall significance of the model.

Table 4. 20 ANOVA Results

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33.477	4	8.369	132.274	.000[b]
	Residual	5.188	82	.063		
	Total	38.665	86			
a. Dependent Variable: Information Technology Project Performance						
b. Predictors: (Constant) , Risk Identification ,Risk Analysis, Risk Responses , Risk Monitoring and Control						

Source: Survey data, 2021

Table 4.21 shows that F-statistic for the model was 132.274 with 4 degrees of freedom and its p-value was 0.000. This means that the overall model is statistically significant. The results indicated that the model could be therefore used in statistical analysis.

Table 4.22 indicates the coefficients results at 95% confidence interval.

Table 4. 21 Coefficients Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	.287	.149		1.929	**.057**
	Risk Identification	.060	.190	.063	.316	**.753**
	Risk Analysis	.254	.125	.300	2.038	**.045**
	Risk Responses	.263	.115	.266	2.288	**.025**
	Risk Monitoring and Control	.350	.144	.352	2.433	**.017**
a. Dependent Variable: Information Technology Project Performance						

Source: Survey data, 2021

Summarization of the results was done as proposed in the model equation shown below:

$$\mathbf{P = \beta_0 + \beta_1 I + \beta_2 A + \beta_3 R + \beta_4 MC}$$

$P = 0.287 + 0.060\ X_1 + 0.254\ X_2 + 0.263\ X_3 + 0.350\ X_4$ … Where

$ß_0$= Constant

P = Dependent variables (performance of IT projects)

X_1, X_2, X_3, X_4 = Risk Identification, Risk Analysis, Risk Responses, Risk Monitoring and Control.

4.5.2 Test of Hypothesis One

Hypothesis one, which stated that risk identification doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya:

H_{01}: Risk Identification doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya.

This Hypothesis was curved on the basis of conceptual arguments in the literature which indicated a depiction that studies on risk identification on the performance of IT projects in different settings had mixed findings. The null hypothesis on the effect of risk identification and performance of IT projects by commercial banks in Kenya was thus premised on the fact that there are mixed findings on the effects of risk identification on IT project performance.

Table 4.22 shows that Beta coefficient for risk identification was 0.063 and with P-value of 0.753. The positive beta value of the variable, though not significant in this study, means that the more risk identification is employed in IT Projects by commercial banks in Kenya, the higher the likelihood of Performance of the project.

The results P-value was greater than 0.05 ($P > 0.05$) indicated that null hypothesis (H_{01}) was not rejected implying that risk identification had no statistical significance influence on the performance of IT projects in commercial banks in Kenya. Consequently, hypothesis one was not rejected at 5% significance level, which then implies that based on the data collected, there is no sufficient evidence to indicate that risk identification

contributes to the performance of IT projects by commercial Banks in Kenya. From the study it may also infer that risk identification is the missing link in the risk management practice and that it's not appropriately undertaken.

This result is in agreement with Didraga (2013) that pointed out that risk identification and planning do not influence the subjective performance of the project in terms of reliability, easiness, flexibility, satisfaction and quality or the objective performance of the IT project in terms of cost, schedule and effort. On the other hand it points to the question posed by Bakker (2009) 'risk management does not contribute to project success. Or perhaps it does?" .The writer points out that this question has engaged both academics and practitioners for long despite the extensive research undertaken in this area and especially so in the area of Information Technology (IT), where projects have a long history of failing.

This results indicates that risk identification only, and not undertaking the other risk management activities in a project, has limited contribution in the performance of a project. On the contrary, the results contradicts the study, effects of risk management practice on the Success of IT Project (Pimchangthonga and Boonjing, 2017) that pointed out that risk identification with a beta of 0.244 influenced the process performance and the success of IT projects

4.5.3 Test of Hypothesis Two

Hypothesis two, which stated that risk analysis doesn't have a significant weighting on performance of IT projects in the commercial Banks in Kenya.

H_{02}: Risk Analysis doesn't have a significant influence on performance of IT projects in the commercial Banks in Kenya.

This hypothesis was anchored on conceptual reviews that risk analysis is limited in the undertaking of IT projects and that results on its influence are varied in studies undertaken. Table 4.22 shows that Beta coefficient for risk analysis was 0.300 and with P-value of 0.045. The positive beta value of the variable means that the more risk analysis is employed in IT Projects in commercial banks in Kenya, the higher the likelihood of Performance of the project. The results P-value was less than 0.05 ($P < 0.05$) indicated that null hypothesis (H_{02}) was rejected implying that risk analysis had statistical significance influence on the performance of IT projects by commercial banks in Kenya. Consequently, hypothesis two is rejected at 5% significance level, which then implies that based on the data collected, there is sufficient evidence to indicate that risk analysis contributes to the performance of IT projects by commercial Banks in Kenya.

This finding in in agreement with Raz, Dvir and Dor (2002) that conducted a study in Israel on over 100 projects across varied industries. The findings revealed that risk assessment techniques such as probabilistic risk analysis are not commonly used, but when they are, they tend to contribute to project progress in terms of budget and timeliness, rather than requirements and product quality. The results is also in

concurrence with the study ‘effect of risk management strategies on project performance on small and medium information technology enterprises in Nairobi Kenya” (Kinyua et al., 2015) that established that risk analysis in enterprises influence project performance to a very great extent.

4.5.4 Test of Hypothesis Three

Hypothesis three, which stated that risk response doesn’t have a significant influence on performance of IT projects by commercial Banks in Kenya.

H_{03}: Risk Response doesn’t have a significant influence on performance of IT projects by commercial Banks in Kenya.

This Hypothesis was anchored on conceptual reviews that risk responses frameworks are critical in the performance of IT projects and the fact that result indicated that limited risk responses mechanism was being conducted in IT projects. Table 4.22 shows that Beta coefficient for risk responses was 0.266 and with P-value of 0.025. The positive beta value of the variable means that the more risk responses is employed in IT Projects by commercial banks in Kenya, the higher the likelihood of Performance of the project.

The results P-value was less than 0.05 ($P < 0.05$) indicated that null hypothesis (H_{03}) was rejected implying that risk analysis had statistical significance influence on the performance of IT projects by commercial banks in Kenya. Consequently, hypothesis three is rejected at 5% significance level, which then implies that based on the data

collected, there is sufficient evidence to indicate that risk responses contributes to the performance of IT projects by commercial Banks in Kenya. This results is in agreement with Pimchangthonga and Boonjing (2017) that risk response planning influenced IT project success at the statistical significance level of 0.05 with a beta coefficient of 0.333, according to their multiple linear regression analysis findings.

4.5.5 Test of Hypothesis Four

Hypothesis four, which stated that risk monitoring and control doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya was developed from the reviews that risk monitoring and control is really undertaken in IT project management .according to study, Risk identification was prevalent, but not risk analysis or the development of a mitigation or response strategy and monitoring.

H_{04}: Risk monitoring and control doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya.

Table 4.22 shows that Beta coefficient for risk monitoring and control was 0.352 and with P-value of 0.017. The positive beta value of the variable means that the more monitoring and control is employed in IT Projects in commercial banks in Kenya, the higher the likelihood of Performance of the project. The results P-value was less than 0.05 ($P < 0.05$) indicated that null hypothesis (H_{04}) was rejected implying that risk monitoring and control had statistical significance influence on the performance of IT projects by commercial banks in Kenya. Consequently, hypothesis four is rejected at 5% significance

level, which then implies that based on the data collected, there is sufficient evidence to indicate that risk monitoring and control contributes to the performance of IT projects by commercial Banks in Kenya.

This finding in in agreement with Didraga (2013) in his test hypothesis H_{01} Risk analysis, risk monitoring, and risk control were found to be connected to the subjective performance of IT projects, which was partially substantiated. In his study, the methodologies and techniques used for risk analysis and risk response monitoring and management were the only procedures that influenced the subjective performance of the IT project in the empirical research, which looked at Romanian IT companies.

4.5.6 Test of Indirect Relationships

Hypotheses V and VI entailed testing for moderating effects of project complexity and mediating effect of risk culture, between risk management and the performance of IT projects by commercial banks in Kenya. The results for the test of these mediation and moderation effects are as discussed here below.

4.5.7 Test of Hypothesis five

Hypothesis five stated that project complexity do not moderate the relationship between risk management and performance of IT projects by commercial Banks in Kenya. The hypothesis sought to establish the moderating role of project complexity in the relationship between risk management practice and performance of IT projects by commercial banks in Kenya. Having project complexity as a moderator variable in the

relationship between risk management and performance of IT projects by commercial banks in Kenya was borne from theoretical underpinnings where scholars debated on the role of project complexity in the performance of projects.

H_{05} Project complexity do not moderate the relationship between risk management and performance of IT projects by commercial Banks in Kenya.

The typical moderation relationship between the dependent and the independent variables was used in this analysis, as depicted by Baron and Kenny (2015) is outlined below:

$$P = \beta 0 + \beta 1\ RM + \beta 2\ C + \beta 3\ RM.C$$

Where

P – Project Performance

RM – Risk management

C – Project Complexity

β0 – Constant

β1, β2, β3 – Coefficients of regressors

At a 95% confidence level, the study tests the hypothesis that project complexity has no moderating influence in the relationship between risk management and the performance of IT projects by commercial banks in Kenya. The results are captured in table below:

Table 4. 22 Project Complexity Moderation Results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.929[a]	.863	.861	.25008
a. Predictors: (Constant), Risk Management				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33.349	1	33.349	533.262	.000[b]
	Residual	5.316	85	.063		
	Total	38.665	86			
a. Dependent Variable: Information Technology Project Performance						
b. Predictors: (Constant), Risk Management, project complexity						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.302	.144		2.103	.038
	Risk Management	.921	.040	.929	23.092	.000
a. Dependent Variable: Information Technology Project Performance						

Source: Survey data, 2021

The results indicated that Anova result as F (1, 85) and statistics was 533.26 having P value of 0.000 which were less than 0.05. The result indicated that the models was statistically significant and could be used for further analysis. Risk management had coefficient of -0.921 with P-value of 0.000 (P<0.005) which indicated that risk management was statically significant. The next analysis was to seek the direction and effect of project complexity on the independent variable (risk management) and its influence on dependant variable (performance of IT projects). In the model product of risk management and project complexity was used to estimate moderating effect.

Table 4. 23 Moderation Model Results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.930[a]	.865	.861	.24967
a. Predictors: (Constant), Moderating factor, Project Complexity				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33.429	2	16.714	268.145	.000[b]
	Residual	5.236	84	.062		
	Total	38.665	86			
a. Dependent Variable: Information Technology Project Performance						
b. Predictors: (Constant), Moderating factor, Project Complexity						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.369	.155		2.378	.020
	Project Complexity	-1.177	.230	-1.121	-5.118	.000
	Moderating factor	**1.041**	**.114**	**2.008**	**9.172**	**.000**
a. Dependent Variable: Information Technology Project Performance						

Source: Survey data, 2021

Table 4.24 shows adjusted R square of 0.861 which implied that 86.1 percent variation in performance of IT projects (dependent variable) was explained by risk management and project complexity (predictor variable). From the table, Anova results indicated F (2, 84) statistic been 286.145 and P-value 0.000 (P< 0.05).The results showed that the model was statistically significant. The results show that the coefficient of project complexity was negative 1.177 indicating an inverse relationship, the less complex a project is the better

the performance and P-value of 0.000 (P<0.05) and lastly coefficient of moderating factor was 1.041 and P-value of 0.005 (P<0.05). The P- value for moderating factor was less than 0.05 indicating statistical significant.

The decision criteria was that when both the direct and moderated relationship models are evaluated and both models are significant, then moderation is taking place. This was the case in this study. The results reveals that the moderation factor of risk management and project complexity had coefficient of 1.041 and p-value of 0.000 (P < 0.05) which indicates significant influence. The results reveal that project complexity had a moderating effect on the relationship between risk management and performance of IT projects by commercial banks in Kenya and therefore the study rejected the null hypothesis $\mathbf{H_{05}}$

The results are in agreement with Hartono et al.,(2019) in the study titled “project risk management maturity (PRMM) for project based organizations” investigated using project complexity as a moderating variable. The model proposed that the average degree of "complexity" of projects usually completed by organizations moderated the relationship between the two main variables in the study. Carvalho and Junior (2015) whose study on the moderation effect of project complexity indicated that other moderating and control variables, in addition to project complexity and industry variables, should be investigated in the future to determine their contribution on project performance.

4.5.8 Test of Hypothesis six

Hypothesis six stated that risk culture do not mediate the association between risk management and performance of IT projects by commercial banks in Kenya.

H_{06}: Risk culture do not mediate the association between risk management and performance of IT projects by commercial banks in Kenya.

The aim of the study was to seek if risk culture had a mediating influence on association between risk management and IT project performance by commercial banks in Kenya by applying Baron and Kenny mediation test (1986).

Step 1

A regression analysis with Risk Management (RM) predicting performance of IT projects (PIT) was undertaken to test whether RM was a significant predictor of PIT as specified:

The model will be: PIT= $\beta_0 + \beta_1$ RM.....Model 3.4.2 .1

The results are indicated in tables below:

Table 4. 24 Risk Culture Mediation Effect Results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.929[a]	.863	.861	.25008
a. Predictors: (Constant), Risk Management				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33.349	1	33.349	533.262	.000[b]
	Residual	5.316	85	.063		
	Total	38.665	86			
a. Dependent Variable: Information Technology Project Performance						
b. Predictors: (Constant), Risk Management						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.302	.144		2.103	.038
	Risk Management	.921	.040	.929	23.092	.000
a. Dependent Variable: Information Technology Project Performance						

Source: Survey data, 2021

β_1 was 0.921 and P value 0.000 (P<0.05) indicating that's is of significance. This indicated that risk management is a significant element of performance of IT projects.

Step 2

A regression analysis with risk management forecasting risk culture (RC) was undertaken to test whether RM is a significant predictor of RC as indicated.

The model will be: RC= $\boldsymbol{\beta_0}$+ $\boldsymbol{\beta_1}$ RM.....Model 3.4.2.2

The results are indicated below.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.064	.098		-.650	.517
	Risk Management	1.023	.027	.971	37.614	.000
a. Dependent Variable: Risk Culture						

Source: Survey data, 2021

If β1 in the model was 1.023 and P value 0.000(P<0.05) indicating that it was of significance. The conclusion was that risk management is significant factor and influenced risk culture.

Step 3

A regression analysis with Risk Culture predicting Performance of IT projects performance was undertaken as indicated:

PIT= $\boldsymbol{\beta_0}$+ $\boldsymbol{\beta_1}$ RC+ ε.....Model 3.4.2.3

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.490	.148		3.321	.001
	Risk Culture	.864	.041	.917	21.223	.000
a. Dependent Variable: Information Technology Project Performance						

Source: Survey data, 2021

The risk culture β1 in the model was 0.864 and a P value 0.000 (P< 0.005) indicating that risk culture influenced information technology project performance. Step 1, 2 and 3 are significant indicating that mediation is probable. Since they are significant, it progressed to step 4.

Step 4

Multiple regression with RM and RC predicting PIT was conducted.

PIT = $\boldsymbol{\beta_0}$ + $\boldsymbol{\beta_1}$ RM+ $\boldsymbol{\beta_2}$ RC + ε.....Model 3.4.2.3

The results are indicated below:

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.318	.143		2.229	.028
	Risk Culture	.252	.158	.268	1.600	.113
	Risk Management	.663	.166	.669	3.994	.000
a. Dependent Variable: Information Technology Project Performance						

Source: Survey data, 2021

Risk culture had coefficient of 0.252 and P-value of 0.113 (P> 0.05) indicating that it was not significant. Risk management had a coefficient of 0.663 and P value of 0.000(P<0.05) indicating significance. Since risk culture was not significant when risk management was controlled, it indicated no mediation. The null hypothesis was not rejected in this study. H_{06} concluding that risk culture had no mediating effect on the relationship between risk management and performance of IT projects by commercial Banks in Kenya.

The findings collaborates with the risk management association survey of 65 financial institutions in June 2013 titled “risk culture: from theory to emerging practice”, which was published in the RMA journal between the months in January 2014 and yielded interesting outcomes of how organizations view risk culture. The study noted that the practice of assessing risk culture was found to be limited in the survey, with just 37% of respondents saying they do so. Not more than one-third of respondents trusted risk culture to be completely integrated into their business in terms of integration. While risk culture is largely renowned as important for successful corporate governance and risk management, the sector of financial services continues to find it difficult to translate it into actionable results and noted in the study.

4.6 Summary of Findings of Hypothesis Tests

Table 4. 25 Summary of Findings of Hypothesis Testing

Hypothesis	Statistical Approach(Model)	Finding	Decision	Conclusion
H_{01}: Risk Identification doesn't have a significant influence on Performance of IT projects in the commercial Banks in Kenya.	PIT = β_0+ β_1I+ β_2A + β_3 R+ β_4 MC + ε Where; PIT = Composite Index for Performance of IT projects in the commercial Banks in Kenya. β_0=Constant and an Intercept β_0, β_2, β_3 and β_4 = Beta Regression coefficients I= Composite Index for Risk Identification A= Composite Index for Risk analysis R= Composite Index for Risk Response MC= Composite Index for Risk monitoring and Control ε = Error term	ß = 0.063 P=0.753 > 0.005	Failed to reject **H_{01}**	Risk identification had no statistical significant effect on IT projects performance by commercial banks in Kenya.

H_{02}: Risk analysis doesn't have a significant influence on Performance of IT projects in the Commercial Banks in Kenya.	PIT = β_0+ β_1 I+ β_2 A + β_3 R+ β_4 MC + ε Where; PIT = Composite Index for Performance of IT projects in the commercial Banks in Kenya. β0=Constant and an Intercept β_0, β_2, β_3 and β_4 = Beta Regression coefficients I= Composite Index for Risk Identification A= Composite Index for Risk analysis R= Composite Index for Risk Response MC= Composite Index for Risk monitoring and Control ε = Error term	ß = 0.300 P=0.045 < 0.005	Reject **H_{02}**	Risk analysis had a positive statistical significant effect on IT projects performance by commercial Banks in Kenya.

H_{03}: Risk Responses do not have a significant effect on Performance of IT projects in the commercial Banks in Kenya.	PIT = β_0,+ β_1 I+ β_2 A + β_3 R+ β_4 MC + ε Where; PIT = Composite Index for Performance of IT projects in the commercial Banks in Kenya. β0=Constant and an Intercept β_0, β_2, β_3 and β_4 = Beta Regression coefficients I= Composite Index for Risk Identification A= Composite Index for Risk analysis R= Composite Index for Risk Response MC= Composite Index for Risk monitoring and Control ε = Error term	ß = 0.266 P=0.025 < 0.005	Reject **H_{03}**	Risk Responses had a positive statistical significant effect on IT projects performance by commercial banks in Kenya.

H_{04}: Risk Monitoring and Control doesn't have a significant effect on Performance of IT projects by Commercial Banks in Kenya	PIT = β_0+ β_1 I+ β_2 A + β_3 R+ β_4 MC + ε Where; PIT = Composite Index for Performance of IT projects in the commercial Banks in Kenya. β0=Constant and an Intercept β_0, β_2, β_3 and β_4 = Beta Regression coefficients I= Composite Index for Risk Identification A= Composite Index for Risk analysis R= Composite Index for Risk Response MC= Composite Index for Risk monitoring and Control ε = Error term	ß = 0.352 P=0.017 < 0.005	Reject **H_{04}**	Risk monitoring and control had a positive statistical significant effect on IT projects performance by commercial Banks in Kenya.

H_{05}: Project Complexity do not moderate the relationship in Risk Management and Performance of IT Project by Commercial Banks in Kenya.	P = β0+β1 RM +β2 C + β3 RM.C Where P – Project Performance RM – Risk management C – Project Complexity β0 – Constant β1, β2, β3 - Coefficients/regressors RM composite index for Risk Management and C composite index of indicators of Project Complexity.	ß = 1.041 P=0.000< 0.05	Reject **H_{05}**	Project Complexity do moderate the relationship in Risk Management and Performance of IT Project by Commercial Banks in Kenya.
H_{06} Risk Culture does not mediate the association between risk management and the performance of IT projects in the Commercial Banks by Kenya.	PIT= $\boldsymbol{\beta_0}$ + $\boldsymbol{\beta_1}$ RM + e….. step 1 RC= $\boldsymbol{\beta_0}$ + $\boldsymbol{\beta_1}$ PM +e……step 2 PIT= $\boldsymbol{\beta_0}$ + $\boldsymbol{\beta_1}$ RC +e ……..step 3 PIT = $\boldsymbol{\beta_0}$ + $\boldsymbol{\beta_1}$ RM+ $\boldsymbol{\beta_2}$ RC +e step 4 In equations PIT is the dependent variable, performance of IT projects by commercial banks in Kenya: RM, Risk Management being the independent variable, RC is the mediator variable, Risk Culture, $\boldsymbol{\beta_0}$ being the constant or intercept term, $\boldsymbol{\beta_1}$ is the effect of the mediator variable on the dependent and e is the error term.	ß = 0.252 P=0.113 > 0.05	Failed to reject **H_{06}**	Risk Culture does not mediate the association between risk management and the performance of IT projects by the Commercial Banks in Kenya.

Source: Survey data, 2021

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter outlines the study's key features. It also seeks to draw conclusions from the findings of the study and make recommendations that may be useful in the undertaking of IT projects by commercial banks in Kenya. In addition, the chapter also gives recommendations for areas that may be explored further in other empirical studies that touch on the subject of information technology projects undertakings by commercial banks in Kenya and related financial institutions.

5.2 Summary

The study dedicated on establishing the effects of risk management practices on performance of IT projects in the commercial Banks in Kenya. With this challenges in implementing IT projects and high failure rate, a study was necessary to evaluate the risks management practices and how it affects performance of the IT Project. There was research gap in evaluating risks management practices in IT projects in the banking sector in Kenya. Studies reviewed have been conducted in other jurisdictions and were in other sectors. Results generated from the other studies may not have presented the context within the commercial banks in Kenya.

On the other hand methodology applied in various studies had largely ignored the measurement improvement of mediating and moderating variables that influence risk management on IT projects. A potent way of enhancing this research designs, and thus providing more functional, realistic and accurate findings, was introducing mediating and moderating variables relating to study. These risk management items were: risk identification, risk analysis, risk responses and risk monitoring and control. The study used explanatory and descriptive research design based on a survey to establish the effect of the relationship between risk management and performance of IT projects.

The study also wanted to determine the moderation consequence of project complexity and mediation effect of risk culture on the relationship between risk and performance of IT projects. Data was collected by use of questionnaire and analysed by use of descriptive and inferential statistics. Multiple regression models was used to establish the effect of each of the independent variables on performance of IT projects undertaken by commercial Banks in Kenya.

5.2.1 Summary of Findings on Objective One

The first objective of the study was to establish the effect of risk identification on the performance of IT projects by commercial banks in Kenya. The resultant null hypothesis from this objective stated that risk identification doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya. Analysis of the regression

coefficients indicated that the Beta coefficient for risk identification was 0.063 and with P-value of 0.753.

The results P-value was greater than 0.05 (P >0.05) indicated that the study failed to be rejected null hypothesis (H_{01}) implying that risk identification had no statistical significance influence on the performance of IT projects by commercial banks in Kenya. This finding of the hypothesis one was discussed on the basis of the risk identifications activities undertaken during an IT project, descriptive data and also based on the findings of other studies touching on the relationship between risk identification and IT project performance.

5.2.2 Summary of Findings on Objective Two

The second objective of the study was to establish the effect of risk analysis on the performance of IT projects by commercial banks in Kenya. The resultant hypothesis from this objective stated that risk analysis doesn't have a significant influence on performance of IT projects in the commercial Banks in Kenya. Beta coefficient for risk analysis was 0.300 and with P-value of 0.045. The results P-value was less than 0.05 (P < 0.05) indicated that null hypothesis (H_{02}) was rejected implying that risk analysis had statistical significance influence on the performance of IT projects by commercial banks in Kenya.

Consequently, hypothesis two was rejected at 5% significance level, which then implies that based on the data collected, there is sufficient evidence to indicate that risk analysis

contributes to the performance of IT projects by commercial Banks in Kenya. This finding of the hypothesis two was discussed on the basis of the risk analysis activities, both qualitative risk analysis and quantitative activities, undertaken during an IT project. Descriptive data based on the findings of other studies touching on the relationship between risk analysis and IT project performance were highlighted.

5.2.3 Summary of Findings on Objective Three

The third objective of the study was to establish the effect of risk responses on the performance of IT projects by commercial banks in Kenya. The resultant hypothesis from this objective stated that risk response doesn't have a significant influence on performance of IT projects by commercial Banks in Kenya. Beta coefficient for risk responses was 0.266 and with P-value of 0.025. The results P-value was less than 0.05 ($P < 0.05$) indicated that null hypothesis (H_{03}) was rejected implying that risk analysis had statistical significance influence on the performance of IT projects by commercial banks in Kenya.

Thus, hypothesis three was rejected at 5% significance level, which then implies that based on the data collected, there is sufficient evidence to indicate that risk responses contributes to the performance of IT projects by commercial Banks in Kenya. This finding of the hypothesis three was discussed on the basis of the risk analysis activities undertaken during a project, descriptive data and also based on the findings of other studies relating to the relationship between risk analysis and IT project performance

5.2.4 Summary of Findings on Objective Four

The fourth objective of the study was to establish the effect of risk monitoring and control on the performance of IT projects by commercial banks in Kenya. The resultant hypothesis from this objective stated that risk monitoring and control doesn't have a significant influence on performance of IT projects by commercial Banks in. Analysis of the regression coefficients indicated that the coefficient for risk monitoring and control was 0.352 and with P-value of 0.017. The results P-value was less than 0.05 ($P < 0.05$) indicated that null hypothesis (H_{04}) was rejected implying that risk monitoring and control had statistical significance influence on the performance of IT projects by commercial banks in Kenya.

Hence, hypothesis four was rejected at 5% significance level, which then implies that based on the data collected, there is sufficient evidence to indicate that risk monitoring and control contributes to the performance of IT projects by commercial Banks in Kenya. This finding of the hypothesis four was discussed on the basis risk monitoring and control activities undertaken in the project, descriptive data and also based on the findings of other studies touching on the relationship between risk monitoring and control and IT project performance

5.2.5 Summary of Findings on Objective Five

Hypothesis five stated that project complexity do not moderate the relationship between risk management and performance of IT projects by commercial Banks in Kenya. The

hypothesis sought to establish the moderating role of project complexity in the relationship between risk management practice and performance of IT projects by commercial banks in Kenya. Analysis results show that the coefficient of project complexity was negative 1.177 indicating an inverse relationship. This means that the less complex a project is the better the performance.

Analysis of the regression coefficients results reveals that the moderation factor of risk management and project complexity had coefficient of 1.041 and p-value of 0.000 ($P < 0.05$). P-value for moderating factor was 0.000 ($P<0.05$) indicating statistical significant. The results reveal that project complexity had moderating effect on the relationship between risk management and performance of IT projects by commercial banks in Kenya and therefore the study rejected the null hypothesis. This finding of the hypothesis five was discussed and anchored on project complexity model adopted in the study. Descriptive data and based on the findings of other studies touching on the moderating role of project complexity in project performance were highlighted.

5.2.6 Summary of Findings on Objective six

The six objective of the study was to seek if risk culture had a mediating influence on the association between risk management and IT project performance by commercial banks in Kenya. Hypothesis six stated that risk culture do not mediate the association between risk management and performance of IT projects by commercial banks in Kenya. Result analysis indicated that risk culture had coefficient of 0.252 and P-value of 0.113 ($P> 0.05$)

indicating that it was not significant. Risk management had a coefficient of 0.663 and P value of 0.000($P<0.05$) indicating significance.

Since risk culture was not significant when risk management was controlled, it indicated no mediation. The study failed to reject the null hypothesis that risk culture had no mediating effect on the relationship between risk management and performance of IT projects by commercial banks in Kenya. This finding of the hypothesis six was discussed on the basis of the risk culture indicators adopted in the study .Additionally descriptive data and also based on the findings of other studies touching on the mediating role of risk culture were discussed.

5.2.7 Summary of Descriptive Statistics

The descriptive statistic composite mean were: Risk Identification 3.479, Risk Analysis 3.518, Risk Responses 3.51, Risk Monitoring and Control 3.75, Risk Culture 3.66, Project Complexity 3.9 and Project Performance 3.5.

5.3 Contributions to the Body of Knowledge

The findings of the study contribute to the body of knowledge by underscoring some important proposals. Information Technology projects undertaking by commercial banks in Kenya have remained a challenge to the banks in terms of finalising the project's within cost, on time and as per schedule and the delivery of expected quality. Despite this

challenge, no extensive studies had been undertaken to analyse the contribution of projects risk management practice on the performance of these projects. Most of the studies reviewed had been done in other countries and other sectors like the roads infrastructure and public sector.

Additionally, no study has specifically been undertaken on the entire banking sector in Kenya, and analysed the moderating effect of the complex nature of these IT project as well as the mediating effect of the risk culture in the Banks. None of the studies had established the moderating and mediating effect on the relationship between risk management and performance of IT projects. The study therefore has brought to light the effect of risk management on the performance of IT projects by commercial banks in Kenya, taking note of the moderation effect of project complexity and mediating contribution of risk culture.

This study found out that risk management elements of risk analysis, risk responses and risk monitoring and control were key factors in the performance of IT projects. Previous studies on the subject matter of risk management and project performance, treated risk management as a high level ,one off activity in the project. This study undertook an in-depth analysis on all the components of risk management for a matured enterprise risk management model.

The complexity of the project was also discovered to play a significant role in the performance of IT projects. In the previous studies, the contingent variables of project complexity moderating effect and risk culture mediating effect were ignored. The study therefore, presented insights into the effects of risk management on performance of IT projects undertaken by commercial banks in Kenya. The study also contributes to the body of knowledge by undertaking regression model analysis that quantifies the magnitude of relations between the variable its applicability in the performance of information technology projects.

Additionally to the determination of the influence of the risk management on the performance of IT projects, this study developed a conceptual framework that will help academicians and scholars whose interest are in undertaking studies on the performance of IT projects in other related entities and sectors that undertake IT projects. This study also developed a robust research instrument that can be adopted in testing the effect of risk management on project performance across other sectors in the world. The study also demonstrated the efficacy of employing both the descriptive and explanatory research designs. The two designs integrated well in the description and explanation of the influence of risk management on the performance of information technology projects by commercial banks in Kenya.

5.4 Recommendations

5.4.1 Suggestions for Future Research

The study recommends that further study be undertaken to establish the maturity level of risk management practice by commercial banks in Kenya and the related regulatory financial institutions. The study also recommends that further investigation be undertaken to determine the integration of risk management functions and the practice of risk management in other projects. To address the limitations highlighted in this study, it is suggested that a longitudinal study be undertaken to establish whether the findings of this study could hold. This is important given that the study was undertaken in a period when the banking sector and the business fraternity as a whole in Kenya was undergoing a turbulent times occasioned from the effects of the Covid -19 pandemic that occasion working from home that may impact on business operations.

5.4.2 Recommendations with Policy Implications

The Central Bank of Kenya should set policy guidelines on project risk management activities of risk identification, analysis, responses and monitoring and control and their applications to guide commercial banks in Kenya in undertaking the IT projects. This can be derived from risk management guideline 2013 .The policy formulation can be undertaken through the collaborations with commercial banks, Information Technology

companies and fintech, Kenya bankers associations and related service providers in project management and professional association's bodies like PMI.

Lastly, the study recommends that commercial banks ought to integrate project risk management policy in their risk management framework policy as guided by the risk management standard from project management institute. This calls for banks leadership and project steering committee to make risk management a fundamental activity in all project undertakings and not view it as optional or additional unnecessary work.

On the influence of the moderating variable project complexity, that entailed project budget magnitude, project team size, and project duration, project impact on business and project impact in the organization, policy formulation would be geared towards approval processes. The study findings confirmed that project complexity is a significant moderating variable in the undertaking of the IT projects. It's an indicator that that complexity of an IT project is inversely related to the performance of the project. The study conclusion that that project complexity is a significant moderator of the relationship between risk management and the performance of IT projects by commercial banks in Kenya points to the requirement that banks need pre approvals for more complex project undertakings from the regulator. A policy can be developed to indicate the nature of what would be termed as complex from a regulators perspective such as budget, duration, Team size and impact on business and industry.

5.4.3 Recommendations with Managerial Implications

From this study, it is recommended that the management of banks in Kenya explore on how information technology projects performance can be improved on by integrating the application of risk management. The management of the commercial banks also ought to ensure that the applicable risk management model in the banks are mature in nature. This means that risk management activities should be undertaken as guided by published practical guides on risk management and the risk management standards by project management institute as well as ISO 31000 standard on risk management. This study shows that risk management has a beneficial impact on the success of IT projects by commercial banks in Kenya if implemented and embraced.

5.5 Conclusions

In this study, the data collected indicate that risk management influences the performance of information system projects by the commercial banks in Kenya. This confirms the original prediction of the study that one aspect that influences the performance of a project is the risk management practice. This finding relate to most of the reviewed literature that concluded that risk management is an integral part of a project performance. These results will help in addressing the problem of underperformance of IT projects in the Banking Sector, since its gives the statistical indication of the contribution of risk management to the performance of the projects the banks are undertaking.

The data collected and regression analysis done in this study indicated that risk identification had no significant association with the performance of IT projects in Kenya commercial banks. This implies that the undertaking of risk identification activities only, would not influence the performance of IT project. Risk identification activities, which are the initiation stages in an enterprise risk maturity model, would only yield results if it is subsequently followed by the other risk management processes. Therefore, this study concluded that the risk identification variable is not a significant risk management undertaking, if subsequent risk management processes are not carried in the IT projects.

The risk analysis variable that comprised of qualitative and quantitative risk analysis activities had a significant influence on the performance of IT projects hence affecting their performance. The regression analysis established that risk analysis influenced performance of IT projects. This implies that an increase in the undertaking of risk analysis activities in a project contributed positively to the performance of the project. Therefore, risk analysis was confirmed to be a significant risk management factor that positively affects the performance of IT projects by commercial banks in Kenya.

Inferential statistics of the risk responses determined that the variable has a significant positive effect on the performance of IT projects by commercial Banks in Kenya. This implies that activating risk response strategies such as risk avoidance, transfer, escalation and acceptance in the undertaking an IT project are likely to have a positive effect on the IT projects in the commercial banks. This confirms that when risks in a project are

responded to appropriately, the project performance is enhance. Therefore, risk responses was confirmed as a significant factor in the performance of IT projects.

The variable on risk monitoring and control had a significant influence on the performance of IT projects hence affecting their performance. The regression analysis established that risk monitoring and control influenced performance of IT projects. This implies that an increase in the undertaking of risk monitoring and control in a project contributed positively to the performance of the project. Therefore, monitoring and control, being an iterative process throughout the project life, was confirmed to be a significant risk management factor that positively affects the performance of IT projects by commercial banks in Kenya.

Project complexity variable that entailed project budget magnitude, project team size, and project duration, project impact on business and project impact in the organization has an influence on the relationship between the risk management and the performance IT projects by commercial banks in Kenya. The study findings confirmed that project complexity is a significant moderating variable in the undertaking of the IT projects. It's an indicator that that complexity of an IT project is inversely related to the performance of the project. Thus, this study concludes that project complexity is a significant moderator of the relationship between risk management and the performance of IT projects by commercial banks in Kenya.

This study leads to a conclusion that risk culture had no mediating effect in the relationship between risk management and the performance of IT projects by commercial banks in Kenya. This pointed to the aspect that while risk culture is largely renowned as important for successful corporate governance and risk management, the sector of financial services such as banks continues to find it difficult to translate it into actionable results, like integrating it in IT projects undertaking. Thus, this study concludes that risk culture is not a significant mediator of the relationship between risk management and the performance of IT projects by commercial banks in Kenya.

REFERENCES

Adeleye, B. C., Annansingh, F., & Nunes, M. B. (2004). Risk management practices in IS outsourcing: An investigation into commercial banks in Nigeria. *International Journal of Information Management*. https://doi.org/10.1016/j.ijinfomgt.2003.10.004

Adzmi, R. M., & Hassan, Z. (2018). A theoretical framework of critical success factors on information technology project management during project planning. *International Journal of Engineering and Technology(UAE), 7*(4), 650–655. https://doi.org/10.14419/ijet.v7i4.35.23078

Alami, A. (2016). Why Do Information Technology Projects Fail? *Procedia Computer Science*. https://doi.org/10.1016/j.procs.2016.09.124

Alhawari, S., Karadsheh, L., Nehari Talet, A., & Mansour, E. (2012). Knowledge-Based Risk Management framework for Information Technology project. *International Journal of Information Management*. https://doi.org/10.1016/j.ijinfomgt.2011.07.002

Alin, A. (2010). Multicollinearity. *Wiley Interdisciplinary Reviews: Computational Statistics*. https://doi.org/10.1002/wics.84

Ardhendu Mandal and S C Pal. (2015). Identifying The Reasons For Software Project Failure And Some Of Their Proposed Remedial Through BRIDGE Process Models. *International Journal of Computer Sciences and Engineering*.

Arumugam, R. (2017). Effective and Efficient Project Management through Technology Leadership. *Project Management National Conference - Powering India's Global Leadership*.

Baccarini, D., Salm, G., & Love, P. E. D. (2004). Management of risks in information

technology projects. *Industrial Management and Data Systems*, *104*(3), 286–295. https://doi.org/10.1108/02635570410530702

Bakker, K. (2009). Risk management does (not) contribute to project success. Paper presented at PMI® Global Congress 2009—EMEA, Amsterdam, North Holland, The Netherlands. Newtown Square, PA: Project Management Institute.

Benesty, J., Chen, J., Huang, Y., & Cohen, I. (2009). *Pearson Correlation Coefficient*. https://doi.org/10.1007/978-3-642-00296-0_5

Boddy, C. R. (2016). Sample size for qualitative research. *Qualitative Market Research*. https://doi.org/10.1108/QMR-06-2016-0053

Boehm, B. W. (2007). Software risk management: Principles and practices. *Software Management, Seventh Edition, January*, 365–374. https://doi.org/10.1109/9780470049167.ch11

Bogodistov, Y., & Wohlgemuth, V. (2017). Enterprise risk management: a capability-based perspective. *Journal of Risk Finance*. https://doi.org/10.1108/JRF-10-2016-0131

Bowers, J., & Khorakian, A. (2014). Integrating risk management in the innovation project. *European Journal of Innovation Management*. https://doi.org/10.1108/EJIM-01-2013-0010

chiemelie, I. benneth. (2014). An Analysis of the Factors That Enfluences Success of ICT Project Management. *IOSR Journal of Business and Management*, *16*(8), 52–72. https://doi.org/10.9790/487x-16825272

Cohen, L., Manion, L., & Morrison, K. (2017). Research Methods in Education. In

Research Methods in Education. https://doi.org/10.4324/9781315456539

Cooper, D. R., & Schindler, P. S. (2014). Business Research Methods 12th Edition. In *Business Research Methods*.

de Bakker, K., Boonstra, A., & Wortmann, H. (2010). Does risk management contribute to IT project success? A meta-analysis of empirical evidence. *International Journal of Project Management*, *28*(5), 493–503. https://doi.org/10.1016/j.ijproman.2009.07.002

De Carvalho, M. M., & Rabechini Junior, R. (2015). Impact of risk management on project performance: The importance of soft skills. *International Journal of Production Research*, *53*(2), 321–340. https://doi.org/10.1080/00207543.2014.919423

De Vaus, D. A. (2001). Causation and the logic of research design. In *Research design in social research*.

Dey, P. K., & Ogunlana, S. O. (2004). Selection and application of risk management tools and techniques for build-operate-transfer projects. *Industrial Management and Data Systems*, *104*(3), 334–346. https://doi.org/10.1108/02635570410530748

Diraga, O. (2013). The Role and the Effects of Risk Management in IT Projects Success. *Informatica Economica*. https://doi.org/10.12948/issn14531305/17.1.2013.08

Eaton, C. (2015). Enterprise risk management. *Canadian Nuclear Society - 35th Annual Conference of the Canadian Nuclear Society and 38th CNS/CNA Student Conference 2015*. https://doi.org/10.4018/ijrcm.2014040102

Firmenich, J. (2017). Customisable framework for project risk management. *Construction*

Innovation, *17*(1), 68–89. https://doi.org/10.1108/CI-04-2015-0022

Gates, S. (2006). Incorporating Strategic Risk into Enterprise Risk Management: A Survey of Current Corporate Practice. *Journal of Applied Corporate Finance*. https://doi.org/10.1111/j.1745-6622.2006.00114.x

Greene, R. R. (2017). General systems theory. In *Human Behavior Theory and Social Work Practice*. https://doi.org/10.4324/9781351327404

Grunert, K. G. (1992). *The Concept of Key Success Factors : Theory and Method Charlotte Ellegaard Project no 15 Executive Summary*. *4*.

Gujarati, D. N., & Porter, D. C. (2009). Basic Econometrics (5th ed.). In *Basic Econometrics*.

Hair, J. F., Anderson, R. E., Tatham, R. L. and, & Black, W. C. (2010). Multivariate Data Analysis: A Global Perspective (7th Edition). In *Pearson Prentice Hall, New Jersey*.

Hartono, B., Wijaya, D. F., & Arini, H. M. (2019). The impact of project risk management maturity on performance: Complexity as a moderating variable. *International Journal of Engineering Business Management*, *11*, 1–16. https://doi.org/10.1177/1847979019855504

Hopkin, P. (2010). Fundamentals of Risk Management: Understanding, Evaluating, and Implementing Effective Risk Management. In *Police Liability and Risk Management*.

Hynek, J., Janeček, V., Lefley, F., Půžová, K., & Němeček, J. (2014). An exploratory study investigating the perception that ICT capital projects are different: Evidence from the Czech Republic. *Management Research Review*.

https://doi.org/10.1108/MRR-09-2013-0218

Jankensgård, H. (2019). *A theory of enterprise risk management*. https://doi.org/10.1108/CG-02-2018-0092

Javani, B., & Rwelamila, P. M. D. (2016). Risk management in IT projects – a case of the South African public sector. *International Journal of Managing Projects in Business*. https://doi.org/10.1108/IJMPB-07-2015-0055

Jenner, S. (2015). Why do projects "fail" and more to the point what can we do about it? The case for disciplined , "fast and frugal" decision-making. *PM World Journal*.

Jiang, J. J., Klein, G., & Ellis, T. S. (2002). A Measure of Software Development Risk. *Project Management Journal*. https://doi.org/10.1177/875697280203300305

Karlsen, J. T. (2017). *What characterizes successful IT projects ? February*. https://doi.org/10.1142/S0219622005001738

Kawulich, B. (2012). The role of theory in research. In *Teaching Research Methods in the Social Sciences*. https://doi.org/10.4324/9781315213033-4

King, B. (2012). Bank 3.0,Why Banking Is No Longer Somewhere You Go, But Something You Do. In *Marshall Cavendish Business*.

Kinyua, E., Ogollah, K., & Mburu, D. (2015). Effect of Risk Management Strategies on Project Performance of Small and Medium Information Communication Technology Enterprises in Nairobi, Kenya. *International Journal of Economics, Commerce and Management*, *3*(2).

Koi Akrofi, G. Y. (2017). Delivering Successful IT Projects: A Literature-Based Framework. *Texila International Journal of Management*, *3*(2), 294–319.

https://doi.org/10.21522/tijmg.2015.03.02.art028

Kothari, C. R., & Garg, G. (2019). Research methodology methods and techniques. In *New Age International*.

Kutsch, E., & Hall, M. (2009). The Rational Choice of Not Applying Project Risk Management in Information Technology Projects. *Project Management Journal*, *40*(3), 72–81. https://doi.org/10.1002/pmj.20112

Lederman, N. G., & Lederman, J. S. (2015). What Is A Theoretical Framework? A Practical Answer. In *Journal of Science Teacher Education*. https://doi.org/10.1007/s10972-015-9443-2

Lefley, F. (2013). The appraisal of ICT and non-ICT capital projects: A study of the current practices of large UK organisations. *International Journal of Managing Projects in Business*. https://doi.org/10.1108/IJMPB-04-2012-0010

Lehtinen, T. O. A., Mäntylä, M. V., Vanhanen, J., Itkonen, J., & Lassenius, C. (2014). Perceived causes of software project failures - An analysis of their relationships. *Information and Software Technology*. https://doi.org/10.1016/j.infsof.2014.01.015

Levene, H. (1960). Levene test for equality of variances. *Contributions to Probability and Statistics*.

Likert, R. (2017). The method of constructing an attitude scale. In *Scaling: A Sourcebook for Behavioral Scientists*. https://doi.org/10.4324/9781315128948-23

Milis, K., & Vanhoof, K. (2006). Analysing success criteria for ict projects. *Applied*

Artificial Intelligence - Proceedings of the 7th International FLINS Conference, FLINS 2006. https://doi.org/10.1504/IJNKM.2007.014040

Mongare, C.F., & James, R. (2017). Project management practices and implementation of information technology projects among selected commercial banks in Kenya.

Mufleh, M. A. (2016). Research methods review in the Knowledge Management (KM) and Total Quality Management (TQM) studies. *Ijrras*, *29*(3), 87–101. www.arpapress.com/Volumes/Vol29Issue3/IJRRAS_29_3_02.pdf

Mugenda, A. G. (2008). Social science research: Theory and principles. *Technology, Pedagogy and Education*.

Mutua ,A.Z &Kirui,C(2020). Effects of Project Risk Identification on the Performance of Core Banking Systems in Commercial Banks of Kenya. International Journal of Research and Innovation in Social Science (IJRISS) |Volume IV, Issue III, March 2020|ISSN 2454-6186

Nachbagauer, A. G. M., & Schirl-Boeck, I. (2019). Managing the unexpected in megaprojects: riding the waves of resilience. *International Journal of Managing Projects in Business*. https://doi.org/10.1108/IJMPB-08-2018-0169

Nocco, B. W., & Stulz, R. M. (2006). Enterprise Risk Management: Theory and Practice. *Journal of Applied Corporate Finance*. https://doi.org/10.1111/j.1745-6622.2006.00106.x

Ochenge,D. M (2018) Project Management Practices and Performance of Road Infrastructure Projects done by Local firms in the Lake Basin Region. Kenya.

Papke-Shields, K. E., Beise, C., & Quan, J. (2010). Do project managers practice what

they preach, and does it matter to project success? *International Journal of Project Management*. https://doi.org/10.1016/j.ijproman.2009.11.002

Pearson Correlation. (2018). In *A Practical Approach to Using Statistics in Health Research*. https://doi.org/10.1002/9781119383628.ch17

Pimchangthong, D., & Boonjing, V. (2017). Effects of Risk Management Practice on the Success of IT Project. *Procedia Engineering*, *182*, 579–586. https://doi.org/10.1016/j.proeng.2017.03.158

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*. https://doi.org/10.1080/00273170701341316

Rahman, M. A., & Qi, X. (2018). Core Banking Software (CBS) Implementation Challenges of e-Banking: An Exploratory Study on Bangladeshi Banks. *SSRN Electronic Journal*, *January 2016*. https://doi.org/10.2139/ssrn.2884269

Randell, A. A., Spellman, E., Ulrich, W., Wallk, J., Clark, R. M., Elliott, E., & Melaragno, W. (2014). *Leveraging Business Architecture to Improve Business Requirements Analysis*. *March*.

Raz, T., & Michael, E. (2001). Use and benefits of tools for project risk management. *International Journal of Project Management*, *19*(1), 9–17. https://doi.org/10.1016/S0263-7863(99)00036-8

Raz, Tzvi, Shenhar, A. J., & Dvir, D. (2002). Risk management, project success, and technological uncertainty. *R and D Management*, *32*(2), 101–109. https://doi.org/10.1111/1467-9310.00243

Reeves, J. D., Eveleigh, T., Holzer, T. H., & Sarkani, S. (2013). Risk identification biases and their impact to space system development project performance. *EMJ - Engineering Management Journal*, *25*(2), 3–12. https://doi.org/10.1080/10429247.2013.11431970

San Cristóbal, J. R., Carral, L., Diaz, E., Fraguela, J. A., & Iglesias, G. (2018). Complexity and project management: A general overview. *Complexity*, *2018*. https://doi.org/10.1155/2018/4891286

Saunders, M., Lewis, P., & Thornhill, A. (2008). Research Methods for Business Students 5th Ed. In *Research methods for business students*. https://doi.org/10.1007/s13398-014-0173-7.2

Saunders, M., Lewis, P., & Thornhill, A. (2009). Research methods for business students. Fitfth Edition. In *Pearson Education, UK*.

Schlossarek, M., Syrovátka, M., & Vencálek, O. (2019). The Importance of Variables in Composite Indices: A Contribution to the Methodology and Application to Development Indices. *Social Indicators Research*. https://doi.org/10.1007/s11205-019-02125-9

Schwalbe, K. (2012). Information technology Project Management (7th Edition). In *Cengage Learning*. https://doi.org/10.1016/S0143-974X(98)80047-3

Siruri, M. M. (2019).Technostructure Intervention and Performance of Commercial Banks in Kenya. *Apri 2019*.

Smith, C. W., & Stulz, R. M. (1985). The Determinants of Firms' Hedging Policies. *The*

Journal of Financial and Quantitative Analysis. https://doi.org/10.2307/2330757

Smith, D. (2003). Five principles for research ethics. *Americal Psychological Association*.

Tams, S., & Hill, K. (2015). Information systems project management risk: Does it matter for firm performance? *Journal of Organizational and End User Computing*, *27*(4), 43–60. https://doi.org/10.4018/JOEUC.2015100103

Tariq, M. U. (2015). Title : Operationalizing Variables in Theoretical Frameworks : A Comparative Analysis. *Durreesamin Journal*.

Teklemariam, M. A., & Mnkandla, E. (2017). Software project risk management practice in Ethiopia. *Electronic Journal of Information Systems in Developing Countries*, *79*(1), 1–14. https://doi.org/10.1002/j.1681-4835.2017.tb00583.x

Thomas, S., & Marath, B. (2013). An integrative model linking risk, risk management and project performance: Support from Indian software projects. *IFIP Advances in Information and Communication Technology*, *402*, 326–342. https://doi.org/10.1007/978-3-642-38862-0_20

Tosi, H. L., & Slocum, J. W. (1984). Contingency Theory: Some Suggested Directions. *Journal of Management*, *10*(1), 9–26. https://doi.org/10.1177/014920638401000103

Varajão, J., & Amaral, A. (2020). Risk Management in Information Systems Projects. *International Journal of Project Management and Productivity Assessment*, *9*(1), 58–67. https://doi.org/10.4018/ijpmpa.20210101.oa

Varpio, L., Paradis, E., Uijtdehaage, S., & Young, M. (2019). The Distinctions Between Theory, Theoretical Framework, and Conceptual Framework. *Academic Medicine*. https://doi.org/10.1097/acm.0000000000003075

Von Bertalanffy, L. (1972). The History and Status of General Systems Theory. *Academy of Management Journal*. https://doi.org/10.2307/255139

Weaver, P. (2008). The Meaning of Risk in an Uncertain World. *PMI Global Congress*.

Žukauskas, P., Vveinhardt, J., & Andriukaitienė, R. (2018). Philosophy and Paradigm of Scientific Research. In *Management Culture and Corporate Social Responsibility*. https://doi.org/10.5772/intechopen.70628

APPENDICES

APPENDIX 1: LETTER OF INTRODUCTION

Dear informant,

REF: RESEARCH PARTICIPATION REQUEST.

My name is Fredrick Okong'o Ouma, a doctorate student at Kenyatta University, registration number D86/CTY/27680/2018 pursuing PhD in Business, Project Management. This is a kind request to be a respondent in this study on risk management and performance of information technology projects in the commercial Banks in Kenya. The collected information will be treated confidentially and is meant strictly for academic reasons. Any clarification needed from the researcher can be sought using the phone contacts below.

Thank you so much for your time and cooperation.

Yours faithfully,

Fredrick Okong'o Ouma

D86/CTY/PT/27680/2018

CELL PHONE: +254724982240

Email: okongofred@gmail.com

APPENDIX II: QUESTIONNAIRE

This research endeavours to examine the influence of risk management in the performance of information technology projects in the commercial banks in Kenya. You are hereby chosen to take part in this study and you are assured that information you provide will be handled confidentially and employed strictly for academic application only. Kindly be as objective as possible while filling this questionnaire.

Part A1: Back ground details.

1. Gender: Male ☐ Female ☐

2. Age: 20- 30 yrs.☐. 30-40 yrs.☐. 41 –50yrs. ☐ 50 yrs. and over ☐

3. Highest Education Level:

☐Secondary level ☐ Diploma ☐ Bachelor's degree ☐ Master's Degree ☐Doctoral degree

4. Working experience in the Bank:

☐ 1-6 Years ☐7-10 Years ☐11-15 years ☐15 years and above

5. Current Functional Area:☐ Audit/ Risk Management ☐Projects Office

☐Information Technology department ☐others (specify)……

6. Number of years in current role:☐ < 1Year ☐1-3Years ☐4 -5 years ☐5 years and above

7. Project Type: ☐ Core banking system ☐ Digitalization (Internet /Mobile) ☐ hardware & infrastructure ☐ others (indicate)…….

PART B: QUESTIONNAIRE ITEMS

1) Risk management

Please tick in the boxes below the degree to which you agree to the outlined statements on risks management in the performance of the IT Project.

"Key: 5= strongly agree, 4 =agree, 3 = neither agree nor disagree, 2=disagree 1=strongly disagree"

Section B (i): Risk Identification

	Statement	**Responses**				
		5	**4**	**3**	**2**	**1**
1	The project had a risk strategy					
2	Stakeholders risk appetite was outlined.					
3	The project team developed a risk management plan.					
4	The project allocated funds for carrying out risk management.					
5	Project team considered risk to determine the course of action.					
6	The project undertook risk identification.					
7	Project conduct risk identification meetings.					
8	Data gathering techniques were employed to identify risks.					
9	Data analysis techniques were used in risk identification.					
10	Project team developed a risk register and reports.					

Section B ii: Risk Analysis

	Statement (a) Qualitative risk analysis	**Responses**				
		5	**4**	**3**	**2**	**1**
1	The project used experts to conduct risk analysis.					
2	Interviews were carried out to analyses risks					
3	Risk probability and impact assessment were conducted.					
4	Risk categorization was done in the project.					
5	Updates were conducted on project documents after analysis.					

	Statement (b) Quantitative risk analysis	**Responses**				
		5	**4**	**3**	**2**	**1**
6	Overall project risk analysis was conducted.					
7	Risk facilitation workshops are were carried out.					
8	Project uncertainty representation was conducted.					
9	Data analysis tools like simulations, sensitivity analysis, and decision tree were used.					
10	Project documents were updated after analysis					

Section B (iii) Risk Responses

	Statement	**Responses**				
		5	**4**	**3**	**2**	**1**
1	Some parameters of the project were changed to avoid risks.					
2	Project team ensured improved communication to avoid risks.					
3	Project transferred risks by taking insurance covers.					
4	Performance bonds, warranties, and guarantee were used in the project.					
5	Redundancy system were incorporated in the project.					
6	Several tests were conducting in the project to ascertain functionality					
7	The project had established a contingency reserve to deal with risks.					
8	Periodic reviews of the threat were done to ensure that they do not change significantly.					
9	Threats outside the project scope were escalated.					
10	Each project risk was assigned a risk owner.					

Section B (IV) Risk Monitoring and Control

	Statement	Responses				
		5	4	3	2	1
1	Risk response plans were monitored.					
2	Identified risks were tracked					
3	Identification of new risks were done continuously.					
4	Analysis of new risks was conducted.					
5	Evaluation of risk process effectiveness was done throughout the project.					
6	Risk audit was carried out in the project.					
7	Change requests were conducted in line with project risks.					
8	Technical performance analysis was done in the project.					
9	Reserve analysis was done in the project.					
10	Assumption logs were updated after monitoring					

Section C Risk Culture

	Statement	Responses				
		5	4	3	2	1
1	In terms of strategy, projects and operations, the project had strong leadership.					
2	All stakeholders were included in the risk management process at all levels.					
3	Training in risk management methods and learning from incidents were prioritized.					
4	There was no blame culture, yet there was adequate accountability for actions.					
5	On all risk management challenges and lessons learned, there was communication and openness.					

Section D Project Complexity

1. Project Budget: ☐Above Kshs 100,000,000 ☐ Kshs 75,000,000-50,000,000 ☐ Kshs 50,000,000- 25,000,000 ☐25,000,000 -10,000,000 ☐Below 10,000,000

2. Project team size: ☐ Above 20 people ☐ 16-20 ☐ 10-15 ☐ 5-9 ☐Below 4 people

3. Project duration ☐ more than a year ☐9- 12 months ☐6- 9 months ☐3 to 6 months☐ less than 3 months

4. Project impact on business change in the Bank ☐ very high ☐ high ☐ moderate ☐ low ☐ very low

5. Project impact on organization change in the Bank ☐ very high ☐ high ☐ moderate ☐ low ☐ very low

Section E Information Technology Project Performance

Please mark in the boxes below the degree to which you agree to the following statements "Key: 5= strongly agree, 4 =agree, 3 = neither agree nor disagree, 2=disagree 1=strongly disagree"

	Statement	**Responses**				
		5	**4**	**3**	**2**	**1**
1	IT Project completed within cost and budgetary allocations.					
2	IT Project met the targeted quality.					
3	IT Project completed within the stipulated timeframe.					
4	IT Project attained defined scope.					
5	The project attained its overall objective					

Thank you for your Participation.

APPENDIX III: RESEARCH APPROVAL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School

DATE: 31st August, 2021

TO: Mr. Ouma F. Okongo
C/o Department of Management Science
KENYATTA UNIVERSITY

REF: D86/CTY/27680/18

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board at its meeting 25th August, 2021 approved your Ph.D. Research Proposal entitled "Risk Management and Project Performance in Kenya Commercial Banks".

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed supervision Tracking and Progress Report Forms. The Forms are available at the University's Website under Graduate School webpage downloads.

By copy of this letter, the Registrar (Academic) is hereby requested to grant you substantive registration for your Ph.D. studies.

Thank you.

KENYATTA UNIVERSITY
OFFICE OF DEAN
31 AUG 2021
GRADUATE SCHOOL
P.O. Box 43844-00100 NAIROBI

REUBEN MURIUKI
FOR: DEAN, GRADUATE SCHOOL

c.c. Chairman, Department of Management Science
Registrar (Academic) Att; Mr. Richard Chweya

Supervisors:

1. Dr. Paul Sang
   C/o Department of Management Science
   KENYATTA UNIVERSITY
2. Dr. Franklin Kinoti
   C/o Department of Management Science
   KENYATTA UNIVERSITY

EM/cao

APPENDIX IV: RESEARCH AUTHORIZATION

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: D86/CTY/27680/18

Date: 31st August, 2021

The Director General,
National Commission for Science, Technology & Innovation,
P.O. Box 30623-00100,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR.FREDRICK O. OUMA - REG. NO. D86/CTY/27680/18

I write to introduce Mr. Ouma who is a Postgraduate Student of this University. He is registered for a Ph.D. degree programme in the **Department of Management Science in the School of Business.**

Mr. Ouma intends to conduct research for Ph.D. thesis entitled, **"Risk Management and Project Performance in Kenya Commercial Banks".**

Any assistance given will be highly appreciated.

Yours faithfully,

KENYATTA UNIVERSITY
OFFICE OF DEAN
31 AUG 2021
GRADUATE SCHOOL
P.O. Box 43844-00100 NAIROBI

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

RM/cao

APPENDIX V: RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **254020**

Date of Issue: **08/September/2021**

RESEARCH LICENSE

This is to Certify that Mr.. Fredrick okong'o Ouma of Kenyatta University, has been licensed to conduct research in Nairobi on the topic: RISK MANAGEMENT AND PROJECT PERFORMANCE IN KENYA COMMERCIAL BANKS for the period ending : 08/September/2022.

License No: **NACOSTI/P/21/12786**

254020

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

APPENDIX VI: SELECTED IT PROJECTS IN COMMERCIAL BANKS

	Bank	Project
Tier 1 1	Absa Bank Kenya	Core Banking System project
2	Cooperative Bank of Kenya	BFUB Project
3	Diamond Trust Bank	Alternative Banking Channels Project
4	Equity Bank	Finnacle Core Banking Project
5	I&M Bank	Digital KYC project
6	Kenya Commercial Bank	T24 Core Banking upgrade project
7	NCBA Bank Kenya	System Integration Project
8	Stanbic Bank Kenya	T24 core Banking Upgrade
9	Commercial Bank of Africa	CBA Loop Project
10	Standard Chartered Kenya	Digital Platforms project
Tier 2 11	Bank of Baroda	Net Banking Project
12	Citibank	Citi Direct online Banking
13	Eco Bank	Online Omni Lite project
14	Family Bank	Finnacle Core Banking upgrade
15	Housing Finance Company of Kenya	HF Whizz Project
16	Prime Bank	Money Ware Custody Suite upgrade
17	SBM Bank Kenya Limited	SBM Core Banking System Upgrade
18	Access Bank	Paynet Project
Tier 3 19	ABC Bank	Internet Banking Project
20	Bank of Africa	Eagle Core Banking project
21	Consolidated Bank of Kenya	Internet Banking Project
22	Development Bank of Kenya	Flexcube Core Banking System Project
23	Dubai Islamic Bank	Business Intelligence Publisher Project
24	First Community Bank	online Banking project
25	Guaranty Trust Bank Kenya	Cheque Point Project
26	Guardian Bank	Core Banking Project
27	Gulf African Bank	Mobile Banking Project
28	Habib Bank AG Zurich	HBZ Mobile Application Project
29	Kingdom Bank	Core Banking Integration Project
30	Mayfair Bank	Core Banking Project
31	Middle East Bank Kenya	Internet Banking Project
32	M Oriental Bank	Core Banking Integration Project
33	Paramount Universal Bank	e-Banking Project
34	Sidian Bank	Digital Transformation Project
35	Spire Bank	Spire Internet Banking Project
36	United Bank for Africa	Finnacle Core Banking upgrade