ADDIS ABABA UNIVERSITY
COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE
SCHOOL OF INFORMATION SCIENCE

FACTORS AFFECTING THE QUALITY OF INFORMATION TECHNOLOGY (IT) AUDIT IN ETHIOPIAN COMMERCIAL BANKS

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Information Science

BY
Bzuwerk Yemer Begashaw

July, 2018
Addis Ababa, Ethiopia

DECLARATION

I, the undersigned, declare that this thesis is my original work, has not been presented in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Declared by

Bzuwerk Yemer Signature_____ Date_____

Confirmed by Advisor

Ato Getachew Jemaneh Signature _____Date_____

CERTIFICATION

This is to certify that Bzuwerk Yemer has carried out her research work on the topic entitled “Factors Affecting the Quality of Information Technology (IT) Audit In Ethiopia Commercial Banks‟”. The work is original in nature and is eligible for submission for the award of MSc Degree in Information Science.

Advisor: Ato Getachew Jemaneh:_____

Place and date of submission: Addis Ababa University, June 2018

ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

SCHOOL OF INFORMATION SCIENCE

Factors Affecting the Quality of IT Audit in Ethiopia Commercial Banks

By

Bzuwerk Yemer

Approved by the Board of Examiners:

_____	_____
Advisor	**Signature**
_____	_____
Examiner	**Signature**
_____	_____
Examiner	**Signature**

ACKNOWLEDGEMENTS

I would like to take this opportunity to acknowledge the help and encouragement of all who have supported and assisted me during this thesis work. Without their guidance and advice, I would have never been able to accomplish this study.

First and foremost, I would like to thank God Almighty for giving me the strength, knowledge, ability and opportunity to undertake this research study and to persevere and complete it satisfactorily. Without His blessings, this achievement would not have been possible.

I would like to thank my research advisor Ato Getachew Jemaneh for his extrovert guidance and support. He has shown me the right path of research and encouraged me to move forward throughout the study. He was always available to answer my questions, provide feedbacks and advises throughout the journey of this thesis work.

I am very thankful to Dr. Tibebe Beshah, for his valuable advice, support, encouragement and constructive reviews throughout the study.

I would like to thank all the participants who took part in the interview and surveys conducted as a part of this research for their valuable time and kind assistance. I am also grateful to all my colleagues and friends, for their comments and reviews, which helped enrich this thesis work. Especially Hanna Zemelak, she was with me until I finished my study, and I will never foreget those precious moments of our study time in library.

Very special thanks to my husband Ato Yonas Belete for his comments and reviews, patience and support throughout my study. I would like to thank my beloved kids Elnathan Yonas and Kidus Yonas for their kind understanding, encouragement and patience, while I was not giving them sufficient family time due to my study. Mom and Dad thank you for telling me how strong and wonderful I am since my childhood, especially my mam thank you, for your continuous follow up and encouragement to complete my study! My sisters Alemtsehay, Tigist and Senite, and my brother Solomon, thank you for your support in every aspect of my life.

I would also like to express my warmest gratitude to my hasband family W/O Werkenesh Sheferaw and her family for helping my family and taking care of my kids in different ways to cover my responsibilities.

I would like to express my especial gratitude to the following employees of the Office of Federal Auditor General of Ethiopia (OFAG), Ato Haileab Tesfaye, IT Auditor and Ato Yigrem Mengesha,IT director, for their unreserved support in many aspects whenever I required their guidance, feedbacks and professional advice.

ABSTRACT

Information technology (IT) has become an effective and indispensable tool in modern business. Currently, commercial banks and information technology products are two sides of a coin which cannot be separated. On the other hand, IT has also brought with it an increasing range of IT vulnerabilities and threats of the automated business environment and associated organizational costs have increased tremendously along with new risk factors. The reliability of computerized data and of the systems that process, maintain and report these data, protecting the organization's assets and data, and ensuring efficient operations are a major concern and part of the role of information technology (IT) audit. Banks and other financial institutions are, according to regulations, required to develop an information technology audit program to support its information technology infrastructure, to keep non-public customer information secure, and to conduct a risk-based audit.

The purpose of this study is to examine the factors affecting IT audit quality in commercial banks in Ethiopia. The general approach of this research was an exploratory study in which a combination of quantitative and qualitative methods has been used to collect and analyze data. Based on extensive literature review, a research model was established which incorporates six factors that affect the quality of IT audit within commercial banks in Ethiopia. The six variables that are measured in this current study are: auditors IT knowledge and competencies, auditors IT control knowledge, target system complexity, audit procedure and methodology, auditing skills and resource availability.

The survey questionnaire and interview outline contents were prepared based on existing literature and developing additional ones as required. The quantitative aspect of the study involved 55 respondents (IT auditors) from internal audit department of the banks with different job positions, roles, and work experience. In the qualitative study, direct interviews were used to collect data from six IT audit managers of the banks. The quantitative data were analyzed by employing appropriate techniques of descriptive and inferential statistics using SPSS software tool. The qualitative data were analyzed using the techniques of open codding with narrative form. Moreover, document analysis was used as a secondary source of data to gain more information and triangulate the findings.

The findings of the study show that there is a positively significant relationship between IT Audit Quality and Auditors IT Control Knowledge, Target System Complexity, Auditing Skill, Audit Procedure and Methodology, Resource Availability and Auditors IT Knowledge and Competency. The researcher was asked the respondents to rank the critical once from the six factors. The result indicated that Auditors IT Knowledge and Competency ranked first, Auditors IT Control Knowledge ranked second, Audit Procedure and Methodology ranked third, Auditing skill ranked fourth, Resource Availability ranked fifth and Target System Complexity ranked sixth. According to the result, the researcher concluded that Auditors IT Knowledge and Competencies, Auditors IT Control Knowledge, Audit Procedure and Methodology and Auditing Skill which were ranked by the respondants from one to four respectively are the most critical factors that affect IT audit quality. Resource Availability and Target System Complexity are the lowest factors that affect the Quality of IT Audit.

Key words: IT Audit Quality, Auditors IT Control Knowledge, Target System Complexity, Auditing Skill, Audit Procedure and Methodology, Auditor IT Knowledge and Competency, Resource Availability.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

Acronyms	Description
AICPA	American Institute of Certified Public Accountants
AITKC	Auditors Information Technology Knowledge and Competency
AITCK	Auditors Information Technology Control Knowelegde
APM	Audit Procedure and Methodology
AS	Auditing Skill
CAAT	Computer Assisted Auditing Tools
CAE	Chief Audit Executives
CIO	Chief Information Officer
CISA	Certified Information Systems Auditor
CISM	Certified Information Security Manager
CISM	Certified Insormation Security Management
COBIT	Control Objectives for Information and Related Technologies
COSO	Committee of Sponsoring Organizations of the Commission
CPA	Certified Public Accountant
EDP	Electronic Data Process
ERM	Enterprise Risk Management
FFIEC	The Federal Financial Institutions Examination Council
IAF	Internal Audit Functions IS – Information System
IAASB	International Auditing and Assurance Standards Board
ICT	Information Communication Technology
INTOSAI	Intrnational Organization of Supreme Audit Institutions
IT	Information Technology
ISACA	Information Systems Audit and Control Association
ISO	International Organization for Standardization
ITAF	Information Technology Assurance Framework
ITAQ	Information Technology Audit Quality
ITIL	Information Technology Infrastructure Library

ISA	International Standards on Auditing
OFAG	Office of the Federal Auditor General
RA	Resource Availability
SAS	Statement on Auditing Standards
SOX	Sarbanes-Oxley Act
TSC	Target System Complexity

CHAPTER ONE

INTRODUCTION

1.1 Background

In the light of computerization opportunities available across the world, organizations have been increasingly relying on the automation of their activities and information management (Panwar et al., 2014) and the use of information Technology (IT) within the organizations has became increasingly significant and IT is a key component of their business strategies and core business processing activities (ISACA, 2003; Rotim and Komnenić, 2008; David and Liming, 2004; Mahzan and Veerankutty, 2010).

Due to a pervasive and steadily growth of information and communication technology, world's banking industry is entering into new phenomena of unprecedented form of competition supported by modern information and communication infrastructure. Currently, commercial banks and information technology products are two sides of a coin which cannot be separated. In order to deliver quality customer service and to stay competitive in the market, banks have to adopt information technology products and upgrade their service quality. Information technology investments in banks made to enhance better customer service; such as core banking software, Electron banking like POSs, ATMS, mobile banking, internet banking and also any software and hardware used on daily activists of the bank (Rahel, 2016).

Information technology (IT) has become an effective and indispensable tool in modern business (Siew et al, 2017). On the other hand, it has also brought with it an increasing range of IT vulnerabilities and threats of the automated business environment and associated organizational costs have increased tremendously along with new risk factors such as data loss due to vulnerabilities of network, the danger of tampering with data by insiders and outsiders is much higher in IS systems. Edward and Robert (2008) described in their study that an organization's top executives, board of directors and audit committee members look to information technology (IT) management for effective oversight of IT risks. The controls in place to manage these risks are an essential part of the internal control environment and structure(Edward and Robert, 2008).

There are also many types of risks associated with IT, such as loss of computer assets, erroneous record keeping, increased risk of fraud, competitive disadvantages if the wrong IT is selected, loss or theft of data, privacy violations and business disruption (Harb, 2012).

The increased reliance on IT and the complex, evolving nature of IT systems, has resulted in the need to implement internal controls to safeguard commercial information (Siew et al., 2017). The management of IT risks has to be a key part of corporate governance; therefore, the effective and efficient management of IT is vital to the success of most organizations (ISACA, 2003). The reliability

of computerized data and of the systems that process, maintain and report these data, protecting the organization's assets and data, and ensuring efficient operations are a major concern and part of the role of information technology (IT) audit (Siew et al., 2017; Singleton, 2014).

Identifying and taking corrective action on risks that will affect the healthy business environment is mandatory. Since IT is one of the strategic and critical activities of a company, it's advisable to have good performance management and audit strategy in hand. IT audit is one good way and in fact the best effective way of monitoring IT performance (Björklund and Joelsson, 2015). Therefore, in this study, are followed to explore the factors affecting information technology audit quality.

The most cited definition of an information technology audit(IT) is "the process of collecting and evaluating evidence to determine whether an information system safeguards assets, maintains data integrity, consumes resources efficiently, and achieves organizational goals effectively" (ISACA, 2003). An IT audit provides assurance that the IT systems and resources are functioning in an efficient and effective manner to achieve organisation's objective. James (2004) also defined IT auditing as the part of an audit that involves the computerized elements of an accounting information system (James, 2004).

IT audits are widely used internally to examine the operations, effectiveness, controls, and security of critical systems to identify opportunities for improvement and areas of weakness (Stoel et al, 2012). The breadth and extensive knowledge required to perform IT audits are various and many such as Implementing and conducting risk-oriented audit approaches, Applications of standards, such as ISO 27002, Business understanding, Assessment of information security and privacy issues that can impose risk for an organization, Legal and regulatory requirements and Management reporting and follow-up (Lovaas and Wagner, 2012; Komneni, 2008).

According to Lovaas and Wagner (2012), banks and other financial institutions are, according to regulations, required to develop an information technology audit program to support its information technology infrastructure, to keep non-public customer information secure, and to conduct a risk-based audit on an annual basis (Lovaas and Wagner, 2012).

Due to an increased spending and dependence on IT for business operations, and new legislation and professional requirements related to the audit of these operations, recent research has identified the significance of IT audit to organizations and has called for additional research in this area. The reliance on IT and the need for high investment require an increased level of assurance that these systems deliver what they promise. One purpose of IT audits is to provide management with assurance that a system or automated process is meeting its objectives (Stoel et al., 2012; Lovaas, 2009).

This study was motivated by the call for additional research in IT audit from different literatures due to the potential reasons: advances in information technology and increases in IT spending which have resulted in organizations relying on software and technical infrastructures to support most businesses processes, and laws, such as SOX, which require all information systems used to produce financial

statements be documented and tested for compliance with management's IT control objectives (Stoel et al., 2012).

The increased demand for IT audit services put emphasis on the importance of performing these services in the most efficient and effective manner. As a result, additional research is needed to understand the potential issues in performing IT audits and critical factors that may be related to the overall quality of the IT audit (Stoel et al., 2012).

According to the consultation paper of the International Auditing and Assurance Standards Board (IAASB), audit quality is the significant issue that requires more significant attention (Hosseinniakani et al., 2014). To ensure the value of IT audits, organizations should implement a standard method for evaluating the quality of IT audits. There is no clear definition for “Audit Quality” due to many diverse factors affecting the quality (Hosseinniakani et al., 2014). There has been little research into factors that make up IT audit quality.

Understanding how audit quality is important requires exploring audit quality factors more precisely. So, this research explored the different audit quality factors that may affect the quality of IT audit in Ethiopian Commercial Banks context.

1.2 Statement of the Problem

While there is the general motivation of understanding the factors impacting IT audit quality, there are particular concerns which dictate the specific focus of this thesis. The impact of information technology (IT) in business has grown exponentially in recent years (Mahzan and Veerankutty, 2010) and this rapid escalation of technology and the use of computers in business practice result in quality information technology (IT) auditing and internal control standards and guidelines to assist auditors in their roles and responsibilities (Axelsen et al., 2011). Several organizations, such as the American Institute of Certified Public Accountants (AICPA), the International Federation of Accountants and the Information Systems Audit and Control Association (ISACA), have issued standards in this area to be observed by their members in performing an IT audit (David and Liming, 2004; Lovaas and Wagner, 2012).

Most commercial banks are spending huge amounts of money on IT because they recognize that IT can bring tremendous benefit by facilitating their operations and services. However, they need to ensure that their IT systems should be reliable, secure and not vulnerable to computer attacks. IT audit is important because it gives assurance that the IT systems are adequately protected, provide reliable information to users and properly managed to achieve their intended benefits. In addition to this IT audit reduce the risks of data tampering, data loss or leakage, service disruption, and poor management of IT systems (Lovaas and Wagner, 2012).

Audit is playing an important role in developing and enhancing the global economy and business firms. More recently the Global Financial Crisis has seen policy makers once again focus attention on

the importance of an effective audit function as a key component in effective capital markets and attempt to identify key drivers of audit quality (Al-Khaddash et al., 2013).

The Information Technology Audit (IT audit) Program Booklet, by The Federal Financial Institutions Examination Council (FFIEC), states that a well-structured IT audit program is critical for the evaluation of management practices, internal control, and, finally, compliance with bank policy regarding IT. Furthermore, the audit program should be risk-based, promote critical controls, ensure that recommendations are addressed in a timely manner, and keep the Board of Directors current on risk management efforts (Lovaas and Wagner, 2012; Ernst and Young, 2013).

When the audit gives reasonable assurance there is always room for mistakes and errors that can decrease the audit quality and misinform a third party in his/her decision. This raises the question of what is audit quality and what factors affect the quality of an audit (Solomon, 2016).

The IT Audit related literature express that currently a variety of resources are available to guide practitioners at the operational level. For example, The Control Objectives for Information and related Technology (COBIT) Framework provides detailed series of potential controls and checklists. In addition to this, there are many publications and textbooks give an overview of IT audit processes and specific direction for audit tasks. However, there has been little research on the IT audit quality, specifically on what factors influence IT audit quality and on the relative importance of each factor (Stoel et al., 2012).

Research into perceptions of audit quality is important because it determines the credibility of the audit report and also useful in ensuring that policies and practices support confidence and credibility in the audit function by encompassing attributes found to be relatively more important in perceptions of audit quality (Al-Khaddash et al., 2013).

One of the significant financial sectors in Ethiopia is the banking industry. Currently, this sector is playing a prominant role in the development of the country. Consequently, one can argue that auditors are vitally important to the banking sector (Al-Khaddash et al., 2013). As competition in commercial banking sector is high, so audit quality has become an important issue for managers who look to improve the level of their bank.

Merhout and Havelka (2007) have developed a framework for the IT audit process quality by gathering data from internal and external IT audit practitioners. They focused on creating a framework of logical factors that affect IT audit quality. They identified more than 260 attributes or factors affecting the quality of IT Audit and that were “critical” to the IT audit process. However, the identified logical categorizations of attributes do not provide any empirical evidence to supporting their framework or to evaluate the importance of the listed attributes.

Merhout and Havelka (2008) undertook a field study to develop a model of IT audit quality. The field study was composed of two stages: the first to develop an initial framework and the second to provide validation and refinement of the framework. Both stages consisted of a series of focus groups

using a nominal group process including IT auditors, financial and operational auditors, and IT audit managers. They identified 108 unique factors from the five groups and they refined and expanded the framework to eight logical categories based on who or what entity might control, influence, or determine the factor. These are Audit Team Factors, Audit Process and Methodology Factors, Client-controled Organizaational Factors, IT Audit-controlled Organizational Factors, IT Audit Personnel Technical Competency Factors, IT Audit Personnel Social and Interpersonal Factors, Enterprise and Organizational Environment Factors and Target Process or System Factors. A focus group was used to obtain and develop factors related to IT audit quality. As this study used focus group consists of only a few respondents, their numbers of participants werel low, it was likely that the factors generated could be biased. Their framework contains general categories and does not provide questionnaire tools. There fore, this research used more number of participants to identify and empirically taste the IT audit quality factors.

Inaddition, Since every IT audit is unique, the appropriate choices, the factors that affect IT audit success will vary based on the circumstances of the organization, i.e. the industry, size of the organization, complexity of the systems involved, etc (Havelka and Merhout, 2007). Therefore, due to the unique nature of the IT audit, the influencing factors that affect the quality practices of the IT Audit may vary in Ethiopian commercial banks. Prior researchers identified some of the factors affecting the quality of IT audit, however these factors had not been studied and empirically tasted in the Ethiopian commercial banks context.

Therefore, this research will attempt to fulfill the non-empirical evidence gap by integrating those factors identified by the researchers with the actual IT Audit quality practices in Ethiopian commercial banks context.

Investigating the factors that affect IT audit quality is expected to help IT audit managers to improve the IT audit quality provided by the internal auditing and to find the most appropriate conditions that lead to high audit quality (Al-Khaddash et al., 2013). This practical work and experience in the IT audit quality of banks sector can help in connecting the theoretical ideas with the real practice.

1.3 Research Questions

The study aims to identify the factors affecting IT audit quality in Ethiopian commercial banks from internal IT auditor's perspective. The study attempts to answer the following research questions:

- What are the factors that affect the Quality of IT Audit in Ethiopian commercial banks?
- Which factors are the most critical that affecting IT Audit Quality in Ethiopian commercial banks?

1.4 Objectives of the Study

1.4.1 General objective

The general objective of the study is to identify the factors affecting IT auditing quality in the Ethiopian commercial banks from internal IT auditor's perspective.

1.4.2 Specific objectives

To meet the general objective, the following specific objectives are set:

- Identify factors that may affect the Quality of IT Audit in Ethiopian commercial banks.
- Determine the most important (critical) factors that affect the Quality of IT Audit in Ethiopian commercial banks.

1.5 Significance of the Research

The identification of the factors that affect the Quality of IT audit may give IT Audit managers to better control and manage the audit process and thus improve the effectiveness and/or efficiency of the audit; to self-evaluate each factor to determine their ability to improve their IT audits; to prioritize opportunities for training and development on the differences in factors that are perceived as critical for audit success. The result will also help regulatory and IT audit professional bodies to properly monitor the IT audit process and to maintain trust among the various stakeholders. Moreover, the factors could also be used as part of a quality control program to conduct post-audit reviews and this could help determine where issues occurred or opportunities were missed for improving audit quality (Stoel et al., 2012; Robert, 2010).

The findings of this research will also assist Ethiopian commercial banks to gain greater insight/awareness and knowledge about factors affecting IT Audit quality and its importance to their performance. In addition to this, the research can be used as a springboard for further studies regarding Information Technology audit aspects. The gaps that was mentioned in the study can act as a guide to any intended research to assist in topic selection and identify areas that need further study. Finally, the study will benefit both the regulators and the commercial banks in Ethiopia in making clearer the determinant of audit quality and its impact on the quality of audit.

1.6 Scope and Limitation of the Study

The aim of this study was to explore the factors that affect the quality of IT audit in Ethiopian commercial banks. The research conducted in the Ethiopian commercial banks include both government and private banks.

The major challenges the researcher faced, that might have an implication on the overall result of the study includes firstly, at a local level, there were limited or no empirical research works aimed at

investigating the quality of IT audit. Secondly, there are limited number of IT auditors found in Ethiopian commercial banks.

1.7 Organization of the Thesis

The study is organized in six chapters. Chapter One presents the introduction which consists of background information, problem statement, research question, research objective (general and specific), significance, scope and limitation of the study. Chapter Two is about literature review and related work which presents detail review (Conceptual and empirical literatures) of the study area. The Third Chapter discusses the methodology of the research includes: overview, general approach and method, study population and sampling, data collection methods and procedures, data analysis techniques, validation and reliability and summary of the research. Chapter Fr presents the empirical findings and analysis of the study. Chapter Five presents the results of discussion. And Chapter Six presents conclusion based on the analysis result and recommendations provided by the researcher.

CHAPTER TWO

LITRATURE REVIEW AND RELATED WORKS

2.1 Overview

The main objective of this chapter is to present a theoretical framework and relevant empirical findings related to the current study “Factors Affecting the quality of IT Audit”. Further a conceptual framework is developed based on the theoretical and empirical reviews.

Most businesses, private or public, profit or not-for profit, are increasingly dependent on Information Technology and it has also impacted the business environment in three significant ways: IT has increased the ability to store, capture, analyze, and process tremendous amounts of information, IT has significantly impacted the control process and IT has also impacted the auditing profession in terms of the skills required to perform an audit and the knowledge required drawing conclusion (Wagner, 2001).

The importance of information technology, the need to derive more value from IT investments and manage IT-related risks is increasing. Business executives and managers are taking ownership and making organizational changes to create a more effective structure for overseeing and monitoring IT-related goals and issues. IT auditors should have expert knowledge regarding IT risk and controls to provide assurance to management (Mengistu, 2016).

Komneni (2008) indicates that the extensive use of IT in business today has had a major impact on the audit profession too. Keeping pace with this technology and ensuring that it exists within a secure and controlled environment is one of the key challenges facing the audit profession (Komneni, 2008).

Inaddition, IT presents risk factors that are unique to accounting, auditing and systems. That is, IT itself brings risk to the entity regarding its systems, business processes and financial/accounting processing. That risk is unique to IT and without IT being present, that risk would not exist, at least not to the same level. It takes a professional, such as an IT auditor, to identify and assess the inherent risk associated with IT. Those risk factors include systems-related issues, such as systems development, change management and vulnerabilities, and other technology-specific factors (Singleton, 2014).

The last few years have been an exciting time in the world of IT auditing as a result of the accounting scandals and increased regulation. IT auditing began as Electronic Data Process (EDP) Auditing and developed largely as a result of the rise in technology in accounting systems, the need for IT control, and the impact of computers on the ability to perform assurance services. When compared to auditing as a whole IT auditing has had a relatively short yet rich history and remains an ever changing field (Nkwe, 2011).

IT Auditors evaluate the effectiveness and efficiency of IT controls in information systems and related operations to ensure they are operating as intended (ISACA, 2003). The IT audit activity provides assurance around all-important risks, including those introduced or enabled by the implementation of IT. So due to the increased reliance of business operations on IT and new regulations regarding the assurance of IT for those operations, information technology auditioning has grown rapidly (Stoel et al., 2012).

2.2 Definition of IT Audit

Audit can be defined as 'a systematic, independent and documented process for obtaining audit evidence, to set goals and objectives, outline strategies and tactics, develop plans, schedules and necessary controls to run the organization'. Internal audits are intended to add value and improve an organization's operations by evaluating and improving the effectiveness of risk management, control and governance processes and it helps an organization to accomplish its objectives (Björklund and Joelsson, 2015).

Today the global economies are more dependent on information technology and the IT related risks have more impact on the business and required for strong IT controls for business operations, this calls for IT audit. (Stoel et al., 2012; Suduc et al. 2010).

Panwar et al. (2014) define IT Audit as "the process of deriving assurance on whether the development, implementation and maintenance of IT systems meets business goals, safeguards information assets and maintains data integrity." In other words, IT Audit is an examination of the implementation of IT systems and IT controls to ensure that the systems meet the organization's business needs without compromising security, privacy, cost, and other critical business elements (Panwar et al., 2014).

"IT Audit is the process of collecting and evaluating evidence to determine whether a computer system has been designed to maintain data integrity, safeguard assets, allows organizational goals to be achieved effectively, and uses resources efficiently" (ISACA, 2003; Harb, 2012; Siew et al., 2017; Mengistu, 2016; ALraja and ALomiam, 2013; Axelsen et al., 2011). International Standards of Auditing (ISA 315) requires auditors to examine and ascertain the IT procedures, processes, and controls when assessing the client's controls environment (Siew et al., 2017).

IT auditing is the process of gathering and evaluating evidence based on which one can evaluate the performance of IT systems to determine whether the operation of information systems in the function of preserving the property and maintain data integrity (Mengistu, 2016). The primary role of an IT audit is to ensure the integrity of an organization's information systems (Harb, 2012). Identifying and addressing risk is one of the business most important issues and IT is central to any organization. The IT audit ensures that these risks are addressed quickly and carefully (Björklund and Joelsson, 2015).

IT auditors evaluate and examine the reliability of computer generated data supporting financial statements, analyze specific programmes and their outcomes and the adequacy of controls in information systems and related operations to ensure system effectiveness. An effective information system leads the organization to achieve its objectives and an efficient information system uses minimum resources in achieving the required objectives (Kaul, 2002).

One aspect of conducting IT audits is the discovery of irregular acts, i.e. intentional violations of policies or regulations, or unintentional breaches of the law (Havelka and Merhout, 2008).

Björklund and Joelsson (2015) described IT audit as a process, developed to identify risks and for controlling and understanding IT (Björklund and Joelsson, 2015). According to Merhout and Havelka (2008) an audit is 'an independent examination of an organization's management assertions that must follow a set of guidelines and standards promulgated by an external sanctioning body'. They described that an audit can be either an external engagement conducted by Certified Public Accounting (CPA) firms or an internal engagement performed by an organization's internal audit function (Havelka and Merhout, 2008; Mengistu, 2016)

In a complex and dynamic business environments where IT becomes significant to the organizations, the role of the internal audit function changes from a traditional one focuses on accounting and financial control to a more strategic one which focuses on risk management and corporate governance, the overall corporate governance applies to IT governance efforts too to assist all employees and business functions including IT and its Governance of the organization to give assurance, evaluations and recommendations (Mengistu, 2016).

2.3 The Need for IT Auditing

Computers play a vital role in assisting the organization to process data and to make decisions, it is important that their use should be controlled, because the rapidity of change and amount of resources invested in IT from time to time makes the activities complex to the management of IT (Mengistu, 2016) and the costs of errors and irregularities that arise in these systems can be high. Not only controlling their use, the way they are utilized and their impact on the overall objectives of an organization have to be evaluated (OFAG, 2017). This calls for the requirement of the auditor to become involved in supporting and helping implement corporate governance in IT and management (Mengistu, 2016).

Company survival depends directly on continued IT services. Thus, IT is a concern of internal control. Computer Auditing is a specialization of Internal Auditing. Because IT facilities have become vital to organizational functions, clear policy statements have become a necessity. Without a clear statement of direction, organizations can become disoriented and perform ineffectively. Standards are the means by which policy is attained. The IS auditor must assess both the adequacy of the standards, and the compliance with the standards.

Policies and standards are critical in the following areas: Systems development life cycle, Analysis and programming, Data structures, Security, Data controls, Documentation, User procedures and User programming (Wagner, 2001).

The demands of IT auditing highly increase in recent years as a result of the accounting scandals and increased regulation. IT auditing adds security, reliability and accuracy to the information systems. ISACA stated that the IT auditor can help organizations implement control structure processes such as Control Objectives for Information and Related Technology (COBIT), the Committee of Sponsoring Organizations of the Treadway Commission (COSO), and International Organization for Standardization (ISO) standards 9000, 9001, 17799, and their amendments (Merhout and Havelka, 2006; Walker, 2015).

The demand for IT audit professionals is increasing, as evidenced by ISACA's simple, but powerful statement: "In the information-based business environment, business professionals who are technically competent in IS, or IS specialists who understand accounting, commerce and financial operations, are in great demand for IS audit careers" (Merhout and Havelka, 2006).

SOX, also known as the Sarbanes-Oxley Act, passed in 2002 had a direct effect on the control practices of publicly traded companies. The SOX has been to require companies to create real-time reporting systems that are transparent, in that they provide a clear understanding of the underlying processes and controls (Walker, 2015).

IT audits are important organizational processes that add value to the organization because they have given an assurance on the integrity, reliability and quality of the information produced by the organization's information systems (Siew et al., 2017). IT audit is needed to assure that the information gathered through systems is controllable, secure and functional. The IT auditor plays an increasingly important role in helping companies manage and respond to risks (Björklund and Joelsson, 2015).

Moreover, organizations with the increased reliance on computers to perform their daily transactions and with the advanced threats and risks associated with new technology, the organizations management needs assurances that the internal controls governing the business computer/system operations are adequate (Harb, 2012).

One of the reasons why it is necessary to perform IT internal audits in companies is the fact that information system integrity protection has become an important business issue in today's business conditions, when companies' core activities are becoming more tightly linked with their information systems (Rotim and Komnenić, 2008). All industries should perform an IT audit, but it is critical for banks and financial institutions and also according to regulations, required to develop an information technology audit program to support its information technology infrastructure, to keep non-public customer information secure, and to conduct a risk-based audit on an annual basis (Merhout and Havelka, 2006 and Lovaas, 2009).

IT audit provides more reliable and more accurate information on IT asset protection, data integrity maintenance. The final result of IT audit is not just a report but its effects and a timely implementation of recommendations and corrective activities (added value) with the purpose of implementation business goals of the company in its entirety (Rotim and Komnenić, 2008).

2.4 IT Audit Objectives

The purpose of IT auditing is to assess whether or not an information system is achieving stated organizational objectives and to ensure that the system is not creating an unacceptable level of risk for the business (Havelka and Merhout, 2008; Rahman,2014). IT audit also ensure that the IT resources allow organizational goals to be achieved effectively and use resources efficiently (Panwar et al., 2014). Moreover the purpose of an IT audit is also to discover where improvements can be made, and to ensure that the company is in compliance with internally and externally mandated laws and regulations (Lovaas, 2009).

The objective of conducting an IT audit is to evaluate an organization computerized information system in order to ascertain whether the information system produces timely, accurate, complete and reliable information outputs, as well as ensuring confidentiality, integrity, availability and reliability of data and adherence to relevant legal and regulatory requirements (Kozlovs et al., 2015; Lovaas and Wagner, 2012; ISACA, 2003; Kaul, 2002).

- **Confidentiality:** refers to 'the protection of sensitive information from unauthorized disclosure. Management needs assurance of the organization ability to maintain information confidential, if confidentiality compromises could lead to significant public reputation harm [ASOSAI, India, and WG].'

- **Integrity:** refers to 'the accuracy and completeness of information as well as to its validity in accordance with business values and expectations. It provides assurance to management that the information produced by the organizations information systems can be relied and trusted upon to make business decisions.'

- **Availability:** relates to 'information being available when required by the business process now and in the future and also cancers the safeguarding of necessary resources and associated capabilities. It gives assurance that the information they need for decision making is available when required'

- **Reliability:** refer to 'the degree of consistency of a system or the ability of a system to perform its required function under stated conditions. IT audit provides assurance that the system consistently operates and performs its stated function as expected.'

- **Compliance with Legal and Regulatory Requirements:** 'Compliance deals with complying with those laws, regulations and contractual obligations to which the business process is subject,

that is, externally imposed business criteria. IT audit gives assurance that necessary compliance procedures have been put in place.'

According to Alraja and Alomiam (2013) describes the general IT audit objectives as follows: Validation of the organizational aspects and administration of the Information Service function, Validation of the controls of the system development life cycle, Validation of access controls to installations, terminals, libraries, etc (Alraja and Alomiam, 2013).

Mahzan and Veerankutty (2010) also describes an IT audit objective as "a statement of the desired result or purpose to be achieved by implementing control procedures in a particular IT activity". They discussed that the fundamental audit objective does not change because of the computerized accounting system. However, additional computer related considerations need to be incorporated into overall audit planning (Mahzan and Veerankutty, 2010). The advent of new technologies has caused changes in audit approaches and in some cases it may cause change in the audit objectives. IT audit objectives that relate to IT usage includes:

- Evaluation of efficiency/effectiveness/economy of IT use
- Evaluation of compliance with policies, procedures, and regulations
- Evaluation of internal control in computer-based systems
- Evaluation of fairness of financial statement representations and the accuracy and completeness of computerized accounting records (Mahzan and Veerankutty, 2010).

2.5 Benefits of IT Audit

IT audit provides an understanding of the business role and the assessment of information security that can put the organization at risk (Björklund and Joelsson, 2015). Havelka and Merhout (2008) stated that the primary and ultimate benefit of an IT audit is to ascertain with a certain level of confidence that an information system is working properly to have a greater confidence in the financial statements produce by the systems, that is the information system processes inputs into outputs correctly, only authorized individuals can access specific data and execute specific programs, and data are stored correctly and securely (Havelka and Merhout, 2008; Cascarno,2012).

The IT auditor can also facilitate maturing organizations successfully to achieve IT governance as part of their internal audit structure (Mengistu, 2016; Yudistira, 2012). The IT auditor has the responsibility to provide independent assessments, assurance and opinions on business operations and controls.

Organizations by conducting IT audits can get benefits such as compliance with other various government regulations, and laws aimed at combating identity theft, the identification of effective control mechanisms and those in need of improvement, improved documentation of information systems and business processes, and improved systems security. In addition organizations can benefit from a comprehensive IT audit program is the identification and documentation of effective control

mechanisms for information systems and the documentation of adequate controls allow management to evaluate the tradeoffs between control requirements and operational efficiency (Mengistu, 2016; Lydon, 2015).

If there is inadequate command and control over business processes and the information systems that support these processes, the IT audit giving awareness of the lack of these controls and to make better decisions for establishing appropriate control mechanisms.

IT audit usually requires the generation of documentation of business processes, applications, and the IT architecture which lead to an organization and technology enablers with a greater understanding of the business processes and enhance an organization's ability to effectively manage the valuable resources. In addition the availability of the documentation help in training new employees, performing evaluations of operations and systems, and measuring the return on investments in IT, especially when evaluating the costs and benefits of new systems (Havelka and Merhout, 2008; Wiley, 2007).

Mengistu (2016) describes that success with IT and IT governance drive successful IT outcomes, this will come when all stakeholders work together with a common understanding and body of knowledge and IT auditors engaging in IT governance initiatives. IT auditors can also help to drive business benefits from improved IT governance such as:

- **Transparency and accountability**: such as improving the transparency of IT costs, IT process and IT portfolio (projects and services), and clarifying decision-making accountabilities and definitions of user and service provider relationships.
- **Return on investment/stakeholder value:** such as improving understanding of IT costs and their input to ROI, balancing the costs of investment against the expected return, ensuring that stakeholders see IT risk/returns, improve the contribution to stakeholder returns, and enhancing reputation and image.
- **Opportunities and partnerships:** such as providing a route to realize opportunities that might not receive attention, positioning IT as a business partner, facilitating more businesslike relationships with key IT partners (vendors and suppliers), achieving a consistent approach to taking risks and improving responsiveness to market challenges and opportunities.
- **Performance improvement:** such as achieving clear identification of whether an IT service or project provides future, added value, focusing on performance improvement leading to attainment of good practices, avoiding unnecessary expenditures, and increasing the ability to benchmark.
- **External compliance:** such as which enables an integrated approach to meeting external legal, contractual and regulatory requirements (Mengistu, 2016).

Havelka and Merhout (2008)) also showed the benefits of IT audit as value-added IT audit services such as: improved return on investiment in IT through improved IT governance, using audit documentation to improve operational efficiency through business and IT process reengineering or improved business process management, using audit observations to improve risk mitigation through enhanced Enterprise Risk Management (ERM) awareness, improved business continuity planning and associated systems disaster recovery planning, improved systems development quality and increased organizational communication and trust development through facilitation among various stakeholders (Havelka and Merhout, 2008).

The high value audit delivers actionable findings that drive the improvement of the organization's financial and business systems and business operations and appropriately assesses technology risks and the control environment as they relate to critical business processes in a particular area (Edward and Robert, 2008, Yudistira, 2012).

2.6 IT Controls

Internal control is the process of introducing and implementing a system of measures and procedures to determine whether the organization's activities are and remains consistent with the approved plans. To achieve the policy objectives to keep the systems on course internal controls are required because it helps to take a corrective measures (Panwar et al, 2014; Jack, 2003).

IT controls are designed to meet control objectives related to Information Security requirements. The core objectives, often referred to as C-I-A (Confidentiality: Protects sensitive information from being viewed by unauthorized users such as Financial Data, Credit Card Numbers, etc., Integrity: Protects the integrity of critical IT resources like Hardware, Software, data repositories, Availability: Ensures that critical IT resources (i.e., hardware, software, and data) are available when needed) (William et al., 2013; Vihar, 2014).

Internal controls include risk management, compliance with internal procedures and instructions and with external legislation and regulations, periodic and ad hoc management reports, progress checks and revision of plans and audits, evaluations and monitoring (Panwar et al., 2014).

Controls in a computer information system reflect the policies, procedures, practices and organizational structures designed to ensure the protection of the organization's assets, the accuracy and reliability of its records, and the operational adherence to the management standards (Panwar et al., 2014).

IT controls provide for assurance related to the reliability of information and information services and used to help mitigate the risks associated with an organization's use of technology (Richard, 2005).

The task of the IT auditor is to give an objective and independent assurance by understanding, examining, and assessing the key controls related to the risks and by performing sufficient testing to ensure the controls are designed appropriately and functioning effectively and continuously that the IT-related controls are operating as intended (Richard, 2005).

The IT Controls review work carried out may be influenced by different International Auditing frameworks and before taking up an IT audit, the IT auditors should familiarize themselves with these standards such as: INTOSAI Auditing Standards, Control Objectives for Information and Related Technologies (CoBIT) of IT Governance Institute, International Federation of Accountants (IFAC) Auditing Standards, international standards of professional IT audit organizations such as the Information Systems Audit and Control Association (ISACA) and the Institute of Internal Auditors (IIA) (Kaul, 2002).

IT controls are used to mitigate the risks associated with in the IT environment and application systems and classified in to two categories: General IT Controls and Application IT Controls (Panwar et al., 2014; Kaul, 2002; ISACA, 2003).

IT General Controls are the foundation of the IT Control structure and concerned with the general environment in which the IT systems are developed, operated, managed and maintained. These are designed to manage and monitor the IT environment that affect all applications and which focus on the management and monitoring of IT (Panwar et al., 2014; Kaul, 2002).

General IT controls are applied to all systems components, processes, and data for a given organization or systems environment (Panwar et al., 2014; Kaul, 2002; Richard, 2005; Bellino et al., 2007). The objectives of these controls are to ensure the appropriate development and implementation of applications, as well as the integrity of program and data files and of computer operations (Bellino et al., 2007). The most common controls are: Logical access controls over infrastructure, applications, and data, System development life cycle controls, Program change management controls, Physical security controls over the data center, System and data backup and recovery controls and Computer operation controls (Panwar et al., 2014; Kaul, 2002; Richard, 2005; Bellino et al., 2007).

Application Controls are specific controls unique to each application systems. They include controls that help to ensure the proper authorization, completeness, accuracy, and validity of transactions, maintenance, and other types of data input, encryption of data to be transmitted, processing controls, etc. These controls are used to provide assurance (primarily to management) that all transactions are valid, authorized and recorded (Panwar et al., 2014; Richard, 2005; ISACA, 2003; Kaul, 2002; Bellino et al., 2007). The objective of application controls is to ensure that: Input data is accurate, complete, authorized, and correct; Data is processed as intended in an acceptable time period; Data stored is accurate and complete; Outputs are accurate and complete; A record is

maintained to track the process of data from input to storage and to the eventual output (Bellino et al., 2007).

2.7 Areas Covered in IT Audit

IT audit should be carried out from a risk based approach to identify the threats within IT (Björklund and Joelsson, 2015). IT audits cover issues such as IT Governance, Development and Acquisition of business solutions, IT/Computer operations, Outsourcing, Business Continuity and Disaster Recovery, Information Security and Application controls. Panwar et al. (2014) categorized IT controls as general IT controls and application controls (Panwar et al., 2014; ALraja and ALomiam, 2013).

IT Governance

IT Governance is the overall framework that guides IT operations and an integral part of the enterprise governance in an organization to ensure that the IT investments and activities are aligned and meet the business objectives (Panwar et al., 2014).

The objectives of IT governance are IT is aligned with the business, IT enables the business and maximizes benefits, IT resources are used responsibly, IT risks are managed appropriately. IT auditing is major tool for IT governance, the IT auditors are involved in giving assurance that each of these objectives met. For easy IT auditing adoption, employees who have business and IT skills are needed (Nkwe, 2011).

Auditors need to understand and evaluate the different components of the IT Governance structure to determine whether the IT decisions, directions, resources, management and monitoring support the organization's strategies and objectives (Panwar et al., 2014).

2.8 The Stages of IT Audit

The process of IT audit in company is a process of applying appropriate standards and publications, internal audit standards, internal acts, as well as standards and criteria for assessing the condition of IT systems in an audited area. The process of IT audit in company includes the use of adequate methods, procedures, techniques and different means, ways and forms of performing an audit, which enable IT auditors to ascertain the actual and objective state and provide a professional evaluation and audit results. IT audit is performed in four stages: Planning the audit, Information testing and evaluation/Feildwork, Reporting stage and Follow-up stages (James, 2004**;** Rotim and Komnenić, 2008; Rahman,2014). Rotim and Komnenić (2008) illustrated according to place, time and tasks, the IT audit process is divided into: Pre fieldwork activities, Fieldwork activities and Post fieldwork activities.

Pre fieldwork activities include: defining objectives and tasks of the audit, collecting information on audited department's activities, audit planning (drawing up a draft, an action plan and schedule), writing announcement letters: communicating with the report user and the management, preparing work documentation: risk assessment, defining objectives and tests for performing the audit).

Fieldwork activities include: communicating with the management of the audited area or department, testing and assessing information, performing tests, collecting relevant evidence, establishing findings and presenting the main audit findings or results to the management of the audited area or department (auditee).

Post fieldwork activities include: writing the audit report, communicating with user of the internal audit report (auditee management), presenting the report to the auditee management and monitoring the implementation of agreed activities (Rotim and Komnenić, 2008).

The development of an appropriate IT audit plan takes into account the organization's overall risk assessment from its use of technology, as well as which technology components (from those that make up the technology audit universe) should be addressed to mitigate the areas of highest risk. An organization must consider carefully the risks, and through discussion with senior executives, the audit committee and the board of directors, agree upon an annual plan suitable for the organization given its risk tolerance, resource allocation and that year's operations, projects and activities (Edward and Robert, 2008).

Lovaas and Wagner (2012) describes that companies should follow a risk-based audit approach. Risk-based IT auditing (RBA) is an approach that focuses on analyzing risk applicable to the business. More precisely, RBA is an approach that focuses on the response of the organization to the risks it faces in achieving its goals and objectives. Unlike other forms of audit, Risk Based Auditing starts with business objectives and their associated risks rather than the need for controls. It aims to give independent assurance that risks are being managed to an acceptable level and to facilitate improvements where necessary. A risk-based audit should include and cover the following areas:

- Identify areas of greatest IT risk exposure to the institution in order to focus audit resources;
- Promote the confidentiality, integrity, and availability of information systems;
- Determine the effectiveness of management's planning and oversight of IT activities;
- Evaluate the adequacy of operating processes and internal controls;
- Determine the adequacy of enterprise-wide compliance efforts related to IT policies and internal control procedures; and
- Require appropriate corrective action to address deficient internal controls and follow up to ensure that management promptly and effectively implements the required actions (Lovaas and Wagner, 2012).

2.9 Internal IT Audit Function

The Institute of Internal Auditors (IIA) defines internal auditing as an independent appraisal function established within an organization to examine and evaluate its activities as a service to the organization (James, 2011). The internal audit function is a key activity in any company wishing to operate in a secure and controlled environment. It is concerned with ensuring compliance with

legislation, regulatory framework and internal procedures. It objectively and independently evaluates and appraises business processes and activities to assess if value for money is being achieved. The internal audit function must be able to deliver a value for money service to the management of a company (Komneni, 2008).

"IT internal auditing is collecting and assessing evidence on whether IT operates in accordance with company asset protection, data integrity maintenance, efficient support of company's goals and efficient use of information resources with the main objective of achieving high level of business and IT alignment". Also, IT auditing supports all types of internal auditing in various companies because today it is not possible to conduct the auditing process without IT support (e.g. CAAT tools and techniques). It is crucial that the competencies of IT auditors as well as the internal auditors have become very important for the internal audit profession (Komneni, 2008; Ramen and Jugurnath, 2015).

The main objective of IT internal audit is to examine and check whether the information system is set within defined criteria of available business processes and resources functioning and aligned to business system, bearing in mind basic IT functioning criteria which are: efficiency, effectiveness, confidentiality, integrity, availability, compatibility and reliability. Therefore IT internal auditors analyze information systems and their operations through risk assessment, evaluation of internal control and internal control system in order to ensure the existence of prescribed risk mitigation control within company's information system to a minimum i.e. to an acceptable level. Risks can be defined as "a probability of negative events or activities appearance, which can affect a non-accomplishment of set company goals as a whole. IT internal audit and its result is a good base for continuous improvement, further alignment of business and IT and achievement of business performance (Rotim and Komnenić, 2008; Mary, 2009).

2.10 Skill for IT Auditing

The need for well-educated IT audtors is increasing, due to the potential of technology to dramatically change organizations and business practices (Wagner, 2001). What IT auditors do is usually contained in risk and control arenas. Therefore, it is critical that IT auditors be adept at understanding, analyzing and communicating results related to risk and controls and what we do (Singleton, 2014). IT audit and assurance professionals require deep technical knowledge to scope the assignment, conduct the assignment, assess the findings, and develop workable and effective recommendations in technology-complex environments. These professionals must be comfortable presenting technology related business risks and their potential impacts to boards of directors, executive management and other stakeholders. Presenting technology issues in a business context ensures that management is better informed and better able to understand the risks, issues, implications and impacts when making technology-related business decisions (Robert, 2010; Mary, 2009).

According to Edward and Robert (2008) the organization must determine the skills necessary to complete the plan, including various IT audits that have been identified. To formulate a comprehensive view of a company's IT audit skills and knowledge, management and the audit committee should see that the chief audit executive implements a well-defined competency model and approach to IT auditing. Part of this competency-based approach is to link the audit areas to the skills needed to audit each area. Some assume that IT audit involves a single set of skills and that broad IT knowledge is sufficient for executing all IT audits. However, in today's complex business and technical world, a much wider array of skills and technical knowledge is typically required for effective IT auditing (Edward and Robert, 2008).

The key success skills and knowledge for IT auditors: oral and written communication skills, interpersonal skills, teamwork, business process understanding, and the ability to use statistical analysis tools and Technical computer skills are also important to an IT auditor. Specific types of communication skills, including interviewing to gather information, conflict management for delivering bad news, and diplomacy (Merhout and Havelka, 2006; Robert, 2010).

The internal IT audit function should have specialties in a number of IT audit competency areas, such as: IT risk assessment and audit planning; IT processes and operations (including system development life cycle and change management); Information strategy and data management; change management strategies; segregation of duties; Application controls and configuration; Security and privacy; IT infrastructure, technology components and configurations; Data analysis and tools usage and Disaster recovery (Edward and Robert, 2008; Merhout and Havelka, 2006).

Some of the specific technical skills include: skills in database, operating systems, and specific hardware that matched what they or their clients used would probably have a "comparative advantage" Some of the specific technologies mentioned included Oracle database, MS Visual Basic / Studio, C++ and Java, and COBOL. However, this desire for programming language skills was more concerned with understanding how applications are built and run rather than for developing new programs. There was also a preference for candidates to have a fundamental understanding of information technology architecture, i.e., mainframes, client-server, and networking (Merhout and Havelka, 2006).

The demand for qualified and experienced IT audit professionals continues to be high and is not likely to diminish. Competition f or talent with the vast array of skills needed to address technology risks makes it challenging to achieve the staffing levels needed for an effective IT audit function. In addition, because systems and applications are often numerous and complex, it is difficult to hire and retain individuals with the precise skills necessary to fulfill a complete annual audit plan. A s a result, organizations continue to look for outside assistance with IT auditing (Edward and Robert, 2008).

Moreover, IT audit and assurance professionals have attained certifications, such as the Certified Information Systems Auditor (CISA) and the Certified Information Security Manager® (CISM®), that demonstrate their knowledge and competence in IT audit and control as well as security management. These professionals are well recognized and appreciated for their technical knowledge and skill (Robert, 2010).

2.11 IT Audit Standards

Information technology and its audit are considered as one of the new subjects these days. Information Systems Audit and Control Association (ISACA) issued different standards to adjust the control and audit process (Adel et al., 2014).

Information Systems Audit and Control Association (ISACA), which is available at www.isaca.org, this organization is the international association dedicated to serving the IT audit profession and "has become the leading IT governance, assurance, security and control organization [with] approximately 35,000 consultants, academics, security professionals, IT auditors and senior executive members [with] 160 chapters spread among 100 countries". ISACA provides numerous resources for educators and students at little or no charge, including a link on their Web site entitled "Students & Educators"; the ISACA Model Curriculum for IS Audit and Control; an Academic Advocate program for faculty advisors of student ISACA chapters; a set of educational materials called "COBIT in Academia"; discounted student memberships in ISACA; a series of articles called "IT Audit Basics Columns"; and the Information Systems Control Journal (Merhout and Havelka, 2006; Komneni, 2008).

Audit standards require audit work to be properly planned to ensure the effectiveness and the efficiency of audit performance (Rahman,2014). Various professional and government organizations develop and maintain standards and guidelines for IT auditing, this is due to the specialized nature of IT auditing and skills necessary to perform the audit. The professional standards provide a framework for all audits and auditors and define the mandatory requirements of the audit. They states about auditors responsibilities and ensure that auditors have the competence, integrity, objectivity and independence in planning, conducting and reporting on their audit work. In addition to IT auditing standards IT auditors need other laws, regulations or authoritative sources that may impact during the conduct of an IT audit (ISACA, 2003; OFAG, 2017).

IT auditors should familiarize with international and national IT auditing standards before starting an IT audit. International IT auditing standards include INTOSAI Auditing Standard, International Federation of Accountants (IFAC) auditing standard, and International standard of professional IT auditing organizations such as the System Audit and Control Association (ISACA) and the Institute of Internal Auditors (IIA) and national auditing standards.

Statement on Auditing Standards (SAS) 108 Suggests that in complex IT settings auditors should consider assigning one or more computer assurance specialists (i.e., IT auditors) to the engagement in order to determine the effect of IT on the audit, gain an understanding of controls, and design and performs tests of IT controls, In addition. SAS 109 notes the importance of IT with respect to auditors" assessments of control risk. For publicly traded corporations. Public Company Accounting Oversight Board (PCAOB) Auditing Standard 5. An Audit of internal Control over Financial Reporting That is Integrated with an Audit of Financial Statements, requires auditors to gain an understanding and test IT system controls in order to provide an opinion on the effectiveness of internal controls over financial reporting. These auditing standards, as well as companies" adoptions of complex IT systems, have substantially enhanced the role of IT auditors on audit engagements (Brazel, 2008).

To ensure the value of IT audits, organizations should set and implement a standard method for evaluating the quality of audits (Siew et al, 2017). Adopting international standards and best practices helps to enhance the quality of IT audits. ISACA published a number of standards and auditing guidelines for IT auditors in different areas. And also IFAC developed international standards on auditing (ISAs) and international auditing practice statements (IAPS). Moreover there are other relevant standards for IT auditors. ISO 27002, COBIT, and COSO are generally considered the IT audit models to follow for most organizations (Lovaas and Wagner, 2012; ITAF, 2014; ISACA, 2010).

COBIT Framework

There has been worldwide interest in corporate governance because of the high profile corporate collapses of the early 2000s. The use of control frameworks has been mandated in the United States of America through the Sarbanes Oxley Act of 2002. One of the popular frameworks adopted is the Control Objectives for Information and Related Technologies (CoBIT). Organizations have shown an increasing interest in using COBiT both as an IT governance framework and also for IT audit because of its focus on the alignment of business and IT goals and processes (Gerke and BIS, 2005).
These guidelines are supplemented by a set of standards, procedures and additional guidelines as well as a code of ethics and IS control professionals standards, the latter forming the basis for the classification of such audit practitioners as a profession. ISACA also run a certification program for audit professionals awarding those successfully fulfilling the requirements a designation of Certified Information Systems Auditor or CISA (Gerke and BIS, 2005; De Haes, 2012).

COBIT (Control Objectives for Information and related Technology) is a comprehensive set of resources that contains all the information organizations need to adopt IT governance and control framework, and its starting point is business strategy as a base for generating business goals for IT then IT goals. CobIT contributes to company needs by:

- Making a measurable link between the business requirements and IT goals
- Organizing IT activities into a generally accepted process model
- Identifying the major IT resources to be leveraged

- Defining the management control objectives to be considered
- Providing tools for management: goals and metrics to enable IT performance to be measured, maturity models to enable process capability to be benchmarked, responsible, accountable, consulted and informed charts to clarify roles and responsibilities (Rotim and Komnenić, 2008).

COSO Framework

The COSO framework (Committee of Sponsoring Organizations of the Tread way Commission) offers a linkage between three principles of Enterprise Governance: Corporate Governance, Internal Control and Risk Management. This model was updated in 2004 as COSO2 to reflect the changed reality of the world. COSO consists of eight different components which are the components of Enterprise Governance, and they are directly connected with objectives that an organization strives to achieve. These are: Internal control environment, Objective setting, Event identification, Risk assessment, Risk response, Control activities, Information and communication and Monitoring (Rotim and Komnenić, 2008; COSO, 2014).

2.12 IT Audit Quality

The term "audit quality" is frequently used in debates among stakeholders, in communications of regulators, standard setters, audit firms and others, and in research and policy setting. Audit quality is a complex subject and, there is no definition or analysis of it that has achieved universal recognition (IAASB, 2013; Kacanski, 2016; CBOK, 2014).

Merhout and Havelka (2008) stated that information technology auditing is often looked upon as a "necessary evil" or is overlooked entirely by IT management. They argue that IT audit activities can provide additional value beyond the primary objective of assurance. IT audits may also serve various objectives and multiple parties within an organization (Stoel et al, 2012). IT audits are special projects which requiring a quality audit process and sound project management principles (Merhout and Havelka, 2008).

To ensure the value of IT audits, organizations should implement a standard method for evaluating the quality of audits (Siew et al, 2017). Havelka and Merhout (2007) and Merhout and Havelka (2008) stated in their research that IT audit shops in the U.S. are required to adhere to quality control standards, such as those promulgated by the Public Company Accounting Oversight Board (PCAOB) and the American Institute of Certified Public Accountants (AICPA) for public accounting firms and the Institute for Internal Auditors (IIA) for internal IT audit operations (Havelka and Merhout, 2007).

Yahya et al. (2015) stated that IT Audit quality can be defined in different ways. As described in their literature audit quality is often defined by the extent of their compliance with auditing standards. Researchers in accounting and auditing, have been addressed multiple dimensions of audit quality. Accordingly they described of the most common definitions of audit quality (Yahya et al., 2015).

Stoel et al. (2012) stated that there are different definitions of IT audit quality, those definitions may include ideas such as impact or effectiveness, completeness as related to different standards, and efficiency or cost [attributes]. They also try to illustrate that to perform an IT audit efficiently and effectively which means to maintain its quality, organizations must make appropriate decisions regarding the scope, resources, activities to be performed, methods, techniques, and other "inputs" to the IT audit process (Stoel et al., 2012).

According to Stoel et al. (2012), organizations spending much money on IT (software and technical infrastructures) to support most of their businesses processes and advances in information technology and laws, such as SOX. SOX require all information systems used to produce financial statements be documented and tested for compliance with management's IT control objectives, these leads an increased importance of IT audit. The increased demand for IT audit services call attention to the importance of performing the audit activities in the most efficient and effective manner to maintain the quality of the IT audit (Stoel et al., 2012).

Siew et al. (2017) stated that critical functions that IT plays in organizations increases, the need for a clearer understanding of what constitutes quality in IT auditing is needed. They suggested that although IT audit quality is not explicitly defined, it could be implied from the objectives of IT audit. They described the IT audit quality as it is multidimensional and as such they proposed that IT audit quality has the following dimensions:

- In terms of **effectiveness**: that is how effective the IT audit assessment that the organization information system is able to meet organizational goals,
- In terms of **reliability**: that is how reliable is the IT audit conducted on the organization,
- In terms of **efficiency**: that is how well the IT audit is able to perform with minimum cost,
- **overall perception of quality**: that is how the IT audit is viewed (Siew et al., 2017)

Merhout and Havelka (2008) described in their research that a quality audit process and product can lead to a more efficient use of the resources of an annual risk-based internal IT audit program which could believably free some audit resources to be used for more value-added projects and enterprise oversight (Merhout and Havelka, 2008).

ISACA's globally recognized standards provide the foundation to help ensure that information and systems can be trusted, the IS Audit and Assurance Standards define mandatory requirements for information systems (IS) auditing and reporting. They inform management of the expectations regarding the work of practitioners and ensure that practitioners understand the minimum level of acceptable performance required to meet professional responsibilities. (https://www.businesswire.com/news/home/20130718006403/en/ISACA-Updates-Audit-Assurance-Standards,jan 4, 2018(5.30)).

The need for a clearer understanding of what constitutes quality in IT auditing is needed due to an increasingly critical function that IT plays in organizations (Siew et al., 2017). Since every IT audit is unique, the factors that determine IT audit quality will vary such as the size of the organization, the complexity of the system, etc (Havelka and Merhout, 2007; 2008).

There are three fundamental aspects of audit quality include inputs, outputs and the underlying factors. Some of the inputs are one personal characteristics of the auditor such as the skills and experience of the IT auditor, the ethical values and way of thinking and the other basic input is audit process such as proper audit procedures, audit methodologies, audit tools, etc. All of these issues are involved in audit quality. In addition the outcomes of the audit which is the audit report also have significant impact on the quality of IT audit (Yahya et al., 2015; Kacanski, 2016; Ebimobowei et al., 2013).

2.13 Related Works

Havelka and Merhout (2007) in their research on "Development of an Information Technology Audit Process Quality Framework" aimed to determine the factors that may influence the IT audit process and develop a model that can be used to improve process quality. The method proposed to identify the quality factors for the IT audit process is a nominal group technique.

Three separate sessions were conducted with three distinct groups of business professionals involved in the IT audit process. All three groups were composed of employees of the same large, health care products and services organization. The first group was composed of IT audit managers, the second group was composed of financial and operations audit managers and staff auditors; and the third group was composed of IT audit seniors and staff. They were identified a total of 117 factors from the three groups as critical to the IT audit process. They independently grouped the factors identified into five logical categories based on their professional experiences. These are Client Factors, Target Process or System Factors, IT Audit Personal Factors, IT Audit Organization Factors and Audit Process/Methodology Factors.

They have suggested that this model could be used by managers to analyze and plan for IT audits by identifying risks and opportunities associated with the five categories of factors. In addition, IT audit managers and clients could use the detailed factors identified to develop and establish metrics to evaluate IT audit quality after the fact (Merhout and Havelka, 2007).

Havelka and Merhout (2008) in their research on "Information Technology Auditing: A Value-Added IT Governance Partnership between IT Management and Audit" aimed to argue that IT audit activities can provide additional value beyond the primary objective of assurance, assuming the organization embraces IT governance partnerships between IT management and the audit function. They also illustrated a comprehensive framework of IT audit quality/success.

They undertook a field study to develop a model of IT audit quality. The field study was composed of two stages: the first to develop an initial framework and the second to provide validation and refinement of the framework. Both stages consisted of a series of focus groups using a nominal group process including IT auditors, financial and operational auditors, and IT audit managers.

They identified 108 unique factors from the five groups and they refined and expanded the framework to eight logical categories based on who or what entity might control, influence, or determine the factor. These are Audit Team Factors, Audit Process and Methodology Factors, Client-controled Organizaational Factors, IT Audit-controlled Organizational Factors, IT Audit Personnel Technical Competency Factors, IT Audit Personnel Social and Interpersonal Factors, Enterprise and Organizational Environment Factors and Target Process or System Factors.

The researchers suggest that IT audits are special projects requiring a quality audit process and sound project management principles. These success factors, if managed properly, can lead to high-quality IT audit products (i.e., engagements) that could conceivably free audit resources for more value-added projects and enterprise oversight (Merhout and Havelka, 2007).

Abdolmohammadi and Boss (2009) in their research on "Factors associated with IT audits by the internal audit function" aimed to estimate the proportion of time that Internal Audit Functions (IAFs) spend on information technology (IT) audits of their organizations and to investigate variables that are potentially associated with IT audits by IAFs. The data used in the study is from the CBOK (2006) database that was developed by the IIA Research Foundation in 2006.

Responses from a large sample of 1,029 chief audit executives (CAEs) from Australia, Canada, New Zealand, the U.K./Ireland, and the U.S. were used to estimate the proportion of time spent by internal audit functions (IAF) on information technology (IT) audits and also used to investigate explanatory and control variables that are associated with the extent of IT audits by IAFs. The study results show that the proportion of IAF time spent on IT audits was only 7.97 percent in 2003, 10.61 percent in 2006, and was projected to be 13.40 percent in 2009, indicating an approximately one percent increase per year. Multivariate regression indicates that four variables; Certified Information System Auditor (CISA) certification, IAF age, training, and the number of organizational employees are significantly and positively associated with IT audits by IAFs. Other common certifications such as CIA, CPA, and CMA are not positively associated with the proportion of IT audits. Also, while CAE experience, education level, and the country of residence did not affect the results, an IS/CS (information system/computer science) was significant and positive in two of the four models tested (Abdolmohammadi and Boss, 2009).

The above three studies by Merhout and Havelka (Havelka and Merhout, 2007; Merhout and Havelka, 2008; Havelka and Merhout, 2009) toward developing a theory for the IT audit process utilized group data gathering techniques with IT audit practitioners, internal and external, to create a framework of logical factors related to IT audit quality. They identified a large (over 260) set of attributes that were suggested by practitioners as "critical" to the IT audit process. While they logically categorize the

attributes identified, Merhout and Havelka do not provide any empirical evidence to support their framework or to evaluate the importance of the attributes or the categories they suggest (Stoel et al.,2012). In addition they have used focus group to obtain and develop factors related to IT audit quality, as these study consisted of only few respondents, it is likely that the factors generated could be biased (Siew et al., 2017).Therefore, one purpose of this research is to empirically analyze the underlying attributes in the context of Ethiopian commercial banks.

Stoel et al. (2012) in their research on "An analysis of attributes that impact information technology audit quality: A study of IT and financial audit practitioners" aimed to analyze attributes identified in prior research that are thought to impact the quality of the information technology (IT) audit process and to develop a structural model of IT audit quality and its antecedents. The researcher identified and evaluated potential constructs suggested by prior work that has proposed frameworks of IT audit quality and financial auditing literature. After studies and using questionnaires that distributed among accountants, auditors and IT Audit Creators (accounting software).

The results show that Independence, Accounting knowledge and audit skills, Business process knowledge and experience, Responsiveness, Field work and audit procedures, Business scale and audit scope, Auditability, Auditor experience with auditee, IT and controls knowledge, Planning and methodology, Resource availability, Auditee relationship, and Business environment are identified as factors affecting IT audit quality[49]. This research did not look at the effects that the identified factors have on the outcome of IT audit nor look at the relationships between these factors (Stoel et al, 2012).

Yeghaneh et al. (2015) in their research on "Factors Affecting Information Technology Audit Quality" aimed to find the factors affecting on information technology audit quality. The study used standard questionnaire with a Likert five options in order to examines the views of CPAs. And the results of the study show that from the view of CPAs working in the audit institute and the audit organization, properly accountability of audit team and existence audit framework and process, business criteria and audit scope, auditability, planning and operations, access to resources, relationship with the entity and the business environment, affects IT audit quality (Yeghaneh et al, 2015).

Siew et al. (2017) in their research on "Factors affecting IT Audit Quality: an Exploratory Study" aimed to investigate the factors that lead to a better IT audit quality by extending previous research by identifying key constructs that affect the quality of IT audit and used it to develop a questionnaire.

An empirical study was carried out on top listed stock exchange companies in Malaysia. The result of the study indicate that of all factors; IT knowledge and competencies are significantly correlated with IT audit quality. The researcher suggested that emphasis should be placed on educating and training the audit team members to make sure that they have the relevant and required IT knowledge and IT competencies to improve audit quality. This research is limited by the number of respondents. This

affects the statistical methods and inferences that can be drawn from the data. And also the questionnaire used needs to be rigorously tested and validated (Siew et al, 2017).

2.14 Conceptual Research Framework

The major objective of this study is to identify the factors that are believed to influence IT audit quality from prior studies (Siew et al., 2017; Stoel et al., 2012) . Specifically, the study assesses whether IT audit quality is influenced by Auditors IT knowledge and competencies, Auditors IT internal control knowledge, Target system complexity, Auditing skill, Audit procedure and Methodology and Resource availability.

The underneath framework is developed with the source of an extensive review of the literature and designed research problems. The researcher has stated the importance of IT audit quality and its main determinants. This model puts emphasis on the determinants of IT audit quality in commercial banks of Ethiopia.

The framework is divided into two divisions which are independent variables and dependent variable. The left side shows the independent variables, which are identified through survey of the literature, while the right side shows the dependent variable, which is IT audit quality.

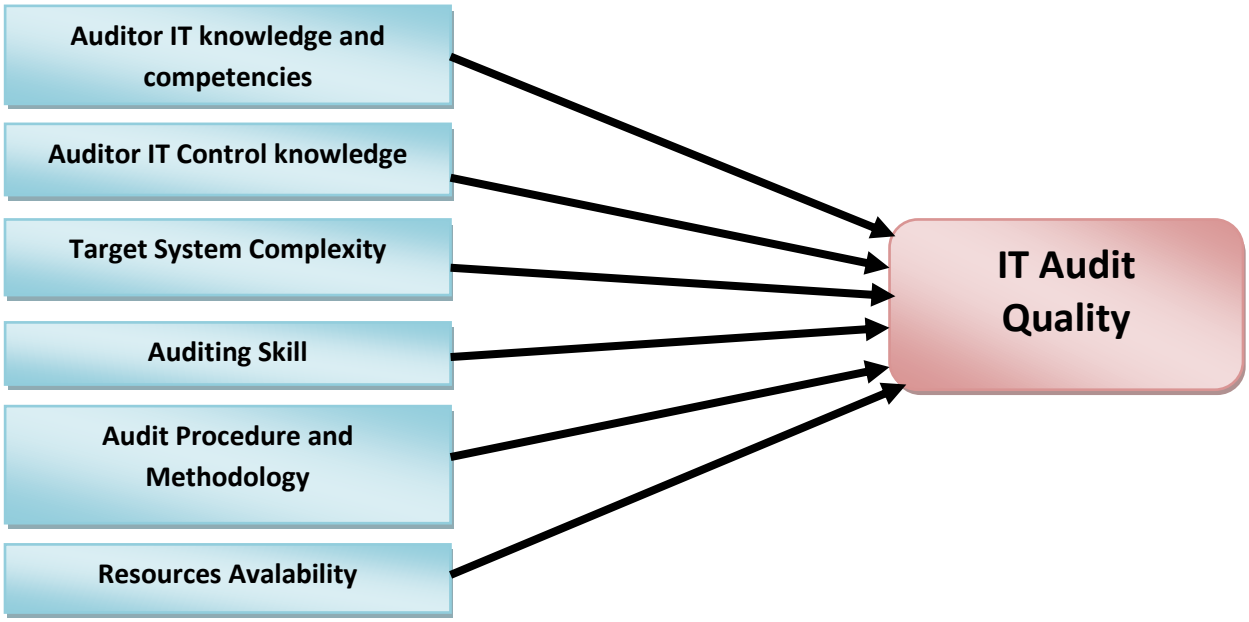


Figure 1: Conceptual Research Framework

IT Audit Quality

IT Audit quality is considered as the dependent variable in this research. Business operations in the banking have been increasingly dependent on the computerized information systems. It has now

become impossible to separate (IT) from the business of the banks. Information Technology auditing play a central role in improving the performance of banks and achieving the bank's strategic development objectives, because IT Audit assess the adequacy of environmental, physical security, logical Security, and operational controls designed to protect IS hardware, software, and data against unauthorized access and accidental or intentional destruction or alteration, and to ensure that information systems are functioning in an efficient and effective manner (Harb, 2012). Due to that the banks will have reliable technology.

Nicho (2008) illustrated an information technology audit is important because it gives assurance that the IT systems are adequately protected, provide reliable information to users, and are properly managed to achieve their intended benefits. It also reduces the risk data tampering, data loss or leakage, service disruption and poor management of IT systems (Nicho, 2008).

Siew et al. (2017) indicated that although IT audit quality is not explicitly defined, and it could be implied from the objectives of IT audit. They used the Delone and McLean paradigm that states that quality itself has measurable domain. IT audit quality is multidimensional and they propose that IT audit quality has the following dimensions (Siew et al., 2017):

- Effectiveness: whether IT audit could assess that the organization information system is able to meet organizational goals (Merhout and Havelka, 2008),
- Reliability: how reliable is the IT audit conducted on the auditee (Stoel et al., 2012),
- Efficiency: how well the IT audit is able to perform while minimizing the cost (Stoel et al., 2012),
- Overall perception of quality: how the IT audit is viewed (Siew et al., 2017).

Auditors IT knowledge and Competency

Auditors IT knowledge and competency, identified in this study as one of the independent variables. Carroll et al. (2009) state that an IT audit is associated with auditors who use technical skills and knowledge to audit through the computer systems, or provide audit services where processes or data, or both, are embedded in technologies (Carroll et al., 2009).

As more and more accounting and business systems were automated, it became more and more evident that the field of auditing had to change. As the systems being audited increased their use of technology, new techniques for evaluating them were required (James, 2004).

Komneni (2008), emphasized that the IT auditor must possess the necessary professional and technical competence, as a whole, to cover the scope of the audit. IT auditor should be competent with respect to understanding: Technical regulatory knowledge, Auditing skills and Communication and interpersonal skills. Also, very important for the IT auditor is basic education, different kind of skills, various training and of course the certifications. Multidisciplinary educations as well as the specializations are becoming most important to the IT audit profession (Komneni, 2008).

The rapid development and changes in the world of ICT Technology require IT auditors to constantly updating their skills and technical knowledge. Also, very important for IT auditors are their competencies and skills and education in multi-disciplinary fields. Moreover, it is very important to the IT audit profession is to be certified in CIA, CISA, CISM or some other professional education (Komneni, 2008; John, 2015).

Prior studies show that to be able to detect material weaknesses in IT systems, IT auditors need to have knowledge and competencies on IT specialized knowledge. Specialized IT professional qualifications and certifications have been shown to have more likelihood of involvement with auditing on IT governance, risks and controls. Knowledge about IT and accounting system, are shown to be important factors in IT audit quality (Havelka and Merhout, 2013 and Stoel et al, 2012). In addition assessing infrastructure, such as networks, routers, firewalls, and wireless and mobile devices requires specialized skills and experience (Richard, 2005). Furthermore, IT auditors require knowledge of tools and techniques to help them audit "through the computer" rather "around the computer" (Siew et al., 2017).

Carroll et al (2009) argue that with the increasing use of Information Systems by most organizations auditing professions need to be integrated into a new emerging impartial profession, relying on the knowledge, skills, expertise and experience from both the audit and IT professionals. They also state that an IT audit is associated with auditors who use technical skills and knowledge to audit through the computer system, or provide audit services where processes of data, or both, are embedded in technologies (Carroll et al., 2009).

Internal auditors focus on the testing of IT processes and controls mitigating identified business risks. In addition, IT auditors are faced with the challenge of being involved in the planning and organizing of IT projects, implementation of proposed solutions, delivery and support of IS and the monitoring of the process, controls, assurance and evaluation (Carroll et al., 2009). It is therefore necessary for IT auditors to engage in learning and obtaining knowledge of both IT and auditing to be successful.

Siew et al., (2017) state that, IT knowledge and competencies are significantly correlated with IT audit quality. They advised that emphasis should be placed on educating and training the audit team members to make sure that they have the relevant and required IT knowledge and IT competencies to improve audit quality Siew et al., 2017). Therefore, Individuals from an IT background have the advantage of understanding the more technical and IT concepts and can identify risks and controls within IT knowledge areas.

Accordingly, the researcher use the attributes for IT knowledge and competencies from related literature, such as Basic information systems IT general concepts, programming languages and procedures, computer communications and networks(including routers, switches, and internet), Data structure and database, Information security, specialized IT professional qualifications and certifications, knowledge of IT and accounting system, knowledge of CAAT (Computer assisted

auditing tools), knowledge of risks associated with technology use (Stoel et al., 2012; Carroll et al., 2009 and Siew et al., 2017).

Auditors IT Control Knowledge

Auditors IT Control Knowledge has been identified in this study as one of the independent variables. IT is a rapidly changing environment that promotes process and organizational change. As a consequence new risks emerge at a rapid pace. Therefore controls must be present to provide continuous evidence of their effectiveness, and that evidence must be assessed and evaluated constantly. IT controls provide for assurance related to the reliability of information and information services and they also help mitigate the risks associated with an organization's use of technology. IT controls range from:

- corporate policies to their physical implementation within coded instructions;
- physical access protection through the ability to trace actions and transactions to responsible individuals; and
- automatic edits to reasonability analyses for large bodies of data (Richard, 2005).

The internal IT auditor's assurance is an independent and objective assessment that the IT-related controls are operating as intended. This assurance is based on understanding, examining, and assessing the key controls related to the risks they manage and performing sufficient testing to ensure the controls are designed appropriately and functioning effectively and continuously (Richard, 2005). IT internal auditors should have a capability to assess an organization's framework and internal audit practices for IT risk and control, compliance, and assurance.

The IIA's International Standards for the Professional Practice of Internal Auditing (Standards) specifically notes that internal auditors must assess and evaluate the risks and controls for information systems that operate within the organization (Richard, 2005). Internal auditors need to understand the range of controls available for mitigating IT risks.

Alraja and Alomiam (2013) in their study found that there is a significant relationship between general controls of information systems auditing and information systems performance, and general controls of information systems auditing has a significant impact on information systems performance (ALraja and ALomiam, 2013).

Accordingly, the researcher used the attributes for IT control knowledge factor from the survey literature: such as knowledge of IT Governance, General IT controls including knowledge of information security and Application Controls (input, process and output controls) (Siew et al., 2017)

Target System Complexity

Target System Complexity identified in this study as one of the independent variables. According to Siew et al. (2017), this factor refers to how difficult it is to audit the auditee. As described in their

literature this construct is the function of business size and scale of the auditee, how broad the scope of the audit, the support given by the auditee and the reliability of the internal controls. For this factor they incorporated “Business Scale and Audit Scope” and “Auditability” into target system complexity. They are indicated by the following items: number of geographical dispersed business units, number of business units or processes or systems involved, support by auditee, and how well the internal control is defined and documented Siew et al., 2017).

Havelka and Merhout (2007 and 2008) stated in their research that the process or system category included any factors based on the process or system being audited, i.e., the target of the audit, and specific considerations for the specific audit “project” being performed. Some examples of processor system factors are: clearly defined project scope, system complexity and type, amount of manual versus automation in process, and the level of documentation for the process or system (Havelka and Merhout, 2007 and Havelka and Merhout, 2008).

Auditing Skill

Auditing skill has been identified in this study as one of the independent variables. IT auditors need to understand the process flow of transactions or information in Information systems, which include technical knowledge and an understanding of the controls needed to ensure accuracy, validity, timeliness and completeness of organizational information, resources and assets. For this reason the combination knowledge, skills, experience and daily roles and responsibilities of IT and auditing professionals fall under the profession of IT auditing. Thus, professionals coming from different backgrounds (IT and/or auditing) are forced to learn and develop the skills necessary to meet the demands of the IT auditing profession (Carroll et al, 2009). Therefore IT auditing is dependent on Information Technology (IT), it is essential that an IT auditor possesses IT and auditing knowledge to bridge the gap between the IT and auditing professions.

Auditing skills include a number of specific sub skills, such as developing and executing an audit plan, preparing and using checklists, following-up, documenting findings, etc. In addition, communication and interpersonal skills are very important for the IT audit function, because if the auditors communicate and interact well with everyone involved, the audit will more likely to be successful. Some characteristics of good interpersonal and communication skills for internal auditors are: a true respect for people, active listening (being sure you understand what is being said), spending more time listening than talking (a three-to-one ratio), oral skills and written skills etc (Komneni, 2008).

Carroll et al (2009) described that audit knowledge should be applied to IT knowledge to enable an IT auditor to executes his or her daily roles and responsibilities (e.g. to help clarify the statement that audit knowledge should be applied to IT knowledge: an audit knowledge concept, “understanding of the concept of risk” should be applied to a specific area of IT knowledge depending on the scope and objective of the audit) (Carroll et al, 2009). In addition the auditing skill required the concept of obtaining and interpreting relevant audits evidence.

Stoel et al (2012) have identified Accounting Knowledge and Audit Skill as the second most parsimonious factor. They refer this factor as the audit personnel's knowledge of accounting and auditing in general, their understanding of the accounting system being audited in specific, and their ability to perform tasks and exercise professional judgment as auditors. They also stated that the impact of the knowledge and skill of audit personnel on audit quality has been addressed in prior research, again primarily in the financial audit research (Stoel et al, 2012).

Therefore given the logic of audit knowledge being applied to IT knowledge, individuals from an auditing background have an advantage because these individuals understand the auditing concepts and are able to identify the impact of risks on the financial statements.

Accordingly, the researcher use the attributes for Auditing skill factor from the survey litrature, such as understanding of the concept of risk, know about applicable standards and best practices, understanding of the business process, Obtaining and interpreting relevant audit evidences, communication skill and independence (Carrol et al, 2009 and Havelka and Merhout, 2012).

Audit Procedure and Methodology

A well-planned, properly structured audit program is essential to evaluate risk management practices, internal control systems, and compliance with corporate policies concerning IT-related risks at institutions of every size and complexity. Effective audit programs are risk-focused, promote sound IT controls, ensure the timely resolution of audit deficiencies, and inform the board of directors of the effectiveness of risk management practices (Lovaas, 2009).

Yeghaneh et al (2015) found that existence of proper framework and audit procedures, methods, forms and other tools and complete audit can assist auditors in performing quality audit work and affect IT audit quality (Yeghaneh et al, 2015).

Havelka and Merhout (2007 and 2008) indicated that the audit process or methodology factor refers to the specific procedures and practices followed by the IT audit team. Some of the constructs identified are: the existence of an audit methodology for the team to follow, coordination between the financial and IT auditors, use of good project management practices, review of field work by a supervisor or senior staffer (Havelka and Merhout, 2007 and 2008).

Stoel et al (2012) found that Fieldwork and Audit Procedures as the fifth most parsimonious factor and this represents the audit team use of appropriate templates, forms, or other tools to conduct the audit and the proper documentation and sign-off procedures for each step in the audit (Stoel et al, 2012).

Accordingly, the researcher use the attributes for Audit Procedures and Methodology factor from the survey litrature, such as the existence of an audit methodology for the team to follow, scope definition, the use of automated tools, and timely oversight/review of audit work, the audit team utilizes common documentation templates and forms, Audit team has strict sign off procedures for

completed audit steps (Havelka and Merhout, 2007 and 2008; Stoel et al., 2012 and Yeghaneh et al., 2015).

Resource Avalability

Resources refer to the availability of audit tools, time, budget and audit staff that the audit team could command to assist their IT auditing activities (Stoel et al., 2012). Siew et al. (2017) found that resource availability is one of the factors that influences the quality of IT audit and according to the researchers this factor includes items like: whether computer-assisted auditing tools (CAATs) are used, whether there is enough time to conduct the IT audit, whether there is enough budget available to conduct the IT audit, and whether there is enough staff to properly conduct the IT audit (Siew et al, 2017).

Havelka, and Merhout (2007) found that the IT audit organization category includes those factors that are characteristics of the IT audit function within the organization. Examples of these factors include: the size of the IT audit organization relative to the overall company, the leadership of the IT audit unit, budget and resource availability, and the availability and use of technology for testing (Havelka, and Merhout, 2007).

Yeghaneh et al. (2015) in their study examined and suggested that to perform any audit work must have an accurate budgeting. In addition, they have suggested that in order to carry out good quality audit work, auditors should accept and perform the audit by considering the availability and access to entity reliable resources (Yeghaneh et al., 2015).

Stoel et al (2012) in their study examined those factors relate to the management of the specific audit, these are the factors Planning and Methodology, Resource Availability, and Auditee Relationship are specific to the particular audit engagement and must be considered as part of IT audit quality (Stoel et al., 2012).

Accordingly, the researcher used the attributes for Audit Procedures and Methodology factor from the survey literature, such as whether computer-assisted auditing tools (CAATs) are used, whether there is enough time to conduct the IT audit, whether there is enough budget available to conduct the IT audit, and whether there is enough staff to properly conduct the IT audit (Havelka and Merhout, 2007; Stoel et al., 2012; Yeghaneh et al, 2015 and Siew et al., 2017).

In general, providing IT audit and assurance professionals with increased skills to enable them to assess the business, as well as the technical aspects of an issue, would benefit both the professional in terms of career satisfaction and also the enterprise in terms of the quality and relevance of the analyses performed and the recommendations made (Robert, 2010).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter dealt with review of theoretical and a related literature on the determinants of IT audit quality and also develops and describes the conceptual research model. This chapter outlines and explains the methodology employed to achieve the research objective. The first section describes a brief overview of the research design and approaches followed with the methodology adopted in the study, which in turn includes population and actual data collection tools in the third section. The fourth section discusses about data presentation and analysis techniques used in the study. The last section presents validity and reliability the research.

3.2 Research Approach

The major objective of this study is to assess the IT audit quality determinant factors in Ethiopian Commercial banks based on factors which are found to significantly influence audit quality. The researcher used mixed research approach on which both quantitative and qualitative methods of research is applied to identify the factors that affect IT Audit quality in commercial banks in Ethiopia.

The combination of qualitative and quantitative approaches provides the most complete or insightful understanding. It thus provides a better understanding of research problems than either one approach alone. It can also provide better opportunities for testing alternative interpretations of the data, for examining the extent to which the context helped to shape the results, and for arriving at convergence in tapping a construct (Creswell, 2007). Moreover, this mixed approach also helps for the purpose of triangulation.

As described in the above chapters, there are little research studies about IT auditing specifically on factors affecting IT audit quality, and qualitative research is viewed to be the most appropriate choice for such study. Mesfin (2017) emphasizes that qualitative research methods can be used to better understand any fact about which little is yet known, as well as to acquire new perceptions on issues about which much is already known, or in order to acquire more in-depth information that may be difficult to deliver quantitatively(Mesfin, 2017). Qualitative research in this study can be used to explore the major factors that determine the quality of IT audit.

Qualitative research method is used designed to help researchers understand people's thoughts and the social and cultural contexts within real life (Mesfin, 2017). This approach gives the participants a chance to express their feelings more freely and openly. Moreover, this approach allows the respondents to formalize their own view of “IT audits quality”.

Quantitative approach is convenient to reach more people with optimized time than qualitative approach. Hence, it provides the potential to mine large amounts of information from large populations with adequate level of accuracy. For the purpose of quantitative analysis, a survey is conducted through a questionnaire to investigate the factors that affects the quality of IT auditing activities in Ethiopian commercial banks.

The researcher follows an informed exploratory process identifying potential constructs and attributes based on the survey of literature and other work that is through qualitative method where attributes are identified and developed to measure related constructs. The researcher then ask a set of knowledgeable and experienced practitioners (IT Auditors) through questioner (questionnaire items are adapted from previous literature) to evaluate the relative impact of each factor on IT audit quality. Next, the researcher uses the survey results to analyze the scores of each constructs and to perform a factor analysis to rationalize the constructs and determine the essential components. Finally, the researcher compares the study results to prior literature for similarities and differences.

3.3 Study Design

3.3.1 Research Population

In this study the population was defined as Ethiopian commercial banks both government and private; specifically those in the banking industry that have IT audit function/unit in their internal audit section. The study population was 17 commercial banks and 54 respondents. The target population of the study was Ethiopian commercial banks internal IT auditors, IT audit managers, and internal audit directors. The total study population is summarized on the following Table 1 that lists banks based on their state of ownership and year of establishment year:

No	Name of the Bank	Ownership	Establishment year	No of IT Auditors found in each bank	No of collected responses
1	National Bank of Ethiopia	Government	1963 E.C	13	7
2	Awash International Bank	Private	1994 E.C	3	3
3	Dashen Bank	Private	1995 E.C	4	2
4	Bank of Abyssinia	Private	1996 E.C	3	3
5	Wogagen Bank	Private	1997 E.C	3	3
6	United Bank	Private	1998 E.C	3	-
7	Nib International Bank	Private	1999 E.C	3	3
8	Corporate Bank Of Oromia	Private	2004 G.C	3	3
9	Lion International Bank	Private	2006 G.C	1	1
10	Zemen Bank	Private	2008 G.C	3	2
11	Oromia International Bank	Private	2008 G.C	3	3
12	Buna International Bank	Private	2009 G.C	2	2
13	Birhan International Bank	Private	2009 G.C	1	-
14	Abay Bank	Private	2010 G.C	2	2
15	Addis International Bank	Private	2011 G.C	3	3
16	Debub Global Bank	Private	2012 G.C	1	1
17	Enat Bank	Private	2012 G.C	3	3
Total				**54**	**43**

Table 1: Establishment year of commercial banks in Ethiopia: source: **www.nbe.org.et**

3.3.2 Sampling Techniques and Sample Size

For the qualitative study, purposive sampling technique is used to select key informants: IT audit managers. The researcher selects the key interviewees for the study purposefully who are believed to be appropriate based on experiences of carrying out IT audit activities. Based on the researcher's subjective judgment, the sample size for the qualitative study was initially 8. Sampling is not applied for the quantitative method, because the total number of the participants was 54 which was not recommended to sample target population below 100; the researcher use total population of the study that is all IT auditors including managers found in 17 commercial banks.

3.3.3 Data Collection Methods and Instruments

In this study two basic data collection procedure were employed, quantitative study using self-administered structured questionnaire and qualitative study by using semi structured interview and document review which helps the researcher as vital additional sources for understanding the phenomenon. The application of different data collection methods can improve the robustness of the

research results through the cross-validation of data gathered using different methods. Moreover, triangulation of data from different sources increases the quality of data, and accordingly the accuracy of the findings (Remus & Wiener, 2009).

3.3.3.1 Source of Data

In order to undertake this research, the researcher used both primary and secondary data. The researcher obtained the primary data through interview and questionnaires which is conducted with experienced practitioners involved with the management or execution of IT audits in commercial banks. The secondary data for this research is obtained through document/literature review.

3.3.3.1.1 Interview

Interview as indicated in Appendix C were prepared and conducted with Internal IT audit managers about the IT audit practice and IT audit quality issues. The IT audit managers were selected because they have more experience on the issue and they are the one who are responsible for the IT audit quality concerns.

While conducting the interview, the researcher briefly explained the purpose of the interview before forwarding questions to the interviewees and the information they provided is kept confidential and confirmed that the research is conducted for academic purpose. In addition to that interview is used necessary for triangulation purpose.

3.3.3.1.2 Questionnaire

The questionnaire is one of the primary tools for data collection and use for this study. The nature and design of the questionnaire which are employed is adopted from previous studies. Therefore, a five-point Likert Scale questionnaire is used to obtain data from internal IT audit managers and internal IT auditors. Accordingly, the scales range from 1= strongly disagree to 5=strongly agree in order to allow the participants to respond in a degree of agreement. Likert Scale is an ordinal psychometric measurement of attitudes, beliefs and opinions. They are the most universal method for survey collection and they are easily understood. The questionnaire development involved a three-step process:

First step, the questionnaire items were selected from previous literature that are relevant to measure the identified constructs depicted in the conceptual research model. Minor customizations were required and some new questions are developed in order to reflect the objective of the study.

Second step, the questionnaire was reviewed by IT audit professionals who are working in OFAG (Office of Federal Auditor General). The discussion with OFAG IT audit experts helped to reshape questionnaire items in order to reduce bias and maximize response rate. Moreover it helped to improve the validity of the questionnaires.

Third step, the validity and reliability of the questionnaire is essential in research data collection. Therefore, the validity test of the questionnaire was conducted using Pearson Product Moment Correlations using SPSS. After the research questionnaire was declared valid in the validity of the test, then the reliability of the questionnaire test was done by using Cronbach's Alpha.

The questionnaire which is attached as Appendix B had three sections. The first section of the questionnaire consists of questions about general information of respondents, the second section contains question about the quality of IT audit in the commercial banks, and last section consists of questions about the factors that affect IT audit quality. The questions were kept as concise as possible with care taken to the actual wording and phrasing of the questions. The reason for the appearance and layout of the questionnaire are of great importance in any survey where the questionnaire is to be completed by the respondent (lemlem, 2017).

3.3.3.2 Data Collection Procedure

The data collecting procedure is the concurrent procedure which is converging quantitative and qualitative data in order to provide a comprehensive analysis of the research problem. In this design, both forms of data are collected at the same time and then are integrated in the interpretation of the overall results.

The paper-based self-administered questioner was distributed to all 54 IT audit professionals working in the commercial banks at the time of data collection period physically by the researcher. The survey was conducted in the month of February and March 2018. Consequently, the researcher continuously follow-ups the status of the respondents by different mechanism like through phone calls and also visit to encourage the respondents to finalize the questionnaires with the allotted time with their genuine feedbacks. A total of 43 usable completed questioners were collected. This represents the achievement of 79.7% response rate.

After data was collected using survey instrument, logged and tracked on excel sheet. Finally, Statistical Package for Social Science (SPSS) version 20 Software used to code all the required variables for the analysis. Accordingly, the questionnaire items were codded and the data imported to SPSS tool. Data cleaning was conducted for possible omissions, missing items and errors and outliers to make the data collected ready for analysis of the study.

The interviewees were planned to conduct with 8 IT audit manager professionals but only 6 were interviewed and each interview took between 30 to 50 minutes. All the interviews were conducted in the interviewees' respective offices in order to keep the comfort of interviewees. The interview was started by a brief introduction regarding the objective of the study. Next to this, interview has been conducted based on the prepared outline.

3.4 Method of Data Analysis

In this research the data analysis is done after collecting all data from the respondents. Thus, the analysis of the study followed the objective of the research. The survey data collected were analyzed using SPSS version 20.

First, the descriptive statistics were presented using frequency distribution and percentages in tabular from. Next, Linearity test, correlations between each construct or independent variables and the dependent variable (IT audit quality) are presented. Finally, multiple regression analyses of all the constructs of the independent variable on the dependent variable (IT audit quality) were tested.

The data collected by means of semi structured interview were discussed thoroughly to better understand factors affecting IT audit quality and was analyzed using open codding with narrative form. The qualitative data is presented together with the quantitative data.

3.5 Reliability and Validity

The quality of a research can be evaluated using its reliability and validity. The reliability and validity of the study is further discussed below:

3.5.1 Data Validity

Data validity refers to correctness and reasonableness of Data. Basically validity boils down to whether the research is really measuring what is it claims to be measuring (Shilla, 2014). Validity can be measured in the form of content and construct. Content validity is the assessment of how well the survey instrument items address the problem being investigated. Construct validity is an assessment of the constructs whether they measured the dependent variable or not (Kerlinger and Lee, 2000).

In order to assess the content validity of this research, OFAG IT audit experts evaluated the items of the survey questions and also the interview questions. The feedback was collected for modification, correctness and reasonability aiming at increasing the questionnaires validity and clarity. Accordingly, the instruments were revised based on the subject matter experts' collected feedback. In addition, test the validity of the questionnaire was conducted using Pearson Product Moment Correlations using SPSS. The validity test Product Moment Pearson Correlations done by correlating each item questionnaire scores with the total score. Item-item questionnaire that significantly correlated with total score indicates that the items are valid.

3.5.1.1 Auditors IT Knowledge and Competency (AITKC) items validity test

The result of the output in Table 3 below shows that some values like: Pearson correlation or correlation value between the item and the item with a total score also as AITKC. Sig. (2-tailed) was a significance level of 5%, while N is the total of survey respondents is 43 people. Based on the significance values obtained by the Sig. (2-tailed) of 0.000 < 0.05, so it can be concluded that all items of AITKC were valid.

Correlations

		AITKC1	AITKC2	AITKC3	AITKC4	AITKC
AITKC1	Pearson Correlation	1	.731**	.336*	.371*	.829**
	Sig. (2-tailed)		.000	.027	.014	.000
	N	43	43	43	43	42
AITKC2	Pearson Correlation	.731**	1	.263	.485**	.800**
	Sig. (2-tailed)	.000		.089	.001	.000
	N	43	43	43	43	42
AITKC3	Pearson Correlation	.336*	.263	1	.370*	.693**
	Sig. (2-tailed)	.027	.089		.014	.000
	N	43	43	43	43	42
AITKC4	Pearson Correlation	.371*	.485**	.370*	1	.671**
	Sig. (2-tailed)	.014	.001	.014		.000
	N	43	43	43	43	42
AITKC	Pearson Correlation	.829**	.800**	.693**	.671**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	42	42	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2: Auditros IT Knowledge and Competency items validity test

3.5.1.2 Auditors IT Control Knowledge (AITCK) items validity test

The result of the output in Table 4 below shows that some values like: Pearson correlation or correlation value between the item and the item with a total score also as AITCK. Sig. (2-tailed) was a significance level of 5%, while N is the total of survey respondents is 43 people. Based on the significance values obtained by the Sig. (2-tailed) of 0.000 < 0.05, so it can be concluded that all items of AITCK were valid.

Correlations

		AITCK1	AITCK2	AITCK3	AITCK4	AITCK
AITCK1	Pearson Correlation	1	.579**	.507**	.398**	.782**
	Sig. (2-tailed)		.000	.001	.008	.000
	N	43	43	43	43	42
AITCK2	Pearson Correlation	.579**	1	.670**	.648**	.872**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	43	43	43	43	42
AITCK3	Pearson Correlation	.507**	.670**	1	.639**	.825**
	Sig. (2-tailed)	.001	.000		.000	.000
	N	43	43	43	43	42
AITCK4	Pearson Correlation	.398**	.648**	.639**	1	.808**
	Sig. (2-tailed)	.008	.000	.000		.000
	N	43	43	43	43	42
AITCK	Pearson Correlation	.782**	.872**	.825**	.808**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	42	42	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3: Auditors IT Control Knowledge items validity test

3.5.1.3 Target System Complexity (TSC)) items validity test

The result of the output in Table 5 below shows that some values like: Pearson correlation or correlation value between the item and the item with a total score also as TSC. Sig. (2-tailed) was a significance level of 5%, while N is the total of survey respondents is 43 people. Based on the significance values obtained by the Sig. (2-tailed) of 0.000 < 0.05, so it can be concluded that all items of TSC were valid.

Correlations

		TSC1	TSC2	TSC3	TSC4	TSC
TSC1	Pearson Correlation	1	.580**	.335*	.248	.749**
	Sig. (2-tailed)		.000	.028	.108	.000
	N	43	43	43	43	42
TSC2	Pearson Correlation	.580**	1	.153	.171	.656**
	Sig. (2-tailed)	.000		.327	.274	.000
	N	43	43	43	43	42
TSC3	Pearson Correlation	.335*	.153	1	.855**	.771**
	Sig. (2-tailed)	.028	.327		.000	.000
	N	43	43	43	43	42
TSC4	Pearson Correlation	.248	.171	.855**	1	.738**
	Sig. (2-tailed)	.108	.274	.000		.000
	N	43	43	43	43	42
TSC	Pearson Correlation	.749**	.656**	.771**	.738**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	42	42	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4: Target System Complexity items validity test

3.5.1.4 Audit Procedure and Methodology (APM)) items validity test

The result of the output in Table 6 below shows that some values like: Pearson correlation or correlation value between the item and the item with a total score also as APM. Sig. (2-tailed) was a significance level of 5%, while N is the total of survey respondents is 43 people. Based on the significance values obtained by the Sig. (2-tailed) of 0.000 < 0.05, so it can be concluded that all items of APM were valid.

Correlations

		APM1	APM2	APM3	APM4	APM5	APM6	APM
APM1	Pearson Correlation	1	.472**	.722**	.327*	.466**	.294	.769**
	Sig. (2-tailed)		.001	.000	.032	.002	.056	.000
	N	43	43	43	43	43	43	42
APM2	Pearson Correlation	.472**	1	.463**	.234	.103	.210	.540**
	Sig. (2-tailed)	.001		.002	.132	.510	.177	.000
	N	43	43	43	43	43	43	42
APM3	Pearson Correlation	.722**	.463**	1	.207	.310*	.130	.631**
	Sig. (2-tailed)	.000	.002		.183	.043	.408	.000
	N	43	43	43	43	43	43	42
APM4	Pearson Correlation	.327*	.234	.207	1	.098	.505**	.623**
	Sig. (2-tailed)	.032	.132	.183		.532	.001	.000
	N	43	43	43	43	43	43	42
APM5	Pearson Correlation	.466**	.103	.310*	.098	1	.403**	.631**
	Sig. (2-tailed)	.002	.510	.043	.532		.007	.000
	N	43	43	43	43	43	43	42
APM6	Pearson Correlation	.294	.210	.130	.505**	.403**	1	.719**
	Sig. (2-tailed)	.056	.177	.408	.001	.007		.000
	N	43	43	43	43	43	43	42
APM	Pearson Correlation	.769**	.540**	.631**	.623**	.631**	.719**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	42	42	42	42	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5: Audit Procedure and Methodology items validity test

3.5.1.5 Auditing skill (AS)) items validity test

The result of the output in Table 7 below shows that some values like: Pearson correlation or correlation value between the item and the item with a total score also as AS Sig. (2-tailed) was a significance level of 5%, while N is the total of survey respondents is 43 people. Based on the significance values obtained by the Sig. (2-tailed) of 0.000 < 0.05, so it can be concluded that all items of AS were valid.

Correlations

		AS1	AS2	AS3	AS4	AS
AS1	Pearson Correlation	1	.628**	.709**	.576**	.835**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	43	43	43	43	42
AS2	Pearson Correlation	.628**	1	.815**	.824**	.912**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	43	43	43	43	42
AS3	Pearson Correlation	.709**	.815**	1	.768**	.918**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	43	43	43	43	42
AS4	Pearson Correlation	.576**	.824**	.768**	1	.884**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	43	43	43	43	42
AS	Pearson Correlation	.835**	.912**	.918**	.884**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	42	42	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6: Auditing Skill items validity test

3.5.1.6 Resource Availability (RA) items validity test

The result of the output in Table 8 below shows that some values like: Pearson correlation or correlation value between the item and the item with a total score also as RA Sig. (2-tailed) was a significance level of 5%, while N is the total of survey respondents is 43 people. Based on the significance values obtained by the Sig. (2-tailed) of 0.000 < 0.05, so it can be concluded that all items of RA were valid.

Correlations

		RA1	RA2	RA3	RA4	RA
RA1	Pearson Correlation	1	.429**	.429**	.331*	.699**
	Sig. (2-tailed)		.004	.004	.030	.000
	N	43	43	43	43	42
RA2	Pearson Correlation	.429**	1	.734**	.929**	.909**
	Sig. (2-tailed)	.004		.000	.000	.000
	N	43	43	43	43	42
RA3	Pearson Correlation	.429**	.734**	1	.717**	.857**
	Sig. (2-tailed)	.004	.000		.000	.000
	N	43	43	43	43	42
RA4	Pearson Correlation	.331*	.929**	.717**	1	.873**
	Sig. (2-tailed)	.030	.000	.000		.000
	N	43	43	43	43	42
RA	Pearson Correlation	.699**	.909**	.857**	.873**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	42	42	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7: Resource Availability items validity test

3.5.2 Data Reliability

After completing the test the validity of the research instrument, the next step was to determine the consistency and reliability of a questionnaire as a research instrument. Reliability measures internal consistency of the subjects in the survey items for example, if an object is measured multiple times using the same instrument, nearly the same result should be found each time with little or no measurement error (Kerlinger and Lee, 2000). Data reliability refers to the data collected by independent collector and if the same questionnaire is administered by another person will yield the same results or is chiefly concerned with making sure the method of data gathering leads to consistent results (Norman, 2003). Cronbach's coefficient alpha is broadly used by many researchers as criterion to assess the reliability of the scale. Cronbach's alpha is a model of internal consistency based on the average inter-item correlation (Norman, 2003).

For this study reliability analysis has been conducted using Cronbach's Alpha test to measure the reliability and internal consistency of the survey. The Cronbach's alpha coefficient (.902) indicated that the survey questionnaire is reliable since it is greater than 0.7 which is the minimal alpha value. Moreover, it is found relevant to test the reliability of each of constructs (IT audit quality, Auditors IT knowledge and competencies, Auditors IT control knowledge, Target system complexity, Audit

procedure and methodology, Auditing skills and Resource availability) in order to get more reliable result. Accordingly the consistency of the items in the questionnaire is presented in Table 9 below:

Reliability Statistics

Description of Constructs	No of items	Cronbach's Alpha
IT Audit Quality	13	0.863
Auditors IT knowledge and competency	4	0.724
Auditors IT Control Knowledge	4	0.827
Target System Complexity	4	0.827
Audit Procedure and Methodology	6	0.721
Auditing Skill	4	0.903
Resource Availability	4	0.836
Overall	39	0.902

Table 8: Reliability test of the study, Source: Own survey, April 2018

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

In this chapter, both quantitative and qualitative data are presented and analyzed that were obtained from different sources. In the quantitative part demographic characteristics of the respondents, the quality of IT audit in the commercial banks and factors of IT audit quality are presented and analyzed. Then for the qualitative analysis the data obtained through interview are presented and analyzed.

4.1 Quantitative and Qualitative Data Presentation and Analysis

4.1.1 Demographic Characteristics of the Respondents

This section attempted to provide general characteristics of the respondents as captured by their responses in the current survey. The variables in these sections are gender, age, education level, work experience in the organization and IT/IS audit experience.

4.1.1.1 Distribution of Respondents by Gender

The research findings as reflected in Table 10 below, 86% of respondents were male and 14% were female. This indicates that most of the IT auditors are males.

Gender	Frequency	Percentage
Male	37	86
Female	6	14
Total	43	100

Table 9: Distribution of Respondents by Gender

4.1.1.2 Distribution of Respondents by Age

The result of the findings as indicated in Table 11 below, the dominant age groups in this study were age group between 18 to 35 years, which included 48.8% of the respondents. 39.5% were between 36 to 45 years, 11.6% of the participants were above between 46 years old. The result shows most of the IT auditors are in age group between 18 to 35 years; indicating that this group of IT auditors are more interested in technology and they are easly update them selves with the advances and ever changing IT environment.

Age	Frequency	Percentage
18 – 35 years	21	48.8
36 – 45 years	17	39.5
46 – 61 years	5	11.6
Above 61 years	0	0
Total	43	100

Table 10: Distribution of Respondents by Age

4.1.1.3 Distribution of Respondents by Educational Level

The result of the study indicated in Table 12 below, 65.1% of participants have a Bachelor's Degree and 34.9% have Master's Degree. Regarding academic qualification, as shown on table 4.3 below, most of the respondents' were Bachelor's and Master's Degree holders. This shows that the majorities of IT auditors have the requisite qualification to perform their job and are ready to contribute towards the quality of IT audit.

Educational Level	Frequency	Percentage
Diploma	0	0
Bachelor's Degree	28	65.1
Master's Degree	15	34.9
PHD	0	0
Total	43	100

Table 11: Distribution of Respondents by Educational level

4.1.1.4 Distribution of Respondents by Work Experience in the Organization

The result of the findings relating to work experience in the company as indicated in Table 13 below, 14 % of respondents work for less than 2 years, 37.2% between 2 to 5 years, and 30.2% between 6 to 10 years and the remaining 18.6% work for more than 10 years. The result shows that most of the respondents have working experience between 2 to 10 years (about 67.4%), this indicated that there is low turnover of employees in the company's/banks. More experience in the company helps IT auditors to know the business environment which is useful for IT audit quality.

Work Experience in the organization	Frequency	Percentage
Less than 2 years	6	14
2 - 5 years	16	37.2
6 - 10 years	13	30.2
Above 10 years	8	18.6

Table 12: Distribution of Respondents by Organizational Work Experience

4.1.1.5 Distribution of Respondents by IT Audit Experience

Regarding to respondents IT/IS experience as indicated in Table 14 below, 65.1 % of respondents had less than 5 years, 25.6% had between 5 to 10 years, 4.7% had had between 11 to 15 years and the remaining 4.7% had more than 10 years IT/IS audit experience. The result shows that most of the respondents had IT/IS audit experience less than 5 years, this indicated that the IT audit is at infant stage and the audit is carrying out with less experienced IT auditors this may impact the quality of IT audit.

IT/IS audit Experience	Frequency	Percentage
Less than 5 years	28	65.1
5 – 10 years	11	25.6
11 – 15 years	2	4.7
Above 15 years	2	4.7

Table 13: Distribution of Respondents by IT Audit Experience

4.1.2 Descriptive Variables

This section mentioned the mean and standard deviation score of the variables included in the current study, the seven variables namely IT audit quality, Auditors IT knowledge and competencies, Auditors IT control knowledge, Target system complexity, Audit procedure and methodology, Auditing skills and Resource availability, have been measured by using five Likert scale.

4.1.3 Factors that Affect IT Audit Quality

A questionnaire was also distributed to respondents to identify factors that affect the IT Audit Quality in the commercial banks. Questions related to Auditors IT Knowledge and Competency, Auditors IT Control Knowledge, Target System Complexity, Audit Procedure and Methodology, Auditing Skill and Resource Availability was assessed. In order to perform high quality IT audits, it is required to know and identify what factors affect IT audit quality. Once these factors are identified, IT audit managers might be able to implement strategies to improve IT audit quality. Respondents indicated their opinion with the given statements about the factors of IT audit quality.

4.1.3.1 Auditors IT Knowledge and Competency

Auditors IT Knowledge and Competencies was considered in the current study as one of the independent variable that affects the quality of IT audit. The researcher asked the respondents about this factor using the items listed in Table 16 below. The result indicated that from the respondents, 0.575% disagrees, 3.475% neutral, 23.825% agree and 72.1% strongly agree. This result shows that most of the respondents are in the category of "Strongly Agree (72.1%)". Moreover, the aggregate mean (mean of the mean) result for the Auditors IT knowledge and competency construct was found to be 4.673, which was rated in the 'Strongly Agree' category.

The result of the interview also indicated that the IT audit function is likely to be most effective where it contains a mixture of IT and accountancy skills. Effective IT auditors can be recruited either from an IT or accountancy background and trained in the use of IT audit techniques and tools. Where IT skills do not exist, these can be increased whilst carrying out practical IT audit work. IT auditors should be able to review the processes and technologies that exist all across the company and should have an ability to learn the key concepts of new technologies quickly and identify key risk points with in those technologies.

Auditors IT knowledge and competencies		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
IT/IS Audit team needs specialized IT professional qualifications and certification	Frequency	-	1	1	11	30	4.63
	Percentage	-	2.3	2.3	25.6	69.8	
IT/IS audit team need to have knowledge about IT and information systems	Frequency	-	-	1	9	33	4.74
	Percentage	-	-	2.3	20.9	76.7	
IT/IS audit team need to have knowledge about CAAT (Computer-assisted auditing tools)	Frequency	-	-	4	13	26	4.51
	Percentage	-	-	9.3	30.2	60.5	
IT/IS audit team need to have knowledge about the risks associated with IT use	Frequency	-	-	-	8	35	4.81
	Percentage	-	-	-	18.6	81.4	
Total score		-	0.575	3.475	23.825	72.1	4.673

Table 14: Items under Auditors IT Knowledge and Competency (Frequency, Percentage distribution and Mean)

4.1.3.2 Auditors IT Control Knowledge

Auditors IT Control Knowledge was considered in the current study as one of the independent variable that affects the quality of IT audit. The researcher was asked the respondents about this factor using the items listed in Table 17 below. The result indicated that from the respondents, 1.75% neutral, 23.85% agree and 74.42% strongly agree. This result showed that most of the respondents were in the category of "Strongly Agree (74.42%)". Moreover, the aggregate mean (mean of the mean) result for the Auditors IT Control Knowledge construct was found to be 4.727, which was rated in the 'Strongly Agree' category.

The result of the interview also indicated that IT auditors need to have knowledge about IT internal controls such as issues of IT governance, information security controls, application controls to identify and address the areas of greatest internal control weakness.

Auditors IT control knowledge		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
IT/IS Audit team members need to have knowledge about business processes and internal controls	Frequency	-	-	2	11	30	4.65
	Percentage	-	-	4.7	25.6	69.8	
IT/IS Audit team members need to have knowledge about IT governance	Frequency	-	-	-	13	30	4.70
	Percentage	-	-	-	30.2	69.8	
IT/IS Audit team members need to have knowledge about information security	Frequency	-	-	-	7	36	4.84
	Percentage	-	-	-	16.3	83.7	
Audit team members need to have knowledge about application controls (Input, processing, output, master data file and application security controls)	Frequency	-	-	1	10	32	4.72
	Percentage	-	-	2.3	23.3	74.4	
Total score	Percentage	-	-	1.75	23.85	74.42	4.727

Table 15: Items under Auditors IT control knowledge (Frequency, Percentage distribution and Mean)

4.1.3.3 Target System Complexity

Target system complexity was considered in the current study as one of the independent variable that affects the quality of IT audit. The researcher was asked the respondents about this factor using the items listed in Table 18 below. The result indicated that from the respondents, 5.82% disagrees, 11.62% neutral, 42.45% agree and 40.1% strongly agree. This result shows that most of the respondents were in the category of "Agree (42.45%)" and "Strongly Agree (40.1)". Moreover, the aggregate mean (mean of the mean) result for the Target system complexity construct was found to be 4.167, which was rated in the 'Agree' category. The result of the interview indicated that Target system complexity increases IT audit risks, which is likely to increase audit programme complexity, emphasize to maintain audit quality in relevant audit areas and finally impact adversely on IT audit quality review.

Target system complexity		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
The IT/IS audit team has to audit geographically and culturally dispersed business units and processes	Frequency	-	3	12	20	8	3.77
	Percentage	-	7.0	27.9	46.5	18.6	
The IT/IS audit team has to audit a number of business units, processes, or systems	Frequency	-	4	5	26	8	3.88
	Percentage	-	9.3	11.6	60.5	18.6	
The auditee has to provide competent support to assist in data gathering	Frequency	-	2	2	14	25	4.44
	Percentage	-	4.7	4.7	32.6	58.1	
The auditee's organizational standards, processes and the system have to be well defined and documented	Frequency	-	1	1	13	28	4.58
	Percentage	-	2.3	2.3	30.2	65.1	
Total score		-	5.825	11.625	42.45	40.1	4.167

Table 16: Items under Target system complexity (Frequency, Percentage distribution and Mean)

4.1.3.4 Audit Procedure and Methodology

Audit procedure and methodology was considered in the current study as one of the independent variable that affects the quality of IT audit. The researcher was asked the respondents about this factor using the items listed in Table 19 below. The result indicated that from the respondents, 0.38% strongly disagrees, 0.766% disagree, 4.65% neutral, 32.18% agree and 62.02% strongly agree. This result shows that most of the respondents are in the category of "Strongly Agree (62.02%)". Moreover, the aggregate mean (mean of the mean) result for the Audit procedure and methodology construct was found to be 4.545, which was rated in the 'Strongly Agree' category.

The result of the interview also indicated that this factor represents the audit team use of appropriate templates, forms, or other tools to conduct the audit and the proper documentation and sign-off procedures for each step in the audit. It is essential because the entire IT audit process should be based upon a clear methodology and procedures. This increases the likelihood that audit objectives, planning, fieldwork, reporting and follow-up arrangements will be compatible and that audit scope is reconciled with resources available.

Items		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
The audit needs to be adequately planned	Frequency	-	-	1	10	32	4.72
	Percentage	-	-	2.3	23.3	74.4	
The IT/IS audit team needs to utilizes a robust audit methodology to plan and manage the audit	Frequency	-	-	-	15	28	4.65
	Percentage	-	-	-	34.9	65.1	
Risk-based audit approach is needed to develop audit plan	Frequency	-	-	1	15	27	4.60
	Percentage	-	-	2.3	34.9	62.8	
IT/IS audit manager has to be active in planning and conducting the audit	Frequency	-	1	2	15	25	4.49
	Percentage	-	2.3	4.7	34.9	58.1	
Audit objectives, scope and plan have to be documented and agreed by auditee and audit team	Frequency	-	1	4	16	22	4.37
	Percentage	-	2.3	9.3	37.2	51.2	
Frequent communication need between audit manager and senior management	Frequency	1	-	4	12	26	4.44
	Percentage	2.3	-	9.3	27.9	60.5	
Total score		0.3833	0.766	4.65	32.183	62.016	4.545

Table 17: Items under Audit Procedure and Methodology (Frequency, Percentage distribution and Mean)

4.1.3.5 Auditing Skill

Auditing skills was considered in the current study as one of the independent variable that affects the quality of IT audit. The researcher was asked the respondents about this factor using the items listed in Table 20 below. The result indicated that from the respondents, 0.575% neutral, 25.57% agree and 73.82% strongly agree. This result shows that most of the respondents are in the category of "Strongly Agree (73.82%)". Moreover, the aggregate mean (mean of the mean) result for the Auditing skill was found to be 4.73, which was rated in the 'Strongly Agree' category.

The result of the interview also indicated that inaddition to maintaining technical skills, it is critical for IT auditors to develop and maintain auditing skills such as communication, relationship building, presentation and writing skills. This shows that to became successful IT auditor it is critical for the auditor not only to understand technologies but also to be able to use that knowledge to uncover risk to the business and apply judgement regarding degrees of risk.

Items		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
IT/IS audit team has to develop and execute an audit plan	Frequency	-	-	1	13	29	4.65
	Percentage	-	-	2.3	30.2	67.4	
IT/IS audit team has to prepare and use checklists	Frequency	-	-	-	11	32	4.74
	Percentage	-	-	-	25.6	74.4	
IT/IS audit team has to document audit findings and evidences	Frequency	-	-	-	8	35	4.81
	Percentage	-	-	-	18.6	81.4	
IT/IS audit team needs to have oral and written skills	Frequency	-	-	-	12	31	4.72
	Percentage	-	-	-	27.9	72.1	
Total score		-	-	0.575	25.575	73.825	4.73

Table 18: Items under Auditing Skill (Frequency, Percentage distribution and Mean)

4.1.3.6 Resource Availability

Resource availability was considered in the current study as one of the independent variable that affects the quality of IT audit. The researcher was asked the respondents about this factor using the items listed in Table 21 below. The result indicated that from the respondents, 1.72% disagree, 5.22% neutral, 44.17% % agree and 48.82% strongly agree. This result shows that most of the respondents are in the category of "Agree (44.17)"and "Strongly Agree (48.82%)". Moreover, the aggregate mean (mean of the mean) result for the resource availability construct was found to be 4.403, which was rated in the 'Agree' category.

The result of the interview also indicated that the availability of resources for each audit work to achive its objective and scope and resources should be planned and adequately assigned. If there are scaricity of resources, it is difficult to audit and achive the quality of the audit.

Items		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Computer-assisted auditing tools (CAATs e.g. ACL) need to be used for testing and analysis	Frequency	-	1	6	20	16	4.19
	Percentage	-	2.3	14.0	46.5	37.2	
There should be enough time to conduct the IT/IS audit	Frequency	-	-	1	17	25	4.56
	Percentage	-	-	2.3	39.5	58.1	
There should be enough budgets allocated to conduct the IT/IS audit	Frequency	-	1	1	22	19	4.37
	Percentage	-	2.3	2.3	51.2	44.2	
There should be enough audit staff to conduct the IT/IS audit in meeting the dateline	Frequency	-	1	1	17	24	4.49
	Percentage	-	2.3	2.3	39.5	55.8	
Total score		-	1.725	5.225	44.175	48.825	4.403

Table 19: Items under Resource Availability (Frequency, Percentage distribution and Mean)

4.1.3.7 Summary of Descriptive Statistics

Table 22 below indicated that variables Auditors IT Knowledge and Competency, Auditors IT Control Knowledge, Target System Complexity, Audit Procedure and Methodology, Auditing Skill, Resource Availability and IT Audit Quality recorded a mean score of 4.67, 4.72, 4.16, 4.54, 4.73 and 3.96 respectively. In addition, the Standard Deviation stood at .419 for Auditors IT knowledge and competency, .395 for Auditors IT control knowledge, .5666 for Target system complexity, .422 for Audit procedure and methodology, .405 for Auditing skill, .547 for Resource availability and .571 for IT Audit Quality. Based on the above result Auditors IT Control Knowledge and Auditing Skill have a highest score of mean 4.73 and 4.72 respectively far above the remaining variables, followed by Auditors IT knowledge and competencies (4.67), Audit procedure and methodology (4.54), Resource availability(4.39) and Target system complexity which stood at 4.16 mean value.

Variables	Mean	Std. Deviation	N
IT Audit Quality (ITAQ)	3.96	0.571	43
Auditors IT Knowledge and Competency (AITKC)	4.67	0.419	43
Auditors IT Control Knowledge (AITCK)	4.72	0.395	43
Target System Complexity (TSC)	4.16	0.566	43
Audit Procedure and Methodology (APM)	4.54	0.422	43
Auditing Skill (AS)	4.73	0.405	43
Resource Availability (RA)	4.39	0.547	43

Table 20: Summary of Descriptive Statistics

4.1.4 Linearity Test

Linearity test aims to determine the relationship between independent variables and the dependent variable is linear or not. The linearity test is a requirement in the correlation and linear regression analysis. Good relationship in the regression model there should be a linear relationship between the free variable and dependent variable. If the value sig. deviation from Linearity > 0.05, then the relationship between the independent variables are linearly dependent and if the value sig. Deviation from Linearity < 0.05, then the relationship between independent variables with the dependent is not linear.

4.1.4.1 IT Audit Quality with Auditors IT Knowledge and Competency

Based on the ANOVA Table 23 below, value sig. Deviation from Linearity of 0.121 > 0.05, it can be concluded that there is a linear relationship between the independent variable of Auditors IT knowledge and competencies and the dependent variable IT audit quality.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
ITAQ * AITKC	Between Groups	(Combined)	2.482	5	.496	1.641	.174
		Linearity	.105	1	.105	.348	.559
		Deviation from Linearity	2.377	4	.594	1.964	.121
	Within Groups		10.893	36	.303		
	Total		13.376	41			

Table 21: linearity test of IT Audit Quality with Auditors IT Knowledge and Competency

4.1.4.2 IT Audit Quality with Auditors IT Control Knowledge

Based on the ANOVA Table 24 below, value sig. Deviation from Linearity of 0.142 > 0.05, it can be concluded that there is a linear relationship between the independent variable of Auditors IT control knowledge and the dependent variable IT audit quality.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
ITAQ * AITCK	Between Groups	(Combined)	3.835	5	.767	2.895	.027
		Linearity	1.880	1	1.880	7.094	.011
		Deviation from Linearity	1.955	4	.489	1.845	.142
	Within Groups		9.540	36	.265		
	Total		13.376	41			

Table 22: linearity test of IT Audit Quality with Auditors IT Control Knowledge

4.1.4.3 IT Audit Quality with Target System Complexity

Based on the ANOVA Table 25 below, value sig. Deviation from Linearity of 0.221 > 0.05, it can be concluded that there is a linear relationship between the independent variable of Target system complexity and the dependent variable IT audit quality.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
ITAQ * TSC	Between Groups	(Combined)	4.115	9	.457	1.580	.164
		Linearity	.796	1	.796	2.750	.107
		Deviation from Linearity	3.319	8	.415	1.434	.221
	Within Groups		9.261	32	.289		
	Total		13.376	41			

Table 23: linearity test of IT Audit Quality with Target System Complexity

4.1.4.4 IT Audit Quality with Audit Procedure and Methodology

Based on the ANOVA Table 26 below, value sig. Deviation from Linearity of 0.681 > 0.05, it can be concluded that there is a linear relationship between the independent variable of Audit procedure and methodology and the dependent variable IT audit quality.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
ITAQ * APM	Between Groups	(Combined)	1.530	6	.255	.753	.611
		Linearity	.471	1	.471	1.392	.246
		Deviation from Linearity	1.059	5	.212	.626	.681
	Within Groups		11.846	35	.338		
	Total		13.376	41			

Table 24: linearity test of IT Audit Quality with Audit Procedure and Methodology

4.1.4.5 IT Audit Quality with Auditing Skill

Based on the ANOVA Table 27 below, value sig. Deviation from Linearity of 0.86 > 0.05, it can be concluded that there is a linear relationship between the independent variable of Auditing skills and the dependent variable IT audit quality.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
ITAQ * AS	Between Groups	(Combined)	3.526	5	.705	2.578	.043
		Linearity	1.092	1	1.092	3.990	.053
		Deviation from Linearity	2.435	4	.609	2.225	.086
	Within Groups		9.849	36	.274		
	Total		13.376	41			

Table 25: linearity test of IT audit quality with Auditing Skill

4.1.4.6 IT Audit Quality with Resource Availability

Based on the ANOVA Table 28 below, value sig. Deviation from Linearity of 0.86 > 0.05, it can be concluded that there is a linear relationship between the independent variable of Resource availability and the dependent variable IT audit quality.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
ITAQ * RA	Between Groups	(Combined)	2.274	6	.379	1.195	.332
		Linearity	1.118	1	1.118	3.524	.069
		Deviation from Linearity	1.156	5	.231	.729	.607
	Within Groups		11.102	35	.317		
	Total		13.376	41			

Table 26: linearity test of IT Audit Quality with Resource Availability

4.1.5 Multicollinearity Test

Multicollinearity test is used to determine whether there is similarity between the independent variables in a model. Similarities between the independent variables will result in a very strong correlation. In addition, multicollinearity test done to avoid habits in the decision making process regarding the partial effect of independent variables on the dependent variable. Good regression model should not happen correlation between the independent variables or not happen multicollinearity. Test multicollinearity as a basis the VIF value of multicollinearity test results using SPSS. If the VIF value lies between 1 and 10, then there is no multicollinearity, else if the VIF < 1 or > 10, then there is multicollinearity.

Based on the Coefficients in Table 29 below, obtained VIF value of Auditors IT Knowledge and Competency (1.348), Auditors IT Control Knowledge (2.194), Target System Complexity (1.1476), Audit Procedure and Methodology (2.165), Auditing Skill (2.089) and Resource Availability (1.798), meaning that the VIF values obtained were between 1 and 10, so it can be concluded that there was no mulicollinearity symptoms.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.225	1.208		1.842	.074		
	AITKC	-.504	.228	-.370	-2.208	.034	.742	1.348
	AITCK	.605	.309	.418	1.958	.058	.456	2.194
	TSC	.026	.177	.025	.145	.886	.677	1.476
	APM	-.302	.287	-.224	-1.053	.299	.462	2.165
	AS	.413	.294	.293	1.405	.169	.479	2.089
	RA	.124	.202	.118	.613	.544	.556	1.798

a. Dependent Variable: ITAQ

Table 27: Multicollinearity Test of Independent Variables (AITKC, AITCK, TSC, APM, AS and RA)

4.1.6 Test of Heteroskedasticity

Heteroskedasticity test is used to examine whether there is a difference in the residual variance of the observation period to another period of observation. A good regression model is not the case heteroskedasticity problem. The researcher used SPSS to test heteroskedasticity using Test Glejser. Glejser test conducted by regressing absolute residual value of the independent variable with regression equation is: Ut = A+B+Xt+vi. If the value significance is greater than 0.05, then there is no problem of heteroskedasticity, else if the value significance is less than 0.05, then there is a problem of heteroskedasticity.

Based on Output Coefficients in Table 30 below, the obtained value of Sig. Auditors IT Knowledge and Competency variable of 0.595, Auditors IT Control Knowledge variable of 0.751, Target System Complexity variable of 0.803, Audit Procedure and Methodology variable of 0.277, Auditing Skill variable of 0.489 and Resource Availability variable of 0.221, meaning that the value of the variables Sig. > 0.05, it can be concluded that there is no heteroskedasticity problem.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.126	.542		-.232	.818
	AITKC	.055	.102	.100	.537	.595
	AITCK	-.044	.139	-.076	-.319	.751
	TSC	-.020	.079	-.049	-.252	.803
	APM	.142	.129	.260	1.104	.277
	AS	.092	.132	.162	.699	.489
	RA	-.113	.091	-.267	-1.246	.221

a. Dependent Variable: AbsUt

Table 28: Heteroskedasticity Test

4.1.7 Correlation Analysis

The current study was used Pearson‟s correlation analysis to assess the relationships among the variables. Correlation test used to determine the level of relationship between the study variables. Pearson Product Moment correlation test can produce a correlation coefficient that shows the relationship, the degree of relationship, and the direction of the relationship (positive or negative). If the significance is less than 0.05, then there is a significant relationship between variables of the study, otherwise if the significance is greater than 0.05, then there is no significant relationship between the variables of the study.

Table 31 below presented the correlation matrix among the variables of Auditors IT knowledge and competencies, Auditors IT control knowledge, Target system complexity, Audit procedure and methodology, Auditing skills and Resource availability.

Correlations

		ITAQ	RA	AITCK	APM	TSC	AITKC	AS
ITAQ	Pearson Correlation	1	.368*	.637**	.373*	.597**	.328*	.419**
	Sig. (2-tailed)		.027	.000	.023	.000	.048	.010
	N	39	36	37	37	35	37	37
RA	Pearson Correlation	.368*	1	.785**	.852**	.829**	.740**	.533**
	Sig. (2-tailed)	.027		.000	.000	.000	.000	.001
	N	36	38	35	37	35	37	37
AITCK	Pearson Correlation	.637**	.785**	1	.757**	.923**	.800**	.555**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	37	35	39	36	36	38	37
APM	Pearson Correlation	.373*	.852**	.757**	1	.844**	.789**	.637**
	Sig. (2-tailed)	.023	.000	.000		.000	.000	.000
	N	37	37	36	40	36	38	38
TSC	Pearson Correlation	.597**	.829**	.923**	.844**	1	.823**	.611**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	35	35	36	36	37	36	35
AITKC	Pearson Correlation	.328*	.740**	.800**	.789**	.823**	1	.695**
	Sig. (2-tailed)	.048	.000	.000	.000	.000		.000
	N	37	37	38	38	36	41	40
AS	Pearson Correlation	.419**	.533**	.555**	.637**	.611**	.695**	1
	Sig. (2-tailed)	.010	.001	.000	.000	.000	.000	
	N	37	37	37	38	35	40	41

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 29: Correlation Analysis

Based on the output Correlations obtained illustrated in Table 31 above shows that, IT audit quality is positively correlated with AITCK factor with r=.637**, p<0.05, with TSC factor positively correlated with r=.597**, p<0.05, with AS factor positively correlated with r=.419**, p<0.05, with RA factor positively correlated with r=.368**, p<0.05, with AITKC factor has not correlated with r = .328**, P>0.05 and with APM factor has not correlated with r=.373**, p<0.05. According to the result

indicated Auditor IT control knowledge, Target system complexity, Auditing skills, Audit procedure and methodology, Auditor IT knowledge and competency and Resource availability has significantly correlated with IT audit quality.

In addition, the output of the correlation analysis obtained illustrated the significant relationship between independent variables, the result shows that the sig. (2-tailed) of AITKC with AITCK, TSC, APM, AS and RA (0.000 < 0.05), the sig. (2-tailed) of AITCK with TSC, APM, AS and RA (0.000 < 0.05), the sig. (2-tailed) of TSC with APM, AS and RA (0.000 < 0.05), the sig. (2-tailed) of APM with AS and RA (0.000 < 0.05) and the sig. (2-tailed) of AS with RA (0.000 < 0.05).

The result indicated that auditors IT knowledge and competencies (AITKC) factor has positive and significant relationship with all the five factors: TSC (82.3%), AITCK (80%), APM (78.9%), RA (74%) and AS (69.5%). Auditor IT control knowledge (AITCK) factor has positive and significant relationship with all the five factors: TSC (92.3%), RA (78.5%), APM (75.7%) and AS (55.5%). Target system complexity (TSC) also has positive and significant relationship with the five factors APM (84.4%), RA (82.9%) and AS (61.1%). Audit procedure and methodology (APM) factor has strong and significant relationship with five factors RA (85.2%) and AS (63.7%). Auditing skills (AS) also has strong and significant relationship with the five factors RA (53.3%). The last resource availability factor has strong and significant relationship with the five factors. This result indicated that all factors are significantly dependent with each other.

4.1.8 Multiple Linear Regressions Analysis

Multiple linear regression analysis is used to determine the effect of independent variables to the dependent variable. To test multiple linear regression first necessary to test the multicollinearity and heteroscedasticity test and the regression model does not have problem of multicollinearity and heteroscedasticity as indicated in the above Tables (Table 29 and 30). If the value of significance < 0.05, then the independent variable has significant effect on the dependent variable, else if the value Significance > 0.05, then the independent variable has no significant effect on the dependent variable.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.717[a]	.514	.336	.465

Table 30: Results of Multiple Regression Analysis

Based on the Output Model summary Table 32 above, the value of R = 0.717 and the coefficient of determination (R square) of 0.514. This suggests the notation that IT audit quality is influenced by 51.4% by Auditors IT knowledge and competencies, Auditors IT control knowledge, Target system complexity, Audit procedure and methodology, Auditing skills and Resource availability.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.881	11	.626	2.890	.010[b]
	Residual	6.494	30	.216		
	Total	13.376	41			

a. Dependent Variable: ITAQ

Table 31: ANOVA table

Based on Output of ANOVA Table 33 above, displayed a probability level of significance value of 0.01. Therefore, the probability (0.01) is smaller than 0.05, then the multiple regression models can be used to predict the IT audit quality. Or in other words, Auditors IT Knowledge and Competency, Auditors IT Control Knowledge, Target System Complexity, Audit Procedure and Methodology, Auditing Skill and Resource Availability, simultaneously significant effect on IT Audit Quality.

4.1.9 Critical Factors that Affect the Quality of IT Audit

The quality of IT audit can be affected by auditors IT knowledge and competencies, auditors IT control knowledge, target system complexity, audit procedure and methodology, auditing skill and resource availability. The researcher asked the respondents to rank those listed factors, which of those listed factors are the most critical that affect the quality of IT audit using the factors listed in Table 34 below. The result indicated that from the respondents, auditors IT knowledge and competencies ranked first, auditors IT control knowledge ranked second, audit procedure and methodology ranked third, auditing skill ranked fourth, resource availability ranked fifth and target system complexity ranked sixth. According to the result, the researcher concluded that auditors IT knowledge and competencies, auditors IT control knowledge and audit procedure and methodology which are ranked by the IT auditors from one to three respectively are the most critical factors that hiders IT audit quality.

IT audit managers emphasiseed that to achive the quality of IT audit, it is important to have clear role and responsibilities of the IT audit function, an IT audit structure that enables IT auditors to support other audit types, proficient IT auditors, an agreed IT audit process supported by verified audit evidence plus recommendations that address the root cause of weaknesses identified.

Factors of IT Audit Quality		1st	2nd	3rd	4th	5th	6th	Rank
Auditors IT knowledge and competencies	Frequency	36	4	3	0	0	0	1st
	Percentage	83.7	9.3	7.0	0.0	0.0	0.0	
Auditors IT control knowledge	Frequency	10	16	8	6	1	2	2nd
	Percentage	23.3	37.2	18.6	14.0	2.3	4.7	
Target system complexity	Frequency	3	10	3	4	6	16	6th
	Percentage	7.0	23.3	7.0	9.3	14.0	37.2	
Audit procedure and methodology	Frequency	8	13	9	6	5	2	3rd
	Percentage	18.6	30.2	20.9	14.0	11.6	4.7	
Auditing skill	Frequency	11	12	7	6	5	1	4th
	Percentage	25.6	27.9	16.3	14.0	11.6	2.3	
Resource availability	Frequency	4	7	10	6	9	6	5th
	Percentage	9.3	16.3	23.3	14.0	20.9	14.0	

Table 32: IT Audit Quality Critical Factors

Based on the output Correlations obtained illustrated in Table 31 above shows that, IT audit quality is positively correlated with AITCK factor with r=.637**, p<0.05, with TSC factor positively correlated with r=.597**, p<0.05, with AS factor positively correlated with r=.419**, p<0.05, with RA factor positively correlated with r=.368**, p<0.05, with AITKC factor has not correlated with r = .328**, P>0.05 and with APM factor has not correlated with r=.373**, p<0.05. According to the result indicated Auditor IT control knowledge, Target system complexity, Auditing skills, Audit procedure and methodology, Auditor IT knowledge and competency and Resource availability has significantly correlated with IT audit quality.

4.2 Discussion of Results

This section discusses the results of present study on the basis of descriptive analysis, correlation and regression analysis to confirm the relationship between Auditors IT knowledge and competencies, Auditors IT control knowledge, Target system complexity, Audit procedure and methodology, Auditing skills and Resource availability and IT audit quality. All the research questions are discussed related with the support of the previous literature.

4.2.1 Perceived importance of each Factor on IT audit quality

This research evaluated the relative perceived impact of each factor (Auditors IT knowledge and competencies, Auditors IT control knowledge, Target system complexity, Audit procedure and methodology, Auditing skill and Resource availability) on IT audit quality. Figure 2 shows the proposed IT audit quality framework.

Figure 2: Proposed IT Audit Quality Framework

4.2.1.1 Auditors IT Knowledge and Competency and IT Audit Quality

The study result indicates that Auditors IT knowledge and competencies has significant and positive impact on IT audit quality from Ethiopian commercial banks IT auditors perspective (average mean of 4.673, which is rated close to 'Strongly Agree' category and r=.328**, p = 0.048 < 0.05). Previous studies show that to be able to detect material weaknesses in IT systems, IT auditors need to have knowledge and competencies on IT knowledge. Specialized IT professional qualifications and certifications have been shown to have more likelihood of involvement with auditing on IT governance, risks and controls. Knowledge about IT and accounting system, are shown to be important factors in IT audit quality (Havelka and Merhout, 2013 and Stoel et al, 2012).

Prior research has found that Auditors IT knowledge and competency to be one of the most important factor for IT audit quality (Havelka and Merhout, 2007; Havelka and Merhout, 2008; Stoel et al., 2012; Havelka and Merhout, 2013; Siew et al., 2017). All these studies justify the result auditors IT knowledge and competencies has high influence on the IT audit quality.

4.2.1.2 Auditors IT Control Knowledge and IT Audit Quality

The study result indicates that Auditors IT control knowledge has significant and positive impact on IT audit quality (average mean of 4.727, which is rated close to 'Strongly Agree' category and r=.637**, p = 0.000 < 0.05). IT is a rapidly changing environment that promotes process and organizational

change. As a consequence new risks emerge at a rapid pace. Therefore controls must be present to provide continuous evidence of their effectiveness, and that evidence must be assessed and evaluated constantly. IT controls provide for assurance related to the reliability of information and information services and they also help mitigate the risks associated with an organization's use of technology. IT auditors must assess and evaluate the risks and controls for information systems that operate within the organization (Richard, 2005). Internal auditors need to understand the range of controls available for mitigating IT risks.

Previous research has found that Auditors IT control knowledge to be one of the most important factors for IT audit quality (Stoel et al., 2012; ALraja and ALomiam, 2013, Havelka and Merhout, 2013; Siew et al., 2017). All these studies justify the result auditors IT control knowledge has high influence on the IT audit quality.

4.2.1.3 Audit Procedure and Methodology and IT Audit Quality

The study result indicates that audit procedure and methodology has significant and positive impact on IT audit quality (average mean of 4.545, which is rated in the 'Agree' category and r=.373**, p = 0.000 < 0.05). A well-planned, properly structured audit program is essential to evaluate risk management practices, internal control systems, and compliance with corporate policies concerning IT-related risks at institutions of every size and complexity. Effective audit programs are risk-focused, promote sound IT controls, ensure the timely resolution of audit deficiencies, and inform the board of directors of the effectiveness of risk management practices (Lovaas, 2009).

Previous research has found that Audit procedure and methodology to be one of the most important factor for IT audit quality (Havelka and Merhout, 2007 and 2008; Stoel et al, 2012; Yeghaneh et al, 2015; Carcello et al., 1992; Samelson et al., 2006). All these studies justify the result audit procedure and methodology has significant influence on the IT audit quality.

4.2.1.4 Auditing Skill and IT Audit Quality

The study result indicates that auditing skill has significant and positive impact on IT audit quality (average mean of 4.73, which is rated close to 'Strongly Agree' category and r=.419**, p = 0.010 < 0.05). Auditing skills include a number of specific sub skills, such as analythical skills, communication skills, developing and executing an audit plan, preparing and using checklists, following-up, documenting findings, etc. In addition, communication and interpersonal skills are very important for the IT audit function, because if the auditors communicate and interact well with everyone involved, the audit will more likely to be successful (Komneni, 2008). Carroll et al (2009) described that audit knowledge should be applied to IT knowledge to enable an IT auditor to executes his or her daily roles and responsibilities (Carroll et al, 2009).

Previous research has found that Auditing skill to be one of the most important factors for IT audit quality (Carrol et al., 2009; Stoel et al, 2012; Havelka and Merhout, 2013). All these studies justify the result auditing skill to perform an audit activity has high influence on the IT audit quality.

4.2.1.5 Resource Availability and IT Audit Quality

The study result indicates that resource availability has significant and positive impact on IT audit quality (average mean of 4.403, which is rated to the 'Agree' category and r=.368**, p = 0.027 < 0.05). Resources refer to the availability of audit tools, time, budget and audit staff that the audit team could command to assist their IT auditing activities (Stoel et al, 2012). To perform any audit work must have an accurate budgeting and accomplishment audit operating favorably. In addition to that in order to carry out good quality audit work, auditors should accept and perform the audit by considering the availability and access to entity reliable resources (Yeghaneh et al, 2015).

Previous research has found that Resource availability to be one of the factors for IT audit quality (Havelka and Merhout, 2007; Stoel et al., 2012; Siew et al., 2017). All these studies justify the result resource availability to carry out an IT audit has a significant importance on the IT audit quality.

4.2.1.6 Target System Complexity and IT Audit Quality

The study result indicates that auditors IT control knowledge has significant and positive impact on IT audit quality (average mean of 4.167, which is rated in the 'Agree' category and r=.597**, p<0.05). This factor refers to how difficult it is to audit the auditee systems (Havelka and Merhout, 2013). Target system complexity is the function of business size and scale of the auditee, how broad the scope of the audit, the support given by the auditee and the reliability of the internal controls (Stoel, Havelka, and Merhout, 2012).

Previous research has found that Target system complexity to be one of the important factors for IT audit quality (Havelka and Merhout, 2007 and Havelka and Merhout, 2008). All these studies justify the result target system complexity has impact on the IT audit quality.

4.2.2 Critical Factors that Affect the Quality of IT Audit

The quality of IT audit can be affected by Auditors IT knowledge and competency, Auditors IT control knowledge, Target system complexity, Audit procedure and methodology, Auditing skill and Resource availability. The researcher was asked the respondents to rank those listed factors, which of those listed factors are the most critical that affect the quality of IT audit. The result indicated that from the respondents, auditors IT knowledge and competencies ranked first, auditors IT control knowledge ranked second, audit procedure and methodology ranked third, auditing skill ranked fourth, resource availability ranked fifth and target system complexity ranked sixth. According to the result, the researcher concluded that auditors IT knowledge and competencies, auditors IT control knowledge and audit procedure and methodology which are ranked by the IT auditors from one to three

respectively are the most critical factors that hiders IT audit quality. But target system complexity ranked last which may have little effect to the quality of IT audit. The impact of target system complexity on the audit quality also identified by previous litratures (Havelka and Merhout, 2007; Stoel et al., 2012; Siew et al., 2017).

The IT audit managers emphasized that it is important for the quality of IT audit to have clear role and responsibilities of the IT audit function, an IT audit structure that enables IT auditors to support other audit types, proficient IT auditors, an agreed IT audit process supported by verified audit evidence plus recommendations that address the root cause of weaknesses identified.

CHAPTER FIVE

CONCLUSIONS, RECOMMENDATION AND DIRECTION FOR FUTURE RESEARCH

This chapter presents conclusions drawn from the study, recommendations based on the evidences presented during the course of the study and as well as suggestions for future research. The subsequent discussion presents conclusions, recommendations and direction future research in an orderly manner.

6.1 Conclusions

IT has become pervasive and critical in successful operations and management of any organizations especially financial institutions like banks. It is necessary to perform IT audits in companies due to the fact that information system integrity protection has become an important business issue in today's business conditions, when companies' core activities are becoming more tightly linked with their information systems. Thus, it has become necessary to audit the information systems of organizations. IT audits are important organizational processes that add value to the organization because they have given an assurance on the integrity, reliability and quality of the information produced by the organization's information systems. The importance of IT audit quality has increased with additional spending on IT and a variety of new legislation.

IT audit in Ethiopia is at infant stage and it has given focus in recent years and also there are no studies related to the current topic, this study was hence conducted to address these issues and contribute the body of knowledge in the field of IT audit quality. The study aimed at assessing mainly perception factors that affect the quality of IT audit in commercial banks in Ethiopia.

In order to best answer the research questions and achieve the objective of the study, a combination of quantitative and qualitative methods are used that involves collecting, analyzing and integrating quantitative (surveys) and qualitative (interviews & secondary data). In terms of data analysis the study employed descriptive statistics, correlation and multiple linear regressions.

In summary, by way of answering the research questions, the study has been able to: (1) assess the level of IT audit quality in Ethiopian commercial banks, (2) identify determinant factors that affect the quality of IT audit, and (3) identify the most critical factors of IT audit quality. The present study successfully delivered all answers of the research questions. Based on the analysis and the findings, the following conclusions are drawn from the study:

- As per the first objective, the results of the study indicate that IT internal auditors in Ethiopian commercial banks consider auditors IT knowledge and competency, auditors IT control knowledge, target system complexity, proper audit procedure and methodology, auditing skill and resource availability as important factors affecting the IT audit quality. It was found that "Auditing skills" and "Auditors IT control knowledge" had the highest mean score (4.73 and 4.72 respectively), followed by "Auditors IT knowledge and competencies" (4.67), "Audit procedure and methodology" (4.54), "Resource availability" (4.39) and "Target system complexity" (4.16).
- The study also revealed the result of a multiple regression analysis to incorporating the degree of influence independent variables (auditors IT control knowledge, auditing skills, target system complexity, audit procedure and methodology, auditors IT knowledge and competency and resource availability) at the dependent variable (IT audit quality). The results of the regression indicated that auditors IT control knowledge, target system complexity and auditing skills are the most important factors determine the IT audit quality by 63.7%, 59.7%, 41.9% respectively, followed by audit procedure and methodology by 37.3% and resource availability by 36.8%. Auditors IT knowledge and competencies is the lower factor affecting the IT audit quality among the above mentioned factors by 32.8%.
- As per the second objective, this study revealed the result of descriptive statistics of the identification of the critical factors that influence the quality of IT audit, the result indicated that Auditors IT knowledge and competency, Auditors IT control knowledge, Audit procedure and methodology and Auditing skill rated highest from first to fourth respectively. Resource availability and Target system complexity rated last. This may indicate that the complexity of IT audits may require increased focus on these factors to ensure that the auditors understand the technical and control aspects of specific objectives to be achieved and tests to be performed for the specific system or process being audited.

6.2 Recommendations

The contribution of this exploratory paper is to identify broad constructs from the literature that affects IT audit quality and used it to develop a questionnaire. Furthermore, this paper presents the preliminary descriptive statistics on the relationships of the factors that affect IT audit quality. We found that auditor's IT control knowledge, target system complexity and auditing skills are significantly correlated with IT audit quality. This has implication on policymakers and professional auditing bodies in improving IT audit quality. Based on the study findings, the researcher makes the following recommendations:

- Information technology audits are vital information management programs for banks and financial institutions. There are laws and regulations exists, requiring financial institutions to develop an information technology audit program to support its information technology infrastructure and keep non-public customer information secure. Furthermore, banks are required to complete a risk-based audit on an annual basis to comply with regulators.

- A quality IT audit should provide independent assurance to the audit committee or senior management that internal controls are in place at the company and are functioning effectively. It should also improve the state of internal controls by helping the company identify control weakenesses and develop cost-effective solutions for addressing those weakenesses.

- The identification of the factors that affect the quality of the IT audit process may give IT audit managers guidance in assessing the resources required for specific assurance engagements. Moreover, by identifying critical factors related to IT audit quality, it may be possible to better control and manage the audit process and thus improve the effectiveness and/or efficiency of the audit.

- Ethiopian commercial banks IT audit managers must work to ensure the availability of the key factors to achieve the quality of the IT audit function.

- IT audit managers must self-evaluate each factor to determine their ability to improve their IT audits and the result also should be used to prioritize opportunities for training and development on the differences in factors that are perceived as critical for audit success.

- The factors could also be used as part of a quality control program to conduct post-audit reviews and this could help determine where issues occurred or opportunities were missed for improving audit quality.

Finally, the concepts identified may be used to quantify measurements of the level of quality of an IT audit. Considering the current global emphasis on controlling the information assets used for external financial reporting and compliance requirements, obtaining and using a set of critical factors for analyzing IT audit quality are valuable in communicating to stakeholders about the overall quality. We believe that the ability to identify the quality of an IT audit will be critical as technology evolutions.

6.3 Direction for Future Study

This research has identified the specific factors which may affect IT audit quality. This is a critical step toward developing a testable model of IT audit quality. This research study has a number of strengths. Nevertheless, in the course of this study the few constraints encountered which calls for further studies. This study concentrated only on the banking sector; hence, future studies could investigate IT audit qualities of other industries like Ethiopian Airlines, Ethiopian Telecom. The survey study carried out in this study was concentrated on few variables or factors, thus, future studies could incorporate other important factors in the study.

This research is also limited by the number of respondents. This affects the statistical methods and inferences that can be drawn from the data. Nevertheless, this paper sets the stage towards more research in this area. The questionnaire used needs to be rigorously tested and validated.

There is also a possibility that some of the individual factors may impact each other and/or work together to affect IT audit quality. Additional research would be useful to explore the relationships between each factor.

One additional area for consideration is the IT Knowledge factor. This research considers overall IT knowledge as a general factor; however, there may be differences between security knowledge, network knowledge, application knowledge or understanding of various hardware and infrastructure platforms.

REFERENCES

Al-Khaddash, H., et al. (2013). Factors Affecting the Quality of Auditing: The Case of Jordanian Commercial Banks, International Journal of Business and Social Science, Vol. 4 No. 11.

Alraja, N.M. and ALomiam, R.N. (2013). The Effect of General Controls of Information System Auditing in the Performance of Information Systems: Field Study, Interdisciplinary Journal of Contemporary Research in Business Copy Right © 2013 Institute of Interdisciplinary Business Research 356 JULY 2013 VOL 5, NO 3

Andrew, J. T. (2013). Internal Audit Quality: A Multi-Stakeholder Analysis, School of Business, Bond University, Australia July 2013

Asteriou, D. & Hall, S. G. (2007). Applied Econometrics: A Modern Approach using Eviews and Microfit revised Edition, Palgrave Macmillan

Axelsen, M. et al. (2011). Examining the Role of IS Auditing in the Public Sector

Bellino, C. et al. (2007). Global Technology Audit Guide (GTAG) 8: Auditing Application Controls

Björklund, J. and Joelsson, R. (2015). A New Approach for IT Audit: Testing the Theory of Technology Debt in an IT Audit Setting. School of Business, Economics and Law, University of Guthenberg.

Carcello, J. et al. (1992). Audit Quality Attributes: The Perceptions of Audit Partners, Preparers, and Financial Statement Users. Aud J Pract Theory 1992;11:1-15.

Carroll, M. et al. (2009). An Information Systems Auditor's Profile, Alternation 1461 (2009) x - x ISSN 1023-1757.

Cascarno, R. (2012). Auditor's Guide to IT Auditing, Second Edition

Chris, D. et al. (2011). IT Auditing, Using Controls to Protect Information Assets, Second Edition, Copyright © 2011 by The McGraw-Hill Companies, ISBN: 978-0-07-174239-9

COSO, (2014). The Updated COSO Internal Control Framework, Third Edition. www.Protiviti.com

Creswell, J. W. (2007). Qualitative Inquiry & Research Design: Choosing among Five approaches. Thousand Oaks, California: Sage Publications, Inc.

David, C. and Liming, G. (2004). The Evolution of IT Auditing and Internal Control Standards in Financial Statement Audits: The Case of the United States, Managerial Auditing Journal, Volume 19, Number 4, 2004, pp. 544-555(12)

De Haes, S. (2012). COBIT 5: Enabling Information Progress Report

Do H.H. (2015). The Factors Affect the Quality of Financial Statements Audit in Vietnam Businesses, Asian Social Science; Vol. 11, No. 27; 2015

Ebimobowei, A. et al. (2013). Auditors' Usage of Computer Assisted Audit Tools and Techniques: Empirical Evidence from Nigeria, Research Journal of Applied Sciences, Engineering and Technology 6(2): 187-195, 2013

Edward, H. and Robert, B. (2008). High Value Audits: An Update on Information Technology Auditing

Ernst, D. and Young, S. (2013). Ten key IT considerations for internal audit Effective IT Risk Assessment and Audit Planning: Insights on Governance, Risk and Compliance, February 2013.

GAO, (2009). Federal Information System Controls Audit Manual (FISCAM), United States Government Accountability Office, February 2009

Gerke, L. and BIS, B. (2005). Investigating COBIT for Information Technology Audit in the Tasmanian Public Sector, School of Information Systems, University of Tasmania, October 2005.

Harb, R.K. (2012). The Impact of Information Systems Audit on Improving Bank's Performance: "Applied Study at Banks Working in Gaza".

Havelka, D. and Merhout, J. (2006): Developing Information Risk Management, Security and Assurance Curricula for AIS/MIS/IT Education, Volume VII, No. 1, 2006.

Havelka, D. and Merhout, J. (2007). Development of an Information Technology Audit Process Quality Framework. AmConferInfoSyst 2007; 13: 1–7.

Havelka, D. and Merhout, J. (2009). Grounded Theory of the Information Technology Audit Process by External Auditor: using group data for Grounded Theory Development'', International Journal of Accounting Information Systems.

Havelka, D. and Merhout, J. (2013). Internal Information Technology Audit Process Quality: Theory development using Structured Group Processes'', International Journal of Accounting Information Systems, http://dx.doi.org/10.1016/j.accinf.2012.12.001

Hosseinniakani, S.M. et al. (2014). A Review on Audit Quality Factors, International Journal of Academic Research in Accounting, Finance and Management Sciences, Vol. 4, No.2, April 2014, pp. 247–258.

ISACA - Updates - Audit-Assurance - Standards, jan 4, 2018(5.30), www.businesswire.com / news / home / 20130718006403 / en /

IAASB, (2013). Framework for Audit Quality, www.iaasb.org

ISACA - IS Audit and Assurance Standard 1001 Audit Charter

ISACA- IS Audit and Assurance Standard 1401 Reporting

ISACA, (2003). 6th ASOSAI Research Project, IT Audit Guidelines, Research team members: Malaysia, India, Australia and China, Septemeber, 2003

ISACA, (2010). IT Standards, Guidelines, and Tools and Techniques for Audit and Assurance and Control Professionals

ISACA-CISA: Certification Certified Information Systems Auditor Courseware, Courseware version 6.1, www.firebrandtraining.co.uk

ITAF, (2014): A Professional Practice Framework for IS Audit/Assurance, 3rd Edition

Jack, J.C. (2003). Auditing Information System, Second Edition

James, A. (2004). Information System Auditing and Assurance, Accounting Information Systems, 4th. Ed.

James, A. (2011). Information Technology Auditing and Assurance: Third Edition

John, W. (2015). Information Systems Auditing Requirements, International Journal of Information Science

Jonson, W. (2015). IT Auditing and Application Controls for Small and Mid-Sized Enterprises: Revenue, Expenditure, Inventory, Payroll, and More.

Kacanski, S. (2016). ICT in Auditing: Impact of Audit Quality Norms on Interpersonal Interactions, European Financial and Accounting Journal, 2016, vol.11, no. 4, pp. 39-64

Kaul, N.V.(2002). ITAM- Manual of Information Technology Audit, Office of the Comptroller & Auditor General of India, Volume 1

Kerlinger, F.N. & Lee, H.B. (2000). Foundations of Behavioral Research (4th ed.), New York, NY: Thomson Learning.

Khalid, G.E. (2015). Factors Affecting Audit Quality in Registered Companies in Libya

Komneni, V. (2008). ICT Auditing and Required Competencies

Kozlovs, D. et al. (2015). Towards Continuous Information Security Audit, Riga Technical University, Latvia

Lovaas, P. (2009). A Comprehensive Risk-Based Auditing Framework for Small- and Medium-Sized Financial Institutions. Dakota State University, Issues in Information Systems, Volume X, No. 2, 2009

Lovaas, P. and Wagner, S. (2012). IT Audit Challenges for Small and Medium- Sized Financial Institutions, Annual Symposium on Information Assurance & Secure Knowledge Management, June 5-6, 2012, Albany, ny

Lydon, P. (2015). Auditing in a Computer Environment

Mahzan, N. and Veerankutty, F. (2010). IT Auditing Activities of Public Sector Auditors in Malaysia. African Journal of Business Management Vol. 5(5), pp. 1551-1563.

Mark, L. and Clive, S. (2011). The Effect of SOX on Small Auditor exits and Audit quality

Mary, B. (2009). Auditors' Training and Proficiency in Information Systems: A Research Synthesis, Journal of Information Systems, Vol. 23, No. 1 pp. 79–96

Mengistu, B.A., (2016). Auditing IT and IT Governance in Ethiopia, Addis Ababa University, IT Doctoral Programme, Information Systems Track, May 2016

Merhout, J., and Havelka, D. ''Information Technology Auditing: A Value-Added IT Governance Partnership between IT Management and Audit''. Comm Assoc InfoSyst 2008; 23: 463–483.

Mohammad, J. A. and Scott, R. B. (2009). Factors Associated with IT Audits by the Internal Audit Function, Department of Accountancy, Bentley University Waltham, MA, 02154-4705.

Nicho, M. (2008). Information Technology Audit: Systems Alignment and Effectiveness Measures

Nkwe, N., (2011). State of Information Technology Auditing in Botswana, Asian Journal of Finance & Accounting ISSN 1946-052X, 2011, Vol. 3, No. 1: E8.

Norman, G.R. (2003). Health Measurement Scales: A practical guide to their development and use. Oxford University Press.

Noor, A.S. (2011). Audit Quality in Practice: A Study of Perceptions of Auditors, Audit Committee Members and Quality Inspectors, Manchester Business School, 2011

OFAG,(2017). The Office of Federal Auditor of Ethiopia IT Audit Mannual.

Panwar, S.M. et al. (2014). WGITA – IDI Handbook on IT Audit for Supreme Audit Institutions, IDI, February, 2014

Rahel, A. (2016). Capital Investment Decisions on Information Technology and Its Impact on the Performance of Private Commercial Banks in Ethiopia.

Rahman, A.L. et al. (2014). Sustainability in Information Systems Auditing, European Scientific Journal September 2014 /SPECIAL/ edition Vol.3.

Ramen, M. and Jugurnath, B. (2015). UTR-CTOE: A New Paradigm Explaining CAATs Adoption, Journal of Modern Accounting and Auditing, December 2015, Vol. 11, No. 12, 615-631

Remus, U., & Wiener, M. (2009). Critical success factors for managing offshore software development projects . Journal of Global Information Technology Management, 12 (1), 6-29.

Richard et al., 2005. GTAG- Global Technology Audit Guide, Information Technology Controls, IIA-The Institute of Internal Auditors, March, 2005

Robert, G. (2010). Business Skills for the Information Technology Audit and Assurance Professional, ISACA Journal Volume 3, 2010

Rotim, T.S. and Komnenić, V. (2008): Improvement of Business and IT Alignment through IT Internal Audit

Samelson, D. et al. (2006). The Determinants of Perceived Audit Quality and Auditee Satisfaction in Local Government. J Public Budg Acc Finan Manage 2006;18:139–66.

Shivaram, R. and Suraj, S. (2015). Measuring Audit Quality

Siew, E.G. et al. (2017). Factors affecting IT Audit Quality: an Exploratory Study, School of Business, Monash University Malaysia, Jalan Lagoon Selatan, Bandar Sunway, Petaling Jaya, Selangor, Malasia, Vol. 2017 (2017), Article ID 802423.

Singleton, T. (2014). The Core of IT Auditing: ISACA Journal Volume 6, 2014

Sobers, M. et al., (2018). Delotti: 2018 Hot Topics for IT internal audit in financial services: An Internal Audit view point

Solomon, K., (2016). Factors Affecting Quality of External Auditing: The Case of Ethiopian Commercial Banks.

Stoel, D., et al. (2012). An Analysis of Attributes that Impact Information Technology Audit Quality: A study of IT and financial audit practitioners, International Journal of Accounting Information Systems 13 (2012) 60–79.

Vihar, P. (2014). Information Technology and Systems Audit, The Institute of Company Secretaries of India, Module 2, Paper 4

Vivien, B. et al. (2010). Factors Affecting Audit Quality in the 2007 UK Regulatory Environment, Perceptions of Chief Financial Officers, Audit Committee Chairs and Audit Engagement Partners.

Wagner, J.H. (2001). Information System Auditing and Electronic commerce

Walker, J.L. (2015). Continuous IT System Auditing

Wiley, J. (2007). Auditor's Guide to Information Systems Auditing

William, B. et al. (2013). IT Auditing and Application Controls for Small and Mid-Sized Enterprises: Revenue, Expenditure, Inventory, Payroll, and More, ISBN: 978-1-118-07261-5

Yahya Hasas Yeghaneh, Y.H. et al. (2015). Factors Affecting Information Technology Audit Quality, Journal of Investment and Management. Vol. 4, No. 5, 2015, pp. 196-203. doi: 10.11648/j.jim.20150405.19

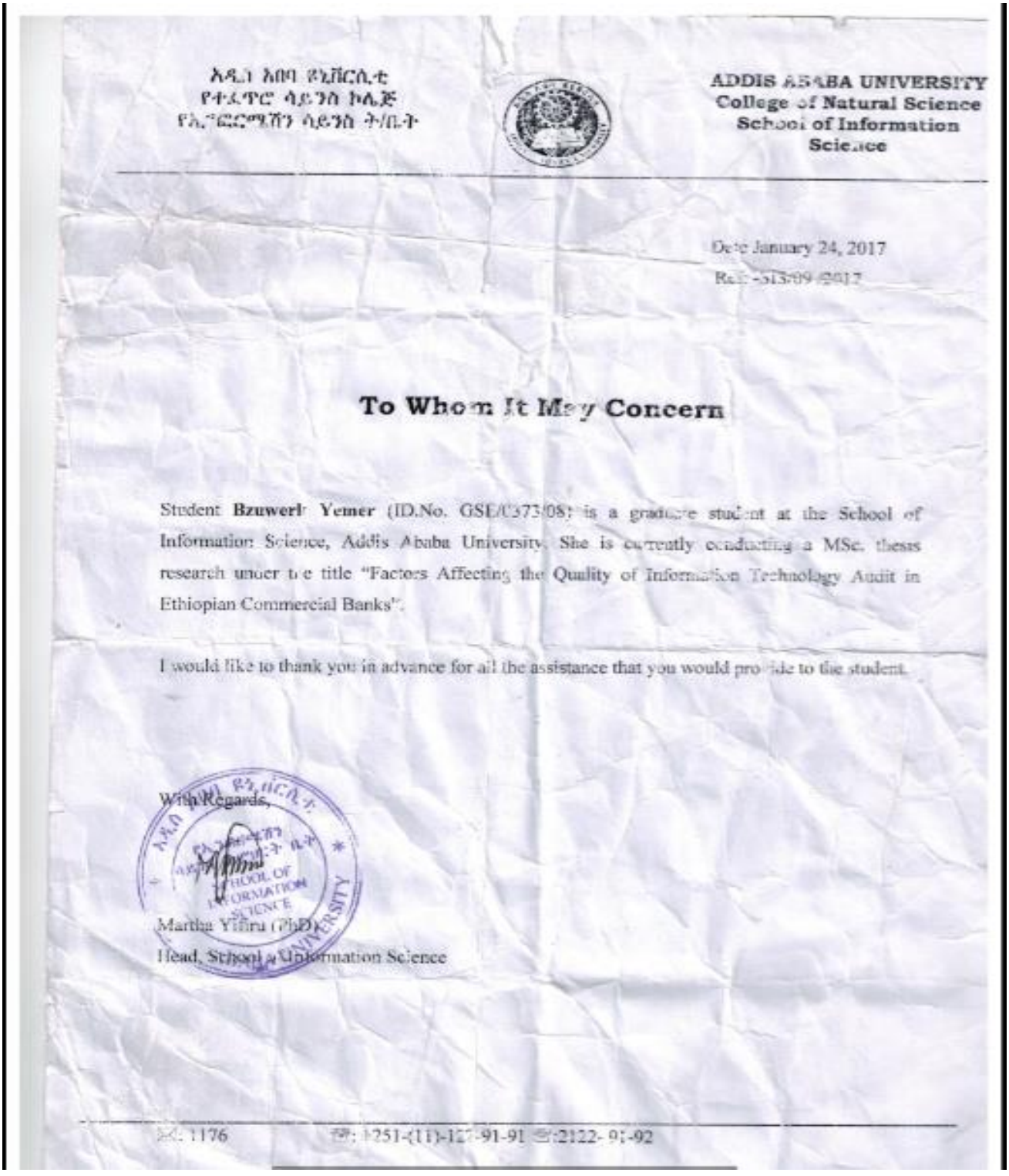
Yahya, H.Y., et al. (2015). Factors Affecting Information Technology Audit Quality. Journal of Investment and Management, 4(5): 196-203, Published online August 11, 2015 (http://www.sciencepublishinggroup.com/j/jim).

Yared, B. (2016). Factors Affecting Knowledge Sharing for Entrepreneurial Development: The Case of Micro and Small Enterprises Engaged in Manufacturing in Addis Ababa, October, 2016

Yudistira, Y. (2012). COBIT 5: A Business Framework for the Governance and Management of Enterprise IT, 2012 (ISACA, 2012)

APPENDICES

Appendix A: Letter of Request



አዲስ አበባ ዩኒቨርሲቲ
የተፈጥሮ ሳይንስ ኮሌጅ
የኢንፎርሜሽን ሳይንስ ትምህርት

ADDIS ABABA UNIVERSITY
College of Natural Science
School of Information Science

Date January 24, 2017
Ref: -513/09/2017

To Whom It May Concern

Student **Bzuwerk Yemer** (ID.No. GSE/0373/08) is a graduate student at the School of Information Science, Addis Ababa University. She is currently conducting a MSc. thesis research under the title "Factors Affecting the Quality of Information Technology Audit in Ethiopian Commercial Banks".

I would like to thank you in advance for all the assistance that you would provide to the student.

With Regards,

Martha Yifiru (PhD)
Head, School of Information Science

SCHOOL OF INFORMATION SCIENCE

ቁ: 1176 ስ.ሳ: 1251-(11)-127-91-91 ፋክስ:2122-91-92

Appendix B: Questionnair Survey

Addis Ababa University
College of Natural Sciences
School of Information Sciences
Survey Questionnaire

Dear Participants

The name of the researcher is BZUWERK YEMER, who is currently MSc student in department of Information Science at Addis Ababa University. The aim of this project is to assess the factors that affect the IT audit quality in commercial banks in Ethiopia. The information collected from this survey questionnaire will be used to build a better understanding of what influences IT audit quality.

The participation in this survey is totally voluntary. The investigator respectfully requests your kind cooperation in answering the whole question as frankly as possible. Your response is anonymously and strict confidentiality will be maintained. Your participation in this survey is greatly appreciated.

For further information, please contact the researcher using the following address:

Tel. (mobile): **+251-911-742419**

E-mail: **yemerbzuwerk@gmail.com**

February 2018

Section 1 - Please provide some background information about yourself by ticking the most appropriate box in each of the following questions.

1. **Age:** ☐ 18-35 ☐ 36-45 ☐ 46-61 ☐ above 61
2. **Gender:** ☐ Female ☐ Male
3. **Level of education:** ☐ Diploma level ☐ Bachelor's Degree Level ☐ Masters Level ☐ PhD
4. **How long have you worked in the organization?**
   - ☐ Less than 2 years ☐ 2-5 years
   - ☐ 6-10 years ☐ More than 10 years

5. What is your overall experience in IT/IS auditing practice?

☐ Less than 5 years ☐ 5 to 10 years

☐ 11 to 15 years ☐ More than 10 years

Section 2: The following are referring to possible attributes of an audit which could reflect the IT audit quality. Please indicate your personal view and agreement of the quality of IT audit in your company in terms of the following attributes by circling the scale 1: Strongly Disagree (SD), 2: Disagree (D), 3: Neutral (N), 4: Agree (A), 5: Strongly Agree(SA). Please circle only one response per statement:

IT/IS Audit Quality						
	Attributes	**SD**	**D**	**N**	**A**	**SA**
1	The IT/IS audit is carried out in accordance with auditing and ethical standards.	**1**	**2**	**3**	**4**	**5**
2	Risk-based audit approach is used to develop IT audit universe.	**1**	**2**	**3**	**4**	**5**
3	The IT/IS audit is adequately planned.	**1**	**2**	**3**	**4**	**5**
4	Sufficient resources and timeframe exist to meet IT/IS audit objectives and scope.	**1**	**2**	**3**	**4**	**5**
5	Auditee understands the audit process and purpose of the IT/IS audit.	**1**	**2**	**3**	**4**	**5**
6	IT/IS audit team members are technically competent.	**1**	**2**	**3**	**4**	**5**
7	IT/IS audit team has good communication skills (oral and written).	**1**	**2**	**3**	**4**	**5**
8	IT/IS audit team members are independent.	**1**	**2**	**3**	**4**	**5**
9	Every audit steps are reviewed by senior IT/IS audit management.	**1**	**2**	**3**	**4**	**5**
10	The IT/IS audit team members established audit findings based on relevant and sufficient evidence.	**1**	**2**	**3**	**4**	**5**
11	The IT/IS audit report is presented to the auditee management.	**1**	**2**	**3**	**4**	**5**
12	The IT/IS audit team members maintain a high level of documentation in the completed audit files.	**1**	**2**	**3**	**4**	**5**
13	The Overall perception of IT/IS audit quality in the company is high.	**1**	**2**	**3**	**4**	**5**

Section 3: The following statements refer to possible factors and their attributes of an audit which could reflect IT audit quality. Please indicate your personal view of the importance of each statement for IT audit quality by circling one number on the scale 1: Strongly Disagree (SD), 2: Disagree (D), 3: Neutral (N), 4: Agree (A), 5: Strongly Agree (SA).

Factors and their Attributes		SD	D	N	A	SA
Auditors IT knowledge and competencies Factor						
1	IT/IS Audit team needs specialized IT professional qualifications and certification.	**1**	**2**	**3**	**4**	**5**
2	IT/IS audit team need to have knowledge about IT and information systems	**1**	**2**	**3**	**4**	**5**
3	IT/IS audit team need to have knowledge about CAAT (Computer-assisted auditing tools)	**1**	**2**	**3**	**4**	**5**
4	IT/IS audit team need to have knowledge about the risks associated with IT use	**1**	**2**	**3**	**4**	**5**
Auditors IT Control knowledge Factor						
5	IT/IS Audit team members need to have knowledge about business processes and internal controls	**1**	**2**	**3**	**4**	**5**
6	IT/IS Audit team members need to have knowledge about IT governance.	**1**	**2**	**3**	**4**	**5**
7	IT/IS Audit team members need to have knowledge about information security.	**1**	**2**	**3**	**4**	**5**
8	Audit team members need to have knowledge about application controls (Input, processing, output, master data file and application security controls).	**1**	**2**	**3**	**4**	**5**
Target System Complexity Factor						
9	The IT/IS audit team has to audit geographically and culturally dispersed business units and processes.	**1**	**2**	**3**	**4**	**5**

10	The IT/IS audit team has to audit a number of business units, processes, or systems.	**1**	**2**	**3**	**4**	**5**
11	The auditee has to provide competent support to assist in data gathering.	**1**	**2**	**3**	**4**	**5**
12	The auditee's organizational standards, processes and the system have to be well defined and documented.	**1**	**2**	**3**	**4**	**5**
Audit procedure and Methodology Factor						
13	The audit needs to be adequately planned.	**1**	**2**	**3**	**4**	**5**
14	The IT/IS audit team needs to utilizes a robust audit methodology to plan and manage the audit.	**1**	**2**	**3**	**4**	**5**
15	Risk-based audit approach is needed to develop audit plan.	**1**	**2**	**3**	**4**	**5**
16	IT/IS audit manager has to be active in planning and conducting the audit	**1**	**2**	**3**	**4**	**5**
17	Audit objectives, scope and plan has to be documented and agreed by auditee and audit team.	**1**	**2**	**3**	**4**	**5**
18	Frequent communication need between audit manager and senior management.	**1**	**2**	**3**	**4**	**5**
Auditing Skill Factor						
19	IT/IS audit team has to develop and execute an audit plan.	**1**	**2**	**3**	**4**	**5**
20	IT/IS audit team has to prepare and use checklists.	**1**	**2**	**3**	**4**	**5**
21	IT/IS audit team has to document audit findings and evidences.	**1**	**2**	**3**	**4**	**5**
22	IT/IS audit team needs to have oral and written skills.	**1**	**2**	**3**	**4**	**5**
Resource Availability Factor						
23	Computer-assisted auditing tools (CAATs e.g. ACL) need to be used for testing and analysis.	**1**	**2**	**3**	**4**	**5**
24	There should be enough time to conduct the IT/IS audit.	**1**	**2**	**3**	**4**	**5**

25	There should be enough budgets allocated to conduct the IT/IS audit.	**1**	**2**	**3**	**4**	**5**
26	There should be enough audit staff to conduct the IT/IS audit in meeting the dateline.	**1**	**2**	**3**	**4**	**5**

Thank You!!!

Appendix C: Interview Questions

Addis Ababa University
College of Natural Sciences
School of Information Sciences

This interview contains questions reflecting IT audit practices and IT audit. Please describe your personal view and agreement of the quality of IT audit

1. In conducting an IT audit, what is necessary for high quality IT audits?
2. Do you think that IT knowledge and skills (specific Software or Hardware Skills) are required for conducting an IT audit and why?
3. Do you think that IT risks and controls knowledge is required for conducting an IT audit and why?
4. Do you think that Auditing skills are required for conducting an IT audit and why?
5. How do you think that Target system complexity affects the quality of IT audit?
6. How do you think that proper audit procedure and methodology and availability of resources are required for conducting an IT audit?
7. Do you think that Availability of resources is required for conducting an IT audit and why?
8. What factors are the most critical for conducting quality of IT Audit and why?
9. Is there anything that you would like to add or you feel we didn't cover about internal audit quality?

Thank You!!!