

ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES

SCHOOL OF INFORMATION SCIENCE

IT AUDITING AND ENTERPRISE GOVERNANCE OF IT MECHANISMS IN THE BANKING INDUSTRY OF ETHIOPIA

By:

BINIAM GEDLIE

JUNE, 2018

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

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Advisor: TIBEBE BESHAH (PhD)

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Declaration

This thesis has not previously been accepted for any degree and is not being concurrently submitted in candidature for any degree in any university.

I declare that the thesis is a result of my own investigation, except where otherwise stated. I have undertaken the study independently with the guidance and support of my research advisor. Other sources are acknowledged by citations giving explicit references. A list of references is appended.

Signature: _____

BINIAM GEDLIE

This thesis has been submitted for examination with my approval as university advisor.

Advisor's Signature: _____

TIBEBE BESHAH (PhD)

Dedication

This thesis is dedicated to my beloved wife Bethlehem Moges and our gorgeous daughter Bersabeh Biniam, who inspire me in every moment of my life!

Acknowledgement

All praise, honor and glory are Yours, Almighty God!

I would like to express my deepest appreciation toward my research advisor, Tibebe Beshah (PhD), for his constructive comments, guidance, academic advice and mentorship. His positive outlook and confidence in my study encouraged me greatly to complete this thesis.

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Abstract

The digital world phenomenon creates both tremendous benefits and unprecedented risks across the business enterprise. Hence, measuring the current performance of IT Auditing and Enterprise Governance of IT practices becomes crucial. Prior studies have revealed that IT governance performance of firms was strongly and positively correlated with overall performance of firms. However, IT auditing practices were not rigorously designed and implemented in their studies as well.

This study mainly focused on investigating the influence of IT Auditing and Enterprise Governance of IT Mechanisms on Firm Performance in the Banking Industry of Ethiopia. Quantitative methods of data collection and analysis have been used. The primary data were collected from nine commercial banks using a survey. A total of 85 questionnaires were distributed, 68 (80%) of the respondents were returned.

The finding of the study indicates that there were strong and positive correlations between the constructs of both IT Auditing and EGIT Mechanisms, and their influence on EGIT Performance. Regardless, IT Audit Quality has positive and strong correlation to IT Auditing than the role of IT Auditors. Similarly, EGIT Structures and Relational Mechanisms have positive and strong correlation to EGIT Mechanisms. However, in this research, EGIT Processes were not statistically significant when compared to the other latent variables of EGIT Mechanisms. Overall, EGIT performance of firms was strongly and positively correlated with firm performance.

As key findings of this research, both IT Auditing and EGIT Mechanisms have positive influence on EGIT Performance. Consequently, Enterprise Governance of IT performance significantly and positively improves firm performance, and is a most worthy consideration for such firms. Finally, the researcher recommends to execute the proposed framework as a point of reference and for the firms to benefit from the IT auditing and EGIT model for mitigating some of the risks they face. Undoubtedly, further studies will expand the scope of this research in other IT/IS intensive sectors such as Insurance, Manufacturing, Aviation and Telecom.

Key words: Enterprise Governance of IT, IT Auditing, Firm performance, financial industry

Contents

Declaration iii

Dedication iv

Acknowledgement v

Abstract vi

List of Tables xi

List of Figures xii

List of Abbreviations xiii

CHAPTER ONE 1

Introduction 1

1.1. Background 1

1.2. Research Motivation 3

1.3. Statements of the problem 3

1.4. Objectives of the Study 5

1.5. Significance of the Study 5

1.6. Scope and Limitations of the Study 6

1.7. Organization of the thesis document 6

CHAPTER TWO 8

Literature review 8

2.1. Introduction 8

2.2. From IT Governance to Enterprise Governance of IT 8

2.3. Enterprise Governance of IT 8

2.4. Enterprise Governance of IT Mechanisms 9

2.4.1. Structures for Enterprise Governance of IT 9

2.4.2. Processes for Enterprise Governance of IT 9

2.4.3. Relational Mechanisms for Enterprise Governance of IT 9

2.5. Principles for Enterprise Governance of IT 10

2.6. Enterprise Governance of IT Frameworks 11

2.6.1. COBIT 11

2.6.2. ITIL 12

2.6.3. ISO/IEC 38500:2015 12
2.6.4. COSO 12
2.7. Principal Domain Areas of EGIT 13
2.8. IT Governance vs IT Management 15
2.9. IT Auditing 15
2.9.1 Role of IT Auditors 16
2.9.2 IT Audit Quality 17
2.9.3 IT Auditing and Enterprise Governance of IT performance 17
2.10 EGIT performance and EGIT mechanisms 18
2.11 Firm Performance 18
2.11.1 Firm Performance and IT Auditing 19
2.11.2 Firm Performance and EGIT Mechanisms 19
2.11.3 Firm Performance and Enterprise Governance of IT performance 19
2.12 Related works 20
2.13 The Conceptual Framework for the Study 24
2.14 Hypothesis Development 25
2.15 Research Hypotheses 31
2.16 Chapter Summary 35
CHAPTER THREE 36
Research Design and Methodology 36
3.1 Introduction 36
3.2 Research Philosophy 36
3.2.1 Interpretivism 36
3.2.2 Positivism 37
3.3 Research Design 38
3.4 Population and Sampling of the Study 38
3.5 Data Collection Technique and Approaches 40
3.5.1 Questionnaire 40
3.5.2 The Questionnaire Development 41
3.6 Data Analysis Technique and Approaches 42

3.7 Validity and Reliability of the Research 42
3.8 Research Variables 43
3.9 Chapter Summary 43
CHAPTER FOUR 44
Data Analysis, Result and Findings 44
4.1 General Background Information 44
4.2 Data Screening and Missing Data 44
4.3 Demographic Data of the respondents 45
4.4 Evaluation of Measurement Model 46
4.4.1 Validity and Reliability of Survey Instrument 47
4.4.2 Composite reliability 48
4.4.3 Convergent validity 50
4.4.4 Discriminant validity 51
4.4.5 Coefficients of determination (R^2) 53
4.4.6 Assessment of predictive Relevance (Q^2) 54
4.4.7 Variance Inflation Factor (VIF) 54
4.5 Hypotheses testing 55
4.6 Size and significance of path coefficients 57
4.7 Discussion of Findings 59
4.7.1 **The Influence of IT Auditing on EGIT Performance** 59
4.7.1.1 The Influence of Role of IT Auditor on IT Auditing 59
4.7.1.2 The Influence of IT Audit Quality on IT Auditing 60
4.7.1.3 The Influence IT Auditing has on EGIT Performance 60
4.7.2 The Influence of EGIT Mechanisms on EGIT Performance 61
4.7.2.1 The Influence of EGIT Structures on EGIT Mechanisms 61
4.7.2.2 The Influence of EGIT processes on EGIT Mechanisms 62
4.7.2.3 The Influence of EGIT Relational Mechanisms on EGIT Mechanisms 62
4.7.2.4 The Influence EGIT Mechanisms on EGIT Performance 63
4.7.3 The Influence of EGIT Performance on Firm Performance. 64
4.7.4 Discussion in light of research questions 65

4.8 Summary 66
Chapter Five 67
Conclusions, Recommendations and Directions for Future 67
5.1 Conclusions 67
5.2 Contribution of the Study 68
5.3 Recommendations for Future Research 70
References 71
Appendix A: Sampling frame of the study 76
Appendix B: Population of target respondents from nine commercial banks. 77
Appendix C: Outer loading value 78
Appendix D: Questionnaire 79
Appendix E: Supporting Letter 86

List of Tables

Table 1: Summary of Related Works 34

Table 2: A five-point Likert scale responses ranging from 1 to 5. 41

Table 3: Summary of the instruments used in the questionnaire 42

Table 4: Demographic data of the respondents 45

Table 5 Reliability Test 48

Table 6 : Reliability and Validity Test 48

Table 7: Average Variance Extracted (AVE) values 51

Table 8: Fornell-Larcker Criterion 52

Table 9: R-Square and R-Square Adjusted value 53

Table 10: Predictive relevance (Q^2) values 54

Table 11: Collinearity Statistics (VIF) values 55

Table 12: T-value and p-value 56

Table 13: Total path coefficients 57

List of Figures

Figure 1: Structures, processes and relational mechanisms for Enterprise Governance of IT [7]..... 10

Figure 2: IT governance and IT management [13]. 15

Figure 3: The proposed conceptual framework 25

Figure 4: Composite reliability 49

Figure 5: Average Variance Extracted (AVE) 50

Figure 6: Path Estimation 57

Figure 7: Path model 58

List of Abbreviations

ATM	Automated Teller Machine
CIO	Chief Information Officer
CIS	Computerized Information Systems
COBIT	Control Objectives for Information and related Technology
CORE	Centralized Online Real-Time Exchange
COSO	Committee of Sponsoring Organizations
E-banking	Electronic Banking
EGIT	Enterprise Governance of Information Technology
ICT	Information and Communication Technology
IS	Information Systems
ISACA	Information Systems Audit and Control Association
ISO/IEC	International Organization for Standardization and International Electrotechnical Commission
IT	Information Technology
IT BSC	Information Technology Balanced Scorecard
ITG	Information Technology Governance
ITIL	Information Technology Infrastructure Library
NBE	National Bank of Ethiopia
POS	Point of Sale
PLS-SEM	Partial Least Squares Structural Equation Modeling
SPSS	Statistical Package for the Social Sciences
WTO	World Trade Organization

CHAPTER ONE
Introduction

1.1. Background

The digital world phenomenon creates both tremendous benefits and unprecedented risks across the business enterprise [1]. Nowadays, almost all modern enterprises are highly dependent on Information Technology (IT) for their day-to-day business operations [2] [3]. IT is among the main capital investments and operating expenditures being made by enterprises [4] and a core competitive and strategic competency for most enterprises [5].

According to Haes et al. [6], the significance of IT for enterprise risk management and value generation, with a specific focus on Enterprise Governance of IT (EGIT), has risen over the last two decades. Enterprises are progressively making tangible and intangible investments in enlightening enterprise governance of IT [6]. Control Objectives for Information and related Technology (COBIT) is developed by ISACA (Information Systems Audit and Control Association), which provides a comprehensive framework that assists enterprises to achieve their objectives for the governance and management of enterprise's IT [7]. IT also often entails large capital investments in organizations [8] and supports the evolution of firm's architecture [9]. Hence, governance in the IT domain has the implication of keeping IT processes under control [4]. In particular, the pervasiveness, complexity, and rapidly changing nature of IT have changed the knowledge and experience required to govern an organization [10].

Studies both at company and country levels have shown that ICT is positively related to corporate and national economic performance [11]. The long-term survival of firms is closely related to their ability of successfully managing IT in today's rapidly changing business environment [12]. Information technologies have considerably changed the bank business model and the types of risks to which banks are exposed; but have also increased lawmakers' focus on IT controls [13]. In recent times, there has been a change in banking delivery channel towards online banking service [14]. Financial institutions have understood that poor information system has an influence on every aspect of their performance, from operational effectiveness to strategic management [11]. They have also

realized the need to ensure that the banks' strategies and objectives and the related IT risks are properly managed [13].

As of September 2017 there were 18 (i.e., 16 private and 2 public) banks operating in Ethiopia. During the 2016/2017 fiscal year, 204 new bank branches were opened, and raising the total number of bank branches to 4,461 of which 67.5 percent were private banks. Consequently, total capital of the banking system reached Birr 80.2 billion, of which public banks accounted for 64.2 percent and private banks 35.8 percent. Meanwhile, the share of Commercial Bank of Ethiopia, the biggest state-owned bank, in total capital of the banking system, was 54.7 percent [15].

According to D'Onza et al. [13], financial institutions should strengthen the security controls of their e-banking activities to protect their information confidentiality and to protect banks from legal and negative reputational consequences. Moreover, business operations in the banking sector have benefited from computerized information systems (CISs) for strengthening their competitiveness [11]. Currently, all commercial banks in Ethiopia use CORE banking system and IT based financial services such as ATM, Mobile banking, POS, Internet Banking, and Electronic Fund Transfer [16]. However, isolating CISs from the business of the banks has become impossible [11]. Take, for example, customers by themselves could perform banking activity in anytime and anywhere using computerized information systems [14].

Many in the financial industry are familiar with the purpose of traditional or financial auditing; but when it comes to IT/IS auditing, the majority would be clueless [17]. According to Gartner Group [18], worldwide IT spending is projected to a total of $3.7 trillion in 2018, showing a 6.2 percent increase from 2017. This dependence on IT entails a requirement of an increased level of assurance so that these systems deliver what they promise. IT audits are widely used internally to inspect the operations, effectiveness, controls and security of critical systems to identify opportunities for improvement and areas of weakness [19]. The main objective of an IT audit is to determine with a certain level of confidence that an information system is working properly, e.g., that it processes inputs into outputs correctly, that only authorized individuals can access specific data and execute specific programs, and that data are stored correctly and securely [20].

Besides, most organizations use the Committee of Sponsoring Organizations (COSO) Internal Control Framework as a benchmark for assessing the effectiveness of their internal controls including their control environment, helping companies to detect and prevent errors in the internal controls system [5]. Some firms are still vulnerable to numerous internal and external threats. One noticeable internal threat is employee fraud. IT Auditing's function has to do with how organizations monitor, prevent, and detect fraud. Furthermore, there is the need to combat fraud in IT Auditing to ensure the reliability, effectiveness and integrity of the banks'-computerized information systems [13] [21].

1.2. Research Motivation

This research motivated by almost all the business transactions are carrying out through Information Systems (IS), which increase the business and financial risk and organization are showing their more concern to reduce and mitigate these threats [22] [23]. The digital world phenomenon, on the one hand, offers tremendous benefits, but on the other, it also creates significant and unprecedented risks [1].

This study is also motivated by in Ethiopia banking industry of IT Auditing practice are limited studies, most people are familiar with the purpose of traditional or financial auditing and majority would be clueless [24]. As many modern business processes are automated and business and accounting data today is kept and processed using increasingly complex information systems, the information systems themselves become an important element of any audit.

This research is also motivated by the argument that EGIT Mechanism being one key resources that improve organizational performance and competitive advantage and the creation of business value from IT-enabled business investments [7]. Therefore, this research was carry out to the foundational theoretical framework that can be used in future empirical researches who might be interested to work in a related topic.

1.3. Statements of the problem

Kuhn and Morris [25] mentioned that IT governance and auditing has now been brought to the head of every executive in charge of publicly reporting the financial results of their organization. In

the Ethiopian financial industry, there is anecdotal evidence (evidence that is obviously known but not well documented through empirical studies) showing both negative and positive magnitudes of IT Audit and IT Governance (ITG) practices [26].

ITG helps facilitate the integration of IT resources with other organizational resources, leading to improved competitive advantages [27]. Contrarily, lack of effective ITG may lead to inability to comply with regulatory requirements, delivery of poor quality in IT product/service, weakened competitive position and lower customer satisfaction [16]. Another key issue in ITG, according to Ghildyal et al. [28], is stated as a lack of effective IT governance and control which has led to poor services of quality, and employee and customer satisfaction. Hence, ITG continues to be a challenge for key decision makers of many firms [25].

When it comes to IT Auditing, increasing significance has stimulated a call for additional research to analyze its characteristics and the contribution it makes to improving corporate information technologies [13]. In business organizations, to perform an IT audit efficiently and effectively, firms must make appropriate decisions regarding the scope, resources (e.g., personnel or computer-automated audit tools), tasks or activities to be performed, methods, techniques, and other "inputs" to the IT audit process [19].

Investments in IT are rising broadly and business managers often worry that the benefits of IT investments might not be as high as expected. The same worry accounts for the perceived ever-increasing total cost of the IT department, without clear evidence of the value driven from it [7]. Take, for example, that project failures, wasted investment, security breaches, system crashes, and the impact of downtime in the banking sector environment have become far too costly for any organization these days, in the way of doing business [8]. The banking customer inclines to undertake that there is uncertainty in performing online transactions in terms of security, functional defect, etc [14].

Tagele [16] did a research with the aim to investigate maturity of IT Governance in the financial sector of Ethiopia in terms of IT Governance Structure, Processes and Relational Mechanisms. However, in his research investigation, he did not address and empirically test, IT Auditing and its factors (IT Audit Quality and the Role of IT Auditors), and thus has not studied their influences on firm performance.

On a recent research, Mengistu [26] has studied under the title "Auditing IT and IT Governance in Ethiopia," indicating that IT governance performance of firms was strongly and positively correlated with overall performance of firms. However, IT auditing practices were not rigorously designed and implemented in this study as well. In addition, he did not include and examine in his research a study of IT Audit Quality and the Role of IT Auditors that have influence on firm performance. Therefore, research in this field is scarce and the researcher believes that additional research in this area is required.

The research questions identified to be addressed in this study are:

1. How are IT Auditing and EGIT Performance related?
2. How are EGIT Mechanisms and EGIT Performance related?
3. How does EGIT Performance affect Firm Performance?

1.4. Objectives of the Study

The general objective of this study is to examine the influence of IT Auditing and Enterprise Governance of IT Mechanisms on Firm Performance in the Banking Industry of Ethiopia.

Specific objectives of the study include:

- examine IT Audit Quality in IT Auditing;
- examine the role of IT Auditors in IT Auditing;
- identify the role of IT Auditing in EGIT performance;
- investigate the role of EGIT Mechanisms in EGIT performance;
- investigate the relationship of IT Auditing and EGIT Mechanisms and their role in EGIT performance; and
- identify the role of Enterprise Governance of IT Performance in Firm Performance.

1.5. Significance of the Study

This research is significant for several reasons. First, the National Bank of Ethiopia (NBE) can use its findings as an input to introduce IT Auditing and Enterprise Governance IT practices into the financial industry of Ethiopia.

Second, the study results also provide board of directors, senior executive managers, CIOs and IT Audit managers with new insights that can use EGIT and IT Auditing as corporate strategic positions for better organizational performance and competitive advantage.

Third, this empirical research could be used as a reference and starting point for any researcher to yield the relationship between IT Auditing and EGIT mechanisms influencing firm performance (both financial and non-financial) through EGIT performance, specifically in the banking industry. The research results should also help in mitigating risks of the banking firms so they might benefit from the IT auditing and EGIT model based on the appropriate theoretical framework.

Finally, the number of commercial banks in Ethiopia has shown a steady increase in recent years [15]. However, new banks seem to continue IT practices that have already been in place in the banks that existed before them. Hence, the inputs that can be found from this study, while the study remains to be done on the already existing and relatively easier to consider number of commercial banks, can be relevant and informative for the decision-making process of commercial banks yet to be opened in the future, in the area of Enterprise Governance of IT and IT Auditing practices.

1.6. Scope and Limitations of the Study

The scope of this research study is to investigate Enterprise Governance of IT and IT Auditing in the banking industry of Ethiopia. Due to time, budget and other limitations, the researcher focused only on commercial banks in Ethiopia. Development Bank, Micro-Finance and Insurance institutions are out of the scope of this study. This study was a specific focus on IT Auditing and Enterprise Governance of IT practices for the commercial banking industry. However, its practices are crucial to all forms of institutions.

1.7. Organization of the thesis document

This thesis is organized as follows:

Chapter One presents an overview, statement of the problem with research questions, the general and specific objective of the study, significance of the research and scope and limitations of the study.

Chapter Two is literature review on theoretical and empirical researches presented. This chapter also presents the conceptual framework of the study and hypothesis development.

Chapter Three is dedicated to provide details on the research design and methodology, research philosophy, sampling, data collection procedures, data analysis techniques and the data validation a process.

Chapter Four is engaged in the presentation of the findings and results. This chapter also presents evaluation of measurement and structural which detail the reliability and validity tests presented, discriminant validity, predictive relevance, coefficient of determination, average variance extracted, variance inflation factor and significance test (t-value and p-value). The research questions are answered and the eight hypotheses tested are discussed by comparing and contrasting results with the existing literature.

Chapter Five provides the conclusion of the study, contribution of the study, limitations of the study and recommendations for future study based on the findings of the research are also outlined in this chapter.

CHAPTER TWO
Literature review

2.1. Introduction

The literature which is reviewed in this chapter is about the relationship between IT Auditing and Enterprise Governance of IT Mechanisms on firm performance. Hence, in this chapter, studies conducted specifically both international and local have been reviewed and presented. The literature which relates to the conceptual understanding of IT Auditing and Enterprise Governance of IT, in terms of its definition, theories, characteristics and types is presented. The literature review also extends to cover the conceptual understanding about firm performance.

2.2. From IT Governance to Enterprise Governance of IT

According to Grembergen and Haes [8], the concept of IT governance discussion mainly stayed as a discussion within the IT area, while Enterprise Governance of IT has an added focus on business involvement. Both EGIT and ITG share a similar concept, but EGIT emphasizes the involvement and responsibility of the business side rather than the technical side [26]. Moreover, EGIT clearly goes beyond the IT-related responsibilities and expands towards business processes needed for business value creation [8]. IT governance is an essential part of enterprise governance. Organizations can and are deploying enterprise governance of IT by using three types of IT governance mechanisms; namely, structures, processes, and relational mechanisms [7] [29].

2.3. Enterprise Governance of IT

Grembergen and Haes [8] define Enterprise Governance of IT as

> *"an integral part of corporate governance and addresses the definition and implementation of processes, structures and relational mechanisms in the organization that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT-enabled business investments."*

2.4. Enterprise Governance of IT Mechanisms

2.4.1. Structures for Enterprise Governance of IT

Enterprise governance of IT structures: The most visible EGIT mechanisms include organizational units and roles responsible for making IT decisions and for enabling contacts between business and IT management decision-making functions (e.g., IT steering committee, executive teams, and business/IT relationship managers). This can be seen as a kind of blueprint of how the EGIT of IT framework will be structurally organized [7] [29].

2.4.2. Processes for Enterprise Governance of IT

Enterprise governance of IT processes refers to the formalization and institutionalization of strategic IT decision-making, IT management techniques [2] and IT monitoring procedures, to ensure that daily behaviors are consistent with policies and provide input back to decisions (e.g., IT performance management, portfolio management, IT alignment/governance maturity models, Service Level Agreements (SLA), COBIT, ITIL, and IT BSC) [7] [10]. These also include IT investment proposal, architecture exception processes and Strategic Information System Planning [29].

2.4.3. Relational Mechanisms for Enterprise Governance of IT

The relational mechanisms or capabilities (the third element of the EGIT Mechanisms) are ultimately about IT leadership and collaborative relationship among, corporate executives, IT management and business management [2], and include job-rotation, announcements, advocates, channels, and education efforts [7]. In addition, EGIT relational mechanisms ensure synergy between business and IT [2].

Jewer and McKay [10] stated also that relational mechanisms which are incorporate with active participation and collaboration between principle stakeholders, partnership rewards and incentives, Business/IT co-location, Cross-functional business/IT training and rotation. Relational mechanisms are crucial in the Enterprise Governance of IT framework and are paramount for attaining and sustaining business–IT alignment, even when the appropriate structures and processes are in place [8].

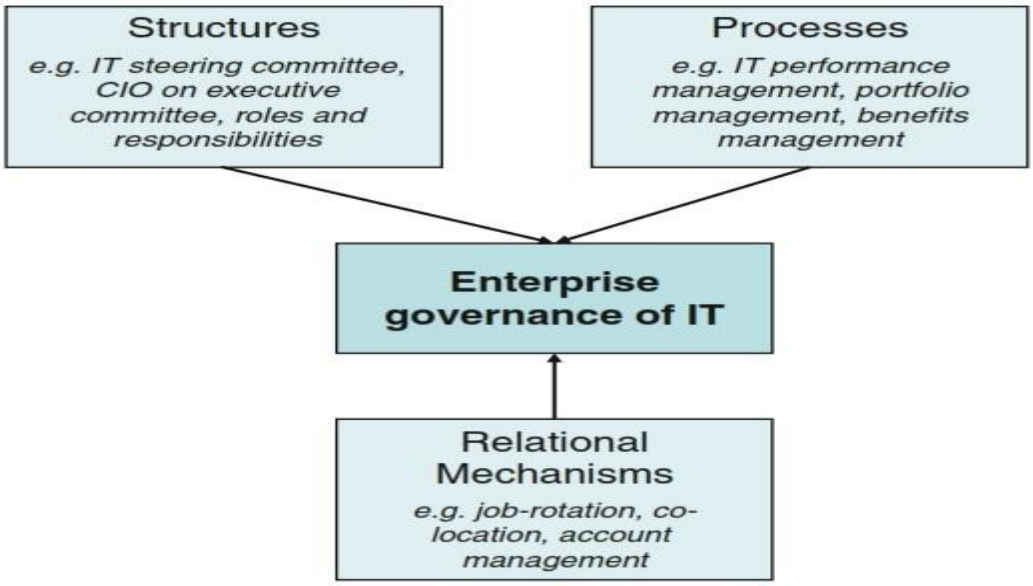


Figure 1: Structures, processes and relational mechanisms for Enterprise Governance of IT [7]

2.5. Principles for Enterprise Governance of IT

These enterprise governance of IT principles clearly depict how business and IT need to collaborate in the organization. EGIT principles are also often a good starting point to use as a reference when building enterprise governance of IT structures, processes, and relational mechanisms [7];

- IT is a professional organization that effectively and efficiently manages its resources in alignment with the needs of the organization.
- IT is the exclusive provider of IT services. Outsourcing is always organized in joint partnership between business and IT.
- IT is pro-actively engaged in further developing and innovating the organization.
- IT primarily develops and maintains competencies that are aligned to and required for supporting the expertise available in the organization.
- The priorities within IT are aligned to the strategic goals of the organizations through integrated planning cycles.
- All IT applications comply with rules and policies as mutually agreed upon by business and IT.
- IT is pro-actively engaged in reviewing and designing efficient business processes.

- IT and the business collaborate based on fixed agreements. Based on a scope definition, impact analysis and capacity reviews, both business and IT commit for timely delivery within quality requirements.
- There is transparency on the required service quality that IT has to deliver to the business, and this service quality is continuously monitored.
- Starting from the initial development of a new business project, the potential impact on IT needs to be analysed.

2.6. Enterprise Governance of IT Frameworks

There are numerous types of EGIT frameworks that have been developed, some motivated from a strategic point of views and others developed from tactical processes such as project management. To each has its strengths and weaknesses as well as the business and IT management must select the appropriate governance frameworks based on the unique needs of the business [30]. The most popular are COBIT, ITIL, ISO/IEC 38500 and COSO [31] [32], presented respectively.

2.6.1. COBIT

Control Objectives for Information and related Technology (COBIT) is developed by ISACA (Information Systems Audit and Control Association) and initially originated in the mid-90s out of the (financial) audit community. It was also initially developed as a framework for implementing IT Governance policies and procedures and for conducting IS auditing [7] [33].

Following prior studies [6] [26] [34] the current version COBIT 5 was developed with a specific focus of "Enterprise Governance of IT" rather than "IT Governance", which is now widely accepted in the international arena as best practice framework for governance of enterprise IT. COBIT 5 was released in April 2012 and divides IT into five domains, which are in turn broken down into 37 high level processes and 300 detailed IT controls [17]. It does cover both IT processes and IT-related business processes [7] [17]. Additionally, the use of COBIT 5 as a process align to business goals because COBIT 5 serve as a tool for Enterprise Governance of IT [35].

According to ISACA [22], "COBIT 5 provides a comprehensive framework that assists enterprises to achieve their objectives for the governance and management of enterprise IT. COBIT 5 enables IT to be govern and managed in a holistic manner for the whole enterprise, taking in the full end-to-end business and IT functional areas of responsibility considering the IT-related interests of internal and external stakeholders". The next section will give you an overview of ITIL, ISO 38500 and COSO.

2.6.2. ITIL

The main objectives of Information Technology Infrastructure Library (ITIL) are the IT Service Management (Delivery and support) put in place in order to guide IT people so they can provide IT services that meet the needs of business, which have been formalized as Service Level Agreements (SLA) [31]. Furthermore, ITIL delivers guidance and good practice for IT service providers for the execution of IT service management (ITSM) from the viewpoint of enabling business value. The main concept of ITIL is based on five pillars; namely customer focus (fundamental for managing IT services and enabling customer needs), the life cycle of service (which emphasizes on managing the full lifecycle of IT services), the concept of process, continuous improvement and communication [36].

2.6.3. ISO/IEC 38500:2015

ISO/IEC 38500 published by ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) in 2008 and revised in 2015, ISO/IEC 38500 is standard for corporate governance of IT and its ultimate objective is to “provide principles, definitions, and a model for governing bodies to use when evaluating, directing, and monitoring the use of information technology (IT) in the organizations” [31]. Furthermore, ISO/IEC 38500 is the standard for corporate governance of IT as it set in place as an advisory standard that provides a framework of principles for senior management and the Board of Directors to use while evaluating, directing and monitoring the use of IT in their organizations [34].

2.6.4. COSO

The COSO (Committee of Sponsoring Organizations) framework is one of the most widely adopted by firms for assessing internal control effectiveness. COSO has been issued in 1992 and updated in 2013 [32], and it is a general purpose corporate governance frameworks for a high degree of

abstraction and cover only issues of governance and organization [6]. Commonly, COSO is a process undertaken by the entity's board of directors/management in order to give a reasonable assurance for the fulfilling of the objectives within some specific category which are: effectiveness and efficiency of operations; reliability of financial reporting; compliance with applicable laws and regulations [30]. However, the COSO internal control framework contains some limited interpretation on the role of IT in maintaining internal controls [6].

2.7. Principal Domain Areas of EGIT

EGIT framework's focus area is one that supports the business, plus, adding value through IT component and IT risks minimization. IT Governance Institute (ITGI) and ISACA propose that IT Governance framework should cover five principal domain areas, which are; Business/IT strategic alignment, IT value delivery, Risk management, Resource management and Performance measurement [7] [26] [30] [31] [37]. These five domain areas are further explained below.

- **Business/IT strategic alignment:** This first domain of EGIT has the starting point in Designing an IT Strategy according with the overall strategy of the organization. The EGIT definition explicitly emphasizes that the outcome of EGIT is the alignment of information technology with the business. This also incorporates "the fit and integration among business strategy, IT strategy, business structures, and IT structures". At this time, business/IT alignment is measured by the approval of the IT operational plan and budget. IT strategic alignment is still a major concern of business executives as it involves how IT is aligned with the business, and how the business should or could be aligned with IT. IT strategic alignment also focuses on the activities that management performs to achieve cohesive goals across the IT and other functional organizations.

- **IT Value delivery**: IT value delivery is defined as "delivery on time, within budget and with the benefits that were promised". In the area of EGIT domain, IT value delivery is one of the main measurement challenges, the other one being business/IT alignment. In this area, the performance of a specific IT services group delivering to a specific business unit is measured. For each business unit, specific metrics are and/or will be defined. The ultimate responsibility

for achieving and measuring the business value of IT rests with the business and is reflected in the business results of the individual lines of business in different ways, depending on the nature of value being required. IT tactical plans, infra-structure (systems uptime), applications (degree of automation), operational (productivity), and financial (income) are considered as determinants of IT value delivery.

- **IT Risk management:** Even at an organizational level, risk cannot be eliminated; it will exist all the time and can only be managed and/or minimized. The management of the organization is responsible for minimizing it to an acceptable level. Risk management should also be a continuous process which begins by assessing the level of exposure of the organization and identifying the main incident risks. IT risk management includes defined responsibilities for risk management, risk analysis methodology, defined strategies for addressing risks, continuous monitoring of threats, occurrence and impact.

- **IT Resource management:** IT Resource management is concerned with the management of IT resources and the organization of IT infrastructures within a corporation. The information resource management concept evolved in three different arenas (database management, records management and data processing management) with little interaction occurring among them. The view of information resource management represents a convergence of perspectives just at that time.

- **IT Performance measurement:** IT Performance measurement is concerned with determining whether IT systems have achieved the goals set for them by the Board and senior management. Relevant and measurable metrics, continuous monitoring and reporting, follow-up policies, root cause analysis and problem management, benchmarking against industry practices and proven standards or frameworks are considered to be the various aspects of IT performance measurement.

2.8. IT Governance vs IT Management

IT governance ensures that IT supports and extends the organization's strategy and objectives through IT governance structures, processes, and relational mechanisms [2], while IT management is mainly focused on the daily effective and efficient supply of IT services and IT operations [17]. In addition, IT management emphasizes on controlling the formulation and implementation of IT strategy and in this way ensure the blending of business and IT [7].

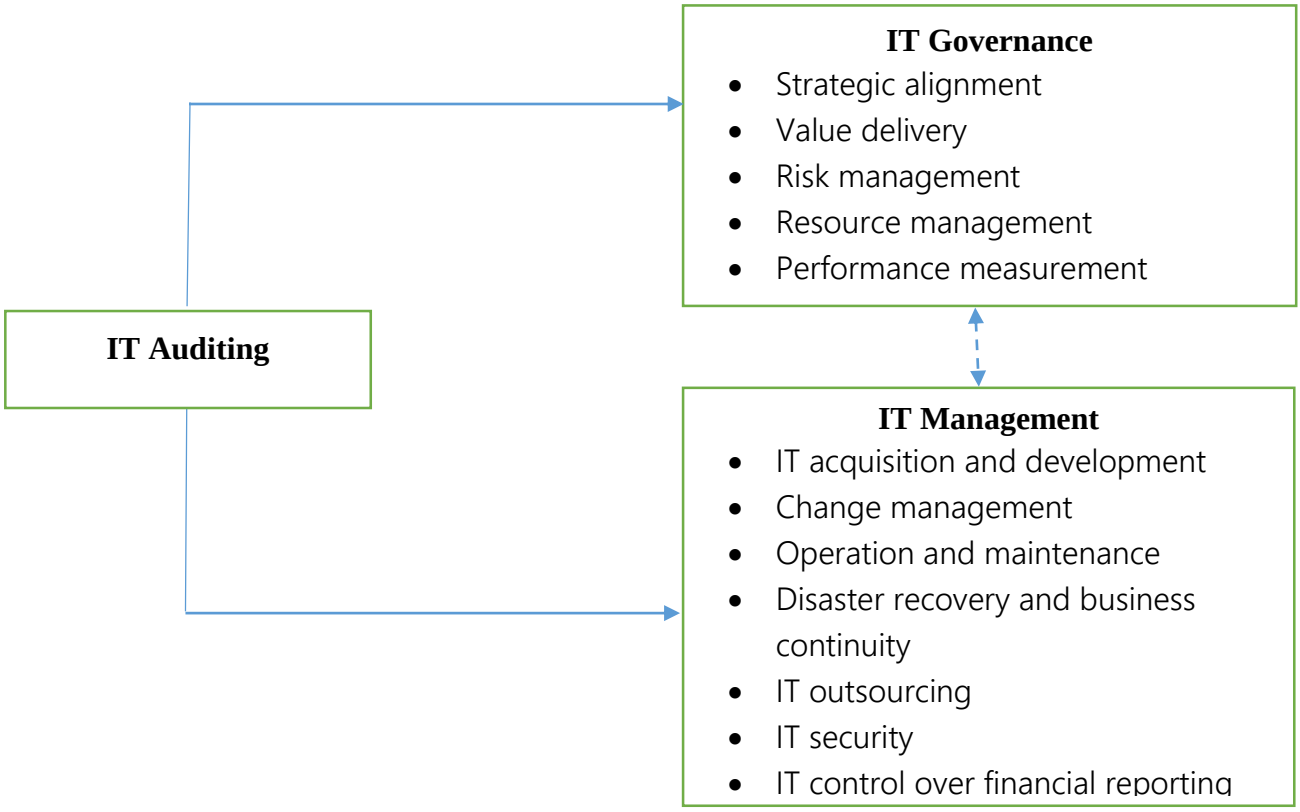


Figure 2: IT governance and IT management [13].

2.9. IT Auditing

Before describing IT Auditing, we should first explain the terms "assurance," "attestation," "audit," and "control." Although these terms generally refer to this same general purpose, each has a very specific meaning in different contexts. In general, IT auditing is an integral part of IT governance and is recognized as a critical IT process in the COBIT and ITIL governance frameworks [20]. Pathank [38] defines IT Audit as "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".

The ultimate goal of IT auditing activities includes [20] [33]:

- to assess whether or not an information system is meeting stated organizational objectives;
- to review the company's control procedures associated to IS;
- to collect analytical evidences about possible misuse;
- to evaluate the level of operational risks for different control areas;
- to suggest to company executives corrective control counter-measures;
- to reduce the risk associated with IT investment and deployment; and
- to ensure that the system is not creating an unacceptable level of risk for the business.

2.9.1 Role of IT Auditors

Prior research by Gheorghe [30] states that IT auditors are responsible for the assessment of the IT Governance efficiency and can also perform a number of key roles includes initiating IT governance programs, planning IT governance solutions, monitoring IT governance initiatives, and helping make IT governance business as usual. Stoel et al. [19] suggests that the role of IT Auditors has attributes which have influence on firm performance.

Auditing IT Governance needs more business knowledge than regular Information Systems audits because the IT auditor has to evaluate how IT is enabling the business strategy [39]. According to Stoel et al. [19], the IT proficiency of auditors and the importance of IT knowledge for assurance practitioners is one critical component of IT auditing. Furthermore, IT auditors have significant and wide-ranging experiences and perceived business process knowledge helpful in understanding the business activities associated with the IT system. IT auditors play an important role in establishing, measuring and analyzing the organization's performance [17].

According to Khan and Amin [1], an IS/IT auditor should have a knowledge of the latest Audit tools and techniques and should have proper training to utilize these tools and resources. For example, an IT auditor should have the knowledge of IT audit standards, guidelines, procedures, policies, audit risk assessment and IT auditing practices. The number of years of IT audit experience [2], IT proficiency of auditors and the importance of IT knowledge for assurance practitioners are critical components of IT auditing [19].

2.9.2 IT Audit Quality

From the literature reviewed so far, IT Audit quality has not been explicitly defined, but it could be implied from the objectives of IT audit [38]. One area in the IT literature that has received little scholarly attention is the quality of IT audits [40]. Prior to actually carrying out IT audits, an empirical investigation by D'Onza et al. [13] conducted on IT audit quality has shown it to be a critical success factor, followed by IT auditors' independence and the organization's knowledge and expertise. Mainly to ensure the value of IT audits, organizations should implement a standard method for evaluating the quality of audits [38].

Mazza et al. [41] also suggest that IT Audit Quality analyzes the factors that may improve Audit Quality using different methodologies. Farouk and Hassan [42] concluded that the influence of auditor size cannot be ignored because it is an important factor for determining audit quality. Research conducted by Farouk and Hassan [42] also concluded that the influence of audit quality on financial performance is positive and significant. Hence, in terms of IT Audit Quality, management's decisions regarding specific resources to deploy for a specific IT audit should attempt to maximize the overall audit quality and minimize the cost as related to their specific IT audit objectives. Additionally, one objective of this research also requires a consideration of other attributes that might impact the performance and outcome of the IT audit [19]. Companies and auditors should be able to improve the IT Audit Quality by making a reliable assessment [41].

2.9.3 IT Auditing and Enterprise Governance of IT performance

The primary benefit of an EGIT assessment audit should focus on appraisal of the level of alignment and integration of the IT strategy with the business strategy, assessment of the output of the IT component and additional value provided for organization [30]. One of the reasons could be that often there is no systematic way of measuring IT performances and implementing IT Governance practices [37]. Little attention has been paid to determine formal metrics of IT governance performance for improving efficiency and reducing costs and increasingly account for enabler of business innovation [30]. Although companies are investing vastly in IT related systems [30], they still require a control framework for governance that provides a process and audit model [4]. Hence, measuring the current performance of Enterprise Governance of IT with ideal or required one.

2.10 EGIT performance and EGIT mechanisms

EGIT consists of structures, processes, and relational mechanisms working together as one entity to ensure that IT and business objectives are aligned [7]. An empirical research by Spremic [37] indicated that companies with effective IT Governance have profits that are 20% higher than other companies pursuing similar strategies. IT Governance is as a must for firms due to the significant risks associated with ubiquitous business IT [43].

Carsten [4] discussed that "effective IT Governance helps mitigate IT-related risks and gives reasonable assurance that the organization's IT processes are consistently delivering the efficiency gains for which they are designed". Bianchi and Sousa [44] stated that the organizations have adopted formal mechanisms of IT governance to improve their performance and profit.

2.11 Firm Performance

Firm performance has been the most important issue for every organization [45]. Zhang et al. [27] mentioned that firm performance refers to competitive advantage, which is defined as an advantage over competitors in some measure such as cost, quality, or speed, leads to control of a market and to larger-than-average profits. Consequently, the ability to achieve business goals through IT is an important factor for firm performance [46].

In this study the researcher mainly engaged to measure firm performance in terms of return on investment, cost saving, quality services and customer satisfaction. Prior studies [3] [45] [47] [48] [49] have measured firm performance in terms of both financial and non-financial aspects. Financial aspects of firm performance which have been measures such as profitability, sales growth, cost saving, return on investment (ROI), return on total asset (ROA), etc [45] [47] [48]. Profitability is charged to be the best measure of financial performance [42]. Stoel et al. [3] argued that internal control weakness may affect the relationship with financial performance. Non-financial aspects of firm performance which have been measured are measures such as, quality services, market share, customer satisfaction, and learning and growth perspective [45] [47]. However, an integration of financial and non-financial information is essential to give a more balanced impression of the overall performance of the firm [49].

2.11.1 Firm Performance and IT Auditing

The role of IT audit leadership is important for intervening to correct deficiencies and capitalizing on achievements [22]. The interconnected nature of IT systems, and continuously evolving threats, involves increased risks and the need to implement IT internal controls (taken synonymously with IT Auditing) to mitigate those risks. Consequently, weakness in IT Auditing represents an organizational liability for firm performance [3]. Regardless of their significance, few studies measure the influence of IT Auditing on firm performance [21].

2.11.2 Firm Performance and EGIT Mechanisms

The three types of EGIT mechanisms are structures, processes and relational mechanisms [7]. All these types of EGIT mechanisms are working together as one entity to ensure that IT and business objectives are aligned [4]. EGIT structures focus on organizational units, the roles responsible for making IT decisions and for enabling contacts between business and IT management decision-making functions, while EGIT processes refer to the formalization and institutionalization of strategic IT decision-making, IT management techniques and IT monitoring procedures. EGIT relational mechanisms underline ultimately about IT leadership and collaborative relationship among, corporate executives, IT management and business management [2] [4] [7].

EGIT and its concurrent ability provide us with a theoretical basis to investigate how firms effectively build the alignment between IT resources and other resources in creating a firm's competitive advantages [27]. Similar research findings by Ghildyal et al. [28] suggest that the positive influence of well-designed EGIT mechanisms enable IS strategic alignment, which itself increases organizational performance. In another research by Mueller [4] stresses that effective ITG is the cornerstone for an organization to achieve its corporate performance goals. Given evidence directs that firms that have implemented ITG generate 40 percent higher IT returns compared to those firms who haven't [4].

2.11.3 Firm Performance and Enterprise Governance of IT performance

Ghildyal et al. [29] state that IT governance/EGIT affects business-IT alignment and organizational performance. Another recent research by Ghildyal et al. [28] identified "there is a linkage between

benefits and impacts that is required to implement IT governance for gaining business performance". There is empirical support for a positive impact relationship between business performance and IT governance, which itself increases organizational performance [29]. A similar research by Lazic et al. [32] suggest that good IT governance draws on corporate governance principles to manage and use IT to achieve corporate performance goals.

Grembergen and Haes [7] suggest improving EGIT performance by using IT BSC (Balance Scorecard) which is an approach to measure and manage the value of IT in terms of both financial and nonfinancial advantages. Hence, the main reason and ultimate goal for IT BSC is to obtain better corporate financial results. In a previous study conducted by Iliescu [39], it is pointed out that ITG can serve as a tool for enhancing the contribution of IT to the organization, can decrease the IT expenditures, can strengthen the internal controls, and can prove if adopted the organization's interest for continuous performance improvement.

2.12 Related works

On a recent research study entitled "Auditing IT and IT Governance in Ethiopia," Mengistu [26] used a combination of qualitative and quantitative research method to develop a conceptual framework. The objective of his study was to investigate IT Auditing and IT Governance in the financial sector of Ethiopia in terms of IT Governance structure, processes and relational mechanisms.

In his survey result shows that, though ITG maturity was rated at an initial stage (level 1) in the financial sector of Ethiopia, the banking sector (1.4) reached better level of maturity than the insurance sector (0.7) based on generic maturity scale from 0 (non-existent) to 5 (optimized). In addition, among ITG mechanisms, relatively, ITG structure was rated as more important as well as more mature than that of ITG Processes and Relational Mechanisms. IT auditing was also positively correlated with ITG performance. Finally, the relationship between ITG performance and firm performance were also confirmed indicating strong and positive correlation.

In his conclusion, he identified that ITG maturity is at an initial stage (level 1) in the financial sector of Ethiopia and this profession is in its infancy. However, Mengistu [26] did not empirically examine in his research study, IT Audit Quality and Role of IT Auditors that influence IT Auditing and firm

performance. Therefore, the researcher believes that there is a gap and additional research in this area is required.

Another recent research study, Tagel [16], entitled "Maturity of Information Technology Governance in the Financial Sector of Ethiopia: a Comparative Study" has been conducted with the aim to investigate maturity of ITG in the financial sector of Ethiopia. In general, 96 self-administered questionnaires were distributed targeting senior business and IT leaders and a return rate of 80% was achieved.

The findings of the research state that importance of ITG in the financial sector of Ethiopia was rated 4.2 based on a scale from 0 (strongly disagree) to 5 (strongly agree); the actual ITG maturity was rated 1.2 (level 1) based on generic maturity scale from 0 (non-existence) to 5 (optimized); and ITG issues were recognized but practiced in an informal and ad hoc basis with little or no evidence of standardization. The reported survey result also shows that among ITG mechanisms, relatively ITG structure was rated as more important as well as mature than that of ITG Processes and Relational Mechanisms.

The research concluded that ITG maturity is at an initial stage (level 1) in the financial sector of Ethiopia, while ITG maturity in the banking sector significantly surpasses that of the insurance sector in all ITG areas; and relatively privately owned financial institutions reached better level of ITG maturity than that of public owned. However, Tagel [16], in his research investigation did not incorporate IT Auditing, IT Audit Quality and Role of IT Auditors that influence on firm performance.

D'Onza et al. [13] have studied with the title "Do IT audits satisfy senior manager expectations? A qualitative study based on Italian banks". The study aims to investigate the relationship between the senior management and the IT Auditing undertaken in Italian banks, focusing specifically on IT Auditors techniques that they apply to meet these expectations, the degree to which senior managers are satisfied with the auditing and the expectation gap.

The researchers conducted 22 interviews with senior managers and IT auditors of seven Italian banks, comprising large and small financial institutions, to gain data for their analysis. The researchers key finding was for IT auditors to focus more strongly on IT security and thus would have to improve

their technical and non-technical skills; the IT auditors' contributions satisfy senior managers, even though they still see room for improvement to be more proactive and to take on effective roles in IT governance processes. Thus, the researchers concluded that IT auditors need to support them on a broader level by considering both the IT governance and IT management domains. The researchers also recommended further research to include the perspectives of other IT auditing stakeholders (e.g. the board of directors, audit committee and external auditors) into consideration.

Another similar research by Spremic et al. [33] entitled "IT Governance and Information System Auditing Practice in Credit Institutions in the Republic of Croatia" with objective of measuring and managing the level of operational risks in credit institutions has been carried out by conducting regular IS audits. The researchers also identified the methodology for conducting IS auditing is presented and maturity levels explained with a 5-point scale system with a qualitative mark which range from completely unsatisfactory to completely satisfactory.

In their research finding, the results of assessing the level of operational risks in credit institutions in the Republic of Croatia which arises from external IS auditing activities in 2010 were depicted i.e., 11 credit institutions satisfactorily manage the level of operational risk, 18 partially satisfactory and 2 partially unsatisfactorily.

The researchers concluded with a recommendation to investigate in further details if the practice of managing operational risks in a small credit institution is improving by conducting regular IS audits and obeying to regulatory framework. However, 'IT Audit Quality' and 'Role of IT Auditors' are not incorporated in this study. Lastly, the researchers did not point out further researchable areas as a recommendation.

In a research by Pandzo and Taljanovic [17] entitled "IT Governance and IT Auditing Practice in Commercial Banks in Bosnia and Herzegovina," they studied using a survey questionnaire which was sent to all commercial banks registered in Bosnia and Herzegovina in electronic and paper form and they asked to rate each on a 1–5 Likert scale.

In their survey, a total of 15 responses were received resulting in a response rate of 54%. They found in the survey result that there is a general lack of awareness and knowledge of appropriate IT risk

management practice, requiring further awareness raising and training across all sizes of banks in Bosnia and Herzegovina. Consequently, the biggest challenge identified by small banks was the lack of financial resources, followed by lack of professional skills and knowledge. However, it is the medium banks that showed biggest concerns about the lack of locally available professional training in the field of IT governance and IT auditing.

The researchers identified and concluded that IT Auditing is one of the fastest growing fields in technology today. However, the researchers did not address in their research IT Audit Quality, Role of IT Auditors and EGIT mechanisms that influence on firm performance.

Barbosa et al. [43] conducted a research with the title "Performance Measurement of Information Technology Governance in Brazilian Financial Institutions". The objective of the study was to measure the performance of Information Technology Governance in financial institutions in Brazil.

This study is considered a transversal descriptive survey, a procedure of collecting primary data from individuals. The data collection instrument was based on a questionnaire (an electronic survey of self-managed) to assess IT Governance performance. The sample consisted of sixty professionals from financial institutions operating in Brazil. As a result, the average performance score was approximately 79.6, showing that the organizations studied have not achieved maximum performance (100).

Further research recommended, an exploratory work that conducts an in-depth interview with employees of major financial institutions, redone in different countries, sectors, or estates, aimed at making comparisons and thus clarifying the real scenario of ITG implementation and performance. However, some limitations have been encountered in regards to the relationship between performance in each IT governance domain.

Havelka and Merhout [50] conducted a research on "Internal Information Technology Audit Process Quality: Theory development using structured group processes" with the main objective of a formulating a theoretical framework of the internal information technology audit (ITA) process. This is developed by collecting data from multiple sources using structured group processes. Although this research focuses on a series of nominal group processes involving IT Auditors, ITA managers,

and financial auditors from three different internal audit organizations, it was performed to generate source data. This data was also coded and analyzed using a constant comparison approach to identify the codes, indicators, concepts, and relationships included in the theory.

The research findings showed 26 concepts organized into audit organization, client organization, enterprise environment, process and methodology, target process/system, and audit personnel, respectively. The researchers also recommended for additional research to be conducted into the antecedents to IT Audit process quality, for both effectiveness and efficiency of the audit.

Lazic et al. [32] have studied with the title "The Impact of IT Governance on Business Performance". The main objective of the study proposes and explains the positive impact of IT governance on the business performance of the firm. The research study follows a qualitative research design which is deemed promising in order to answer the question of how ITG and business performance are related. Furthermore, the framework is developed using eleven exploratory case studies with senior IT executives of major multinational corporations.

The researchers' conclusion shows that ITG is positively related to business performance of firm and creating a sustainable competitive advantage. However, the data set needs to be enlarged in order to refine the presented framework for the purpose of quantitative theory testing. This research analyses the effects of the generation of business value only. The researchers also recommended a further research on the framework needs to be made concerning the cultural dimension and additional potential moderators such as authority, specificity of knowledge, industry or the size of the corporations analyzed.

2.13 The Conceptual Framework for the Study

This section presents the conceptual framework depicted in Figure 3. It encompasses different variables integrating with IT Auditing with a proxy of IT Audit Quality and Role of IT Auditors, EGIT Mechanisms also with a proxy of Structures, Processes, and Relational mechanisms, EGIT performance and firm performance into a single model. Based on the reviewed literature and

discussions shown in the literature review section, the proposed conceptual framework is presented in Figure 3 below.

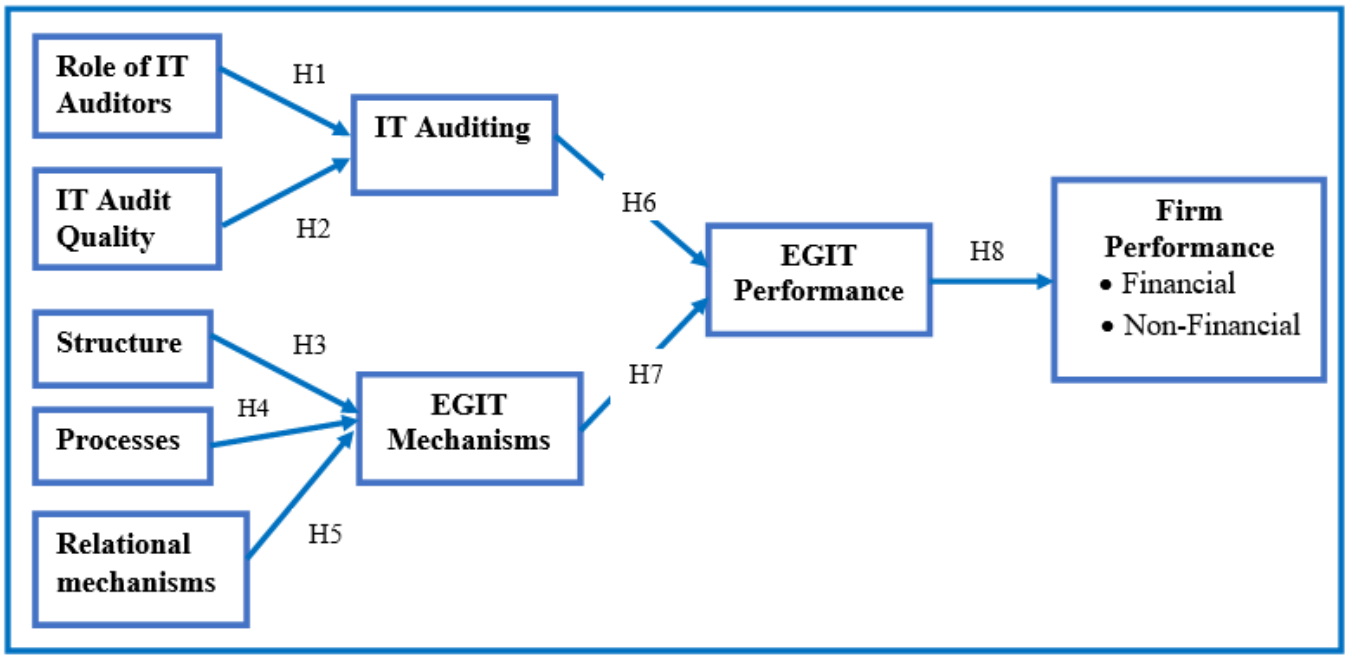


Figure 3: The proposed conceptual framework

(Adapted from Grembergen and Haes [8]; Mueller [4]; Pandzo and Taljanovic [17]; Stoel et al [19]; Mengistu [26]; and Farouk and Hassan [42])

The conceptual framework diagrammatically illustrates the expected relationships among variables. The independent variables are IT Audit Quality, Role of IT Auditors, EGIT Structures, EGIT Processes, and EGIT Relational mechanisms. The mediating variable is EGIT performance. Firm performance is the dependent variable comprised of financial and non-financial aspects.

2.14 Hypothesis Development

In the concept of IT audit, the same can be used to ensure that the IT strategy is aligned with the overall organization strategy and that specific IT policies are in place and being followed [20]. Then, IT auditors are asked to assess their capability to deliver the outsourced services according to predefined parameters and their ability to ensure that the company's IT risks are managed effectively [13]. The auditor itself needs to understand the emerging issues of information security and cyber security, arising from the increased integration of digital technologies into business models [51]. Jeffrey and Douglas [20] also mentioned that IT auditors are concerned with the quality of controls within and over the system development life cycle and have an important role in assuring systems

development quality, such as reviewing policies, processes, and plans around feasibility studies, software development, and system conversions. Organizations are increasingly relying on IT Auditing to safeguard their physical assets and data [38]. IT auditors play an important role in establishing, measuring and analyzing the organization's performance [17].

IT Auditors provide assurance to management that governance is working effectively [30]. Spremic [37] claimed that internal IT Auditors are significantly important and responsible for performing IT Auditing. Moreover, IT auditors have wide-ranging experiences and perceived business process knowledge helpful in understanding the business activities associated with the IT system. IT Audit emphasis is specific to the IT Audit part and incorporates characteristics of the practice office [51].

According to D'Onza et al. [13], an IT auditor may supervise IT by providing with independent assurance of the internal controls and other risk mitigation measures' effectiveness. Stoe et al. [19] argued that the role of IT Auditors' attributes which have influence on firm performance. Pandzo and Taljanovic [17] also claim that IT auditors play an important role in establishing, measuring and analyzing the organization's performance.

Basically, the IT auditor obtains an understanding of IT Auditing in the audited entity as members of the engagement team is required [51]. The number of years of IT audit experience [2], IT auditors and the importance of IT knowledge for assurance practitioners are critical components of IT Auditing [19]. Therefore, based on the literatures reviewed above the following hypothesis is developed.

Hypothesis 1: The Role of IT Auditor is positively and strongly correlated to IT Auditing.

Merhout and Havelka [20] suggested that an Audit Quality process and product can hence lead to a more efficient use of the resources of an annual risk-based Internal IT Audit program. Additionally, the researchers argued that Information Systems Audit is unique and then, the factors that affect IT Audit Quality will vary based on the circumstances of the project. An Audit Quality may significantly contribute to internationalization of the company, profitability of the firm and corporate governance [41].

By ensuing a sound IT audit methodology, an organization can deliver high quality IT audits that meet the requirements for a risk-based assurance program [20]. Research conducted by Farouk and Hassan [42] concluded that the influence of audit quality on financial performance is positive and significant. Hence, in terms of IT Audit Quality related to IT Auditing, management's decisions regarding specific resources to deploy for a specific IT audit should attempt to maximize the overall audit quality and minimize the cost as related to their specific IT audit objectives. Therefore, based on the literatures reviewed above the following hypothesis is developed.

Hypothesis 2: IT Audit Quality is positively and strongly correlated to IT Auditing.

Research work conducted by Carsten [4] suggests that effective IT Governance structures provide strategies that promote the effective management of IT resources. Effective use of IT resources requires effective IT Governance structures [4]. Gheorghe [30] also states that IT has become an essential issue in strategic development and increasing performances of any organization. The researcher also concluded suggesting a structural redefinition of the IT component in order to create plus value and to minimize IT risks through an efficient management of all IT resources of the organization [30].

Another research conducted by Supriyadi [35] on the structure of IT governance focuses on the distribution of responsibilities and decision-making and its relation with stakeholders. Hence, effective IT governance is strongly influenced by strategic objectives and organizational structure. A recent empirical research by Haes and Grembergen [7] claims that the most visible EGIT mechanisms are enterprise governance of IT structures, for making IT decisions and for enabling contacts between business and IT management decision-making functions. Moreover, the relationship between EGIT mechanisms and structures strengthen the connection and integration, affecting them positively [7]. Therefore, based on the literatures reviewed above the following hypothesis is developed.

Hypothesis 3: EGIT Structures are positively and strongly correlated to EGIT Mechanisms.

Enterprise governance of IT processes refers to the formalization and institutionalization of strategic IT decision-making, IT management techniques and IT monitoring procedures, to ensure that daily behaviors are consistent with policies and provide input back to decisions (e.g., IT performance

management, portfolio management, benefits management and IT BSC) [7]. Research work conducted by Supriyadi [35] processes on IT governance focuses on the actions to deliver decisions that are made through IT governance mechanisms. ITG also requires one to align the IT function with the organization's strategy to be implemented, with appropriate management to increase efficiency and effectiveness of IT investments [30].

The importance of having implemented an effective ITG framework in a firm showed up to 40 percent higher returns which can be created by using effective ITG processes [9]. Gheorghe [30] states that for the boards of the organizations to implement processes and structures which allow the organizations to sustain the objectives and strategies through IT component, they should impact the organization positively.

Gheorghe [30] concludes that all these changes have had a strong influence in the governance way of the financial institutions, with great implications in the IT Governance that uses the premises of the corporate governance, which are extended to the IT area. Keeping and maintaining the process of IT governance has value to the organization and can be controlled [35]. Therefore, based on the literatures reviewed above the following hypothesis is developed.

Hypothesis 4: EGIT Processes are positively and strongly correlated to EGIT Mechanisms.

Supriyadi [35] claims that a relational mechanism is required to ensure effective communication between the IT and stakeholders and its approach to provide the information and understanding of IT policies and processes. Moreover, ITG factors explained about only 6% of variation in firm performance. Carsten [4] also states that the foundation of ITG is to provide an acceptable level of assurance that an organization’s strategic objectives are not jeopardized by IT failures [4].

The EGIT relational mechanisms are used to improve association with EGIT mechanisms and ultimately with IT leadership and collaborative relationship among, corporate executives, IT management and business management [2] and include job-rotation, announcements, advocates, channels, and education efforts [7]. In addition, EGIT relational mechanisms ensure synergy between business and IT [2].

Researchers Haes and Grembergen [7] state that relational mechanisms, such as training, awareness building, etc., are crucial and receive a lot of attention in the Enterprise Governance of IT mechanisms and sustaining business–IT alignment, even when the appropriate structures and processes are in place [8]. Therefore, based on the literature reviewed above the following hypothesis is developed.

Hypothesis 5: EGIT Relational Mechanisms are positively and strongly correlated to EGIT Mechanisms.

IT Auditing mainly refers to the truly analytical part of IT Governance by which the level of IS performance can be measured and information system quality assessed. Hence, IT Auditing is the right tool for determined measuring of IT Governance performance [37]. The primary benefit of an IT Governance assessment audit should focus on appraisal of the level of alignment and integration of the IT strategy with the business strategy, assessment of the output of the IT component and plus value provided for the organization [30].

IT auditing is a new profession that encompasses the concept of control in the form of quality assurance, benchmarking and measurement and it can be also used to implement IT governance [37]. A similar earlier research by Pandzo and Taljanovic [17] claims that IT auditors can initiate, plan and monitor IT Governance initiatives and help to derive business benefits from better IT Governance. Mengistu [26] proposed a theoretical relationship between IT auditing and IT governance performance, which has been empirically investigated and confirmed showing the relationship between IT auditing and IT governance performance has positive relationship. Therefore, based on the literatures reviewed above the following hypothesis is developed.

Hypothesis 6: IT Auditing is positively and strongly correlated to EGIT performance.

EGIT mechanisms ensure that IT and business objectives are aligned [7], pointing out ITG mechanisms and their importance to achieve effective and efficient ITG [52]. IT Governance is as a must for firms due to the significant risks associated with ubiquitous business IT [43]. Jewer [10] pointed out of the absence IT governance mechanisms to governance of IT, "if ITG mechanisms are poorly implemented, then governance arrangement will fail to yield the desired results".

The aim of IT governance mechanisms is to enhance business/IT alignment with the positive association of IT governance performance [44]. Almeida et al. [52] suggest that ITG mechanisms are important and they must be combined in order to create a holistic approach that promotes effective and efficient ITG all over the organization. ITG mechanisms have been pointed as the best way to implement IT governance in organizations. Mengistu [26] also concludes there is strong empirical support for the positive relationship between IT governance mechanisms and IT governance performance. Therefore, based on the literature reviewed above the following hypothesis is developed.

Hypothesis 7: EGIT Mechanisms are positively related to EGIT performance.

Recent research by Ghildyal et al. [28] identified that "there is a linkage between benefits and impacts that is required to implement IT governance for gaining business performance." There is empirical support for a positive impact relationship between business performance and IT governance, which itself increases organizational performance [29]. There is empirical support for IT governance showing that it has a positive impact on the contribution of IT to firm performance (particularly financial performance) [10].

Another research conducted by Lazic et al. [32] concludes that ITG is positively related to the business performance of a firm. The Brazilian financial institutions show that attaining 79.6 points and positive progression in the performance of IT governance [43]. Moreover, firms with superior IT governance have at least 20% higher profits than those with poor IT governance given the same strategic objectives [27]. An empirical study conducted by Vejseli and Rossmann [9] and Barbosa et al. [43] shows that there is a link between high-level IT Governance performance results and high financial performance.

Grembergen and Haes [7] suggest improving the Enterprise Governance of IT performance by using IT BSC (Balance Scorecard) which is an approach to measure and manage the value of IT in terms of both financial and nonfinancial advantages. A prior similar study conducted by Gheorghe [30] and Iliescu [39] put forward that, IT Governance can serve as a tool for enhancing the contribution of IT to the organization, can decrease the IT expenditures, can strengthen the internal controls, and can prove, if adopted, the organization's interest for continuous performance improvement. Thus, based

on the above literature, it is evidential that EGIT performance is a key enabler and success factor for firm performance. Therefore, based on the literature reviewed above the following hypothesis is developed.

Hypothesis 8: EGIT Performance is positively related to Firm Performance.

2.15 Research Hypotheses

This research study sets out to examined the significant influence of IT Auditing and Enterprise Governance of IT Mechanisms on Firm Performance. To achieve this, research aims and research questions have been articulated as shown in chapter one, section 1.2. In general, the objectives of the research were supported by the following eight hypotheses. These eight hypotheses also shown to be well supported by literature in section 2.14 as follows;

H1: The Role of IT Auditors is positively related to IT Auditing.

H2: IT Audit Quality is positively related to IT Auditing.

H3: EGIT Structures are positively related to EGIT Mechanisms.

H4: EGIT Processes are positively related to EGIT Mechanisms.

H5: EGIT Relational Mechanisms *are positively related to* EGIT Mechanisms.

H6: IT Auditing is positively related to EGIT performance.

H7: EGIT Mechanisms are positively related to EGIT performance.

H8: EGIT Performance is positively related to Firm Performance.

Table 1: Summary of Related works

Author, Title and Year	Purpose of the Research	Key findings	Recommendations and Future works	Remark
Mengistu, B. Auditing IT and IT Governance in Ethiopia (2016)	Examines IT governance performance of Ethiopian Business Organizations and the contribution of IT auditing.	The relationship between IT governance performance and firm performance were also confirmed indicating strong and positive correlation.	Suggested that the scope of his research in other business firms, governmental organizations and not for profit entities.	'IT Audit Quality' and 'Role of IT Auditors' are not incorporated in the study.
Tagel, M. Maturity of IT Governance in the Financial Sector of Ethiopia: a Comparative Study (2016)	To investigate the perceived importance and maturity of IT Governance practices in financial sector of Ethiopia in terms of IT Governance Structure, Processes and Relational Mechanisms.	Among IT Governance mechanisms, relatively IT Governance structure was rated as more important as well as mature than that of IT Governance Processes and Relational mechanism.	Financial institutions have to start implementing formal IT Governance which fits to their business strategy and culture by mixing-and-matching elements of existing frameworks.	The study addressed Maturity of ITG. Hence, relationship between IT Auditing and EGIT Mechanisms influence on firm performance was out of the scope of the study.
D'Onza et al. Do IT audits satisfy senior manager expectations? A qualitative study based on Italian banks (2015)	To investigate the relationship between the senior management and the IT auditing undertaken in Italian banks.	IT auditors to focus more strongly on IT security and technical and non-technical skills, the IT auditors' contributions satisfy senior managers, even though they still see room for improvement to be more proactive and to take on effective roles in IT governance processes.	They were recommending to include the perspectives of other IT auditing stakeholders (e.g. the board of directors, audit committee and external auditors) into consideration.	They conducted interviews with senior managers and IT auditors of seven Italian banks, comprising large and small financial institutions, to gain data for their analysis.

Author, Title and Year	Purpose of the Research	Key findings	Recommendations and Future works	Remark
Spremic et al. IT Governance and Information System Auditing practice in credit institutions in the Republic of Croatia (2012)	To stress the importance of prescribing IS auditing regulatory framework which helps credit institutions manage the level of operational risk.	The level of operational risks in credit institutions in the Republic of Croatia which arises from external IS auditing activities.	They were not stated both recommendations and future works.	The researchers did not point out further researchable areas as a recommendation.
Pandzo and Taljanovic IT Governance and IT Auditing Practice in Commercial Banks in Bosnia and Herzegovina (2013)	To explore the current practices of ITG and IT auditing in commercial banks in Bosnia and Herzegovina and identify the challenges the banks have in complying with the newly introduced regulations.	Reveal poor IT risk management practices requiring further awareness raising and training across all sizes of banks.	There were not recommendation and future work specified.	The researchers did not address in their research IT Audit Quality, Role of IT Auditors and EGIT mechanisms that influence on firm performance.
Barbosa et al. Performance Measurement of IT Governance in Brazilian Financial Institutions. (2014)	The main aim of their study is to measure the performance of ITG in financial institutions in Brazil.	Generates company results, the average performance score was approximately 79.6, showing that the firms studied have not achieved maximum performance (100).	Further research recommended in-depth interview with employees of a major financial institution, redone in different countries, sectors, or estates.	Some limitations have been encountered in regards to the relationship between performance in each IT governance domain.

Author, Title and Year	Purpose of the Research	Key findings	Recommendations and Future works	Remark
Havelka and Merhout Internal information technology audit process quality: Theory development using structured group processes (2013)	A theoretical framework of the internal information technology audit (ITA) process is developed by collecting data from multiple sources using structured group processes.	The results reveal 26 concepts organized into six categories: Audit Organization, Client Organization, Enterprise Environment, Process and Methodology, Target Process or System, and Audit Personnel.	The antecedents to IT Audit process quality, for both effectiveness and efficiency of the audit.	'IT Audit Quality' is not incorporated in the study.
Lazicet al. The Impact of IT Governance on Business Performance (2011)	The main objective of the study that proposes and explains the positive impact of IT governance on the business performance of the firm.	The research result showed that ITG is positively related to the business performance of a firm.	The framework needs to be further expanded concerning the cultural dimension and additional potential moderators such as authority, specificity of knowledge, industry or the size of the corporations analyzed.	The data set needs to be enlarged in order to refine the presented framework for the purpose of quantitative theory testing.

Table 1: Summary of Related Works

2.16 Chapter Summary

A summary of literature was reviewed, observing at the relationships between the study variables of IT Auditing and Enterprise Governance of IT Mechanisms; issues arising from selected empirical and conceptual studies were provided. This section mainly reviewed and discussed IT Auditing, IT Audit Quality, Role of IT Auditors, EGIT Mechanisms, EGIT performance, and firm performance.

The above mentioned both local and international research attempts indicated the gap of IT Auditing and Enterprise Governance of IT related researches that address the current practices of IT Auditing and EGIT issues in order to contribute to firm performance. Finally, as a summary, the related works that are discussed above are presented in table 1. The next chapter presents the research methodology of the study.

CHAPTER THREE
Research Design and Methodology

3.1 Introduction

This chapter explains the research methodology that was used in the study. First, it discusses the main philosophies used in research in general. Then, it goes on to explain the research design, and population of the study, sampling and sampling procedures, data collection, statistical techniques used in data analysis and reporting. Finally, this chapter concludes with a summary emphasizing the main points.

3.2 Research Philosophy

According to Saunders et al. [53], the term research philosophy refers to a system of beliefs and assumptions about the development of knowledge. According to Aliyu et al. [54], the concept of a paradigm (philosophy) as a predominant framework which put in order for our entire approach to being in the world has become common. Choosing methodologies to research consist of adopting a research philosophy, and a suitable research approach [55].

Saunders et al. [53] mentioned that the researchers at each phase of the study, whether they are consciously aware of them or not, will make a number of types of assumptions. These include, in one or another way, epistemological assumptions (assumptions about human knowledge), ontological assumptions (assumptions about the nature of reality) and axiological assumptions (assumptions about the role of values and ethics within the research process). Among philosophical assumptions the two were found to be widely applied and more popular in the research [53] [54] [55] [56]. These are interpretivism and positivism philosophy.

3.2.1 Interpretivism

Interpretivism is a subjectivist philosophy, which highlights that human beings are different from physical phenomena because they create meanings [53]. Interpretivism stresses that natural reality

and social reality are different and therefore require different kinds of method [55]. Furthermore, interpretive focuses on pursuing to explore peoples' experiences and their views or perspectives of these experiences [55]. Empirically, interpretivists emphasize on individuals' life experiences and cultural artefacts and pursue to include their participants' and their own interpretations into their research [53].

Some of the attributes of interpretivisms have multiple meanings; focus on narratives, stories, perceptions and interpretations; researcher interpretations key to contribution; typically inductive; small samples, in-depth investigations, qualitative methods of analysis, but a range of data can be interpreted [53]. Interpretive studies are, typically, inductive approaches in nature and often associated with qualitative approaches to data gathering and analysis [55].

3.2.2 Positivism

Positivism paradigms (philosophies) refer to the philosophical stand of the natural scientist and involves working with an observable social reality to produce law-like generalizations [53]. This positivist paradigm highlights that genuine, real and factual happenings could be studied and observed scientifically and empirically [54]. A theoretical perspective closely linked to objectivism is positivism which argues that reality exists external to the researcher and must be investigated through the rigorous process of scientific inquiry [55].

Some of the attributes of positivist paradigms have the observer as independent; the researcher is detached, neutral and independent of what is researched; typically deductive (formulate and test hypotheses); highly structured; large sample; typically quantitative methods of analysis, but a range of data can be analyzed [53].

In this study the researcher followed the philosophical assumption the positivist paradigm (philosophy) for the following three reasons: firstly, this philosophy found to be widely applied and more popular in Information Systems [56]; secondly, quantitative approach assert that positivist is

the appropriate philosophy for quantitative approach [56]; lastly, positivists focus on strictly scientific empiricist method designed to yield pure data and facts uninfluenced by human interpretation or bias [53].

This research attempts to develop empirically-based theoretical framework with a significant relationship between IT Auditing and Enterprise Governance of IT Mechanisms on Firm performance influences, which are expressed using quantitative data collection methods.

3.3 Research Design

This study to examine the influence of IT Auditing and Enterprise Governance of IT Mechanisms on Firm Performance in the Banking Industry of Ethiopia. These hypotheses were formalized, tested and confirmed, in whole or part, on the basis of the evidence either accepted or rejected. Furthermore, the unit of observation and the unit of analysis were both be on the individual level and then further analyzing of the research data has been engaged using the quantitative method. The quantitative method is categorized by the use of quantification in both data gathering modalities and their treatment using statistical techniques [43].

3.4 Population and Sampling of the Study

Population for this research is comprised of 17 commercial banks in Ethiopia. Commercial banks have been chosen due to the fact that they are already (relatively) more mature in these domains, the environment being relatively homogenous and making empirical research interesting. Another factor for making this choice is that these firms are also highly regulated by the National Bank of Ethiopia and represent public interest companies whose failure of corporate as well as IT governance would have significant impact on the overall society and economy [26].

The population of target respondents were 108 from 9 commercial banks (see Appendix B), and it included CIOs, IT managers, IT Audit Managers Internal IT auditors, and IT Experts. Yamane's

simplified formula [57] is used to determine sample size. This formula is used to calculate the sample sizes as shown below. A 95% confidence level and P = .5 are assumed.

$$n = N / [1 + N (e)^2]$$

where, n is the sample size, N is the population size, and e is the level of precision. When this formula is applied to the above sample; we get:

$$n = 108 / [1 + 108 (0.05)^2]$$

$$n = 85.03$$

$$n \approx 85$$

In the sample selection, careful site selection is critical for successful theory testing in the field [26] [57], sampling also saves time [53] to address the research questions.

According to the National Bank of Ethiopia (NBE) [15], currently there are 17 commercial Banks. The survey was collected from 9 out of 17 commercial banks (located in Addis Ababa, Ethiopia), selected using systematic random sampling after listing them in an ascending alphabetical order. In this method, the sampling begins by selecting an element from the list at random and then every R^{th} element in the frame is selected at random, where R, the sampling interval, and the subsequent units are selected in a systematic way [57].

Calculated as R=N/n, then it carries on to reach at the sample size by substituting with known size. Where N = 17 (the population of study) and n= 9 (the sample size):

$$R=\frac{17}{9} = 1.88$$

$$R\approx 2$$

From the sampling frame, the systematic random sample starting point is 1, hence every second term is then selected, which are 1, 3, 5, 7, 9, 11, 13, 15, and 17, respectively included in Appendix A. Thus, the researcher distributed the questionnaire to 85 respondents and 68 (80%) of the respondent returned the questionnaire.

3.5 Data Collection Technique and Approaches

In this section, the data collection methods employed have been commonly used in positivist study in general, and within survey methodology in particular [26]; and the approach goes into underlining how specifically the data to be collected are. The data collection method was a survey, collecting data from both primary and secondary sources. Surveys have been widely held to facilitate the collection of a large amount of data from a sizeable population in a highly economical way. Data collection has been used to evaluate propositions or hypotheses related to an existing theory, identify themes and patterns and create a conceptual framework [53].

In order to meet this research's objectives, the technique carried out for collecting the required data was that of self-administered survey questionnaire. Indeed, this method has the advantage of obtaining data more efficiently in terms of finances and availability of respondents.

3.5.1 Questionnaire

In this research, a questionnaire has been used as a general term to include all techniques of data collection in which each respondent answers the same set of questions in a predetermined order to examine and explain relationships between variables. The questionnaire is one of the most commonly used data collection methods within the survey methodology and it is possible to generate results that are representative of the whole population at a lower cost than collecting the data for the whole population [26] [53].

The research assesses the influence of IT Auditing and EGIT Mechanisms on Firm Performance by using a survey questionnaire which was filled by CIOs, IT managers, IT Audit Managers, IT auditors and IT Expert from the banking industry of Ethiopia. The respondents decide on the convenient option to disseminate the questionnaire, via an online survey or paper form. In addition, continuous follow-ups and notifications were conducted through phone calls to increase response rate.

3.5.2 The Questionnaire Development

This study engages the questionnaire survey approach (is usually associated with the deductive approach) [53] in order to collect data for testing the model's validity and research hypothesis. Based on the literature review, 49 items were used to evaluate the significant relationship between IT Auditing and EGIT mechanisms on Firm Performance.

The questionnaire is divided into four parts. Part 'I' contains demographic information of the respondent like gender, age, educational level, current job title and experience in the organization; part 'II' contains IT Auditing - IT Audit Quality and Role of IT Auditors; part 'III' contains Enterprise Governance of IT - structures, processes and relational mechanisms; and part 'IV' contains Firm Performance - financial and non-financial.

The questionnaire was adopted from the previous studies of Grembergen and Haes [7]; Siew et al. [33]; Stoel et al. [16]; Mengistu [21]; Eltinay and Masri [39]; and Devie and Widjaja [41] as specified in table 3 and with modifications aimed at addressing the objectives of the current study. Multi-item scales were used for measuring the research variables using a five-point Likert scale. Based on five-point Likert scale, responses range from 1 to 5, as shown as follows in Table 2:

Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Scale	1	2	3	4	5

Table 2: A five-point Likert scale responses ranging from 1 to 5.

The questionnaire used attached as Appendix D. This technique has the benefit of attaining data more efficiently in terms of finances and availability of respondents. Questionnaires were administered with a combination of drop and pick method and the prepared google form sent via email.

Variables	Source	Subscales	Number of items
EGIT Mechanisms	Grembergen and Haes [7]	EGIT Structure	9
		EGIT Processes	10
		EGIT Relational Mechanisms	9
IT Auditing	Siew et al. [38]; Stoel et al. [19]	IT Audit Quality	6
	Stoel et al. [19]	Role of IT Auditor	5
Firm Performance	Mengistu [26]	Financial Performance	6
	Eltinay and Masri [45]; Devie and Widjaja [47]	Non-Financial Performance	4
		Total number of items used	**49**

Table 3: Summary of the instruments used in the questionnaire

3.6 Data Analysis Technique and Approaches

To test the conceptual model (see figure 3) presented in this study conducts a variance-based structural equation modelling method, namely Partial Least Squares (PLS). The collected quantitative data analysis was done using descriptive (i.e., frequency and percentage) and inferential statistics (i.e., including testing the hypothesis p-value and t-value). Consequently, the data has been cleaned from missed item and outliers automating into Partial Least Squares Structural Equation Modeling (PLS-SEM), used to test and analyze the research model. SmartPLS 3.2.7 statistical software is used for data analysis and SPSS tool has been used for demographic analysis.

3.7 Validity and Reliability of the Research

In order to ensure and evaluate the research validity and reliability of the model, the assessment to be used is the traditional internal consistency reliability, which is Cronbach's alpha, that has a cutoff value of 0.7 [58] [59] and provides an estimate of the reliability based on the inter-correlations of the observed indicator variables. The researcher's evaluation of the convergent validity and

discriminatory validity, structural model assessment by using path coefficient, coefficients of determination (R^2), variance inflation factor (VIF) and predictive relevance (Q^2) were also measured.

3.8 Research Variables

The conceptual model (see figure 3) diagrammatically depicts the expected relationships among variables. The independent variables are IT Audit Quality, Role of IT Auditors, EGIT Structures, EGIT Processes, and EGIT Relational mechanisms. The mediating variable is EGIT performance whereas Firm performance is the dependent variable comprised of financial and non-financial aspects.

- Independent variables (the variable that the researcher has some control over): Those are EGIT Mechanisms (Structures, Processes and Relational Mechanisms) and IT Auditing (IT Audit Quality and Role of IT Auditor).
- Mediating Variable: EGIT performance is a mediator variable and/or dependent variable.
- Dependent Variables (the response that is measured): EGIT performance and Firm performance.

3.9 Chapter Summary

In summary, chapter four discussed the research methodology that was applied in the study and described the research paradigm and the justification for the choice of a mixed methodology approach. Furthermore, this chapter emphasized the research design, population of the study, sample and sampling procedures, determining sample size, and data collection technique and approaches, procedures for determining the reliability and validity of the data. Finally, the chapter explained the statistical techniques used in data analysis. The result of the finding is presented in the next chapter.

CHAPTER FOUR
Data Analysis, Result and Findings

4.1 General Background Information

This chapter starts by describing data screening and missing data procedures. Then, it presents demographic data for the respondents' analysis. Meanwhile, assessment of measurement model (reliability and validity test) and structural equation model (significance test, path analysis, R-squared, average variance extracted (AVE), Q-squared and VIF) are presented respectively. Finally, the chapter presents the hypotheses tests and corresponding findings.

4.2 Data Screening and Missing Data

This study collected data from nine commercial banks to test the proposed model. The primary issues that needed to be examined include missing data, suspicious response patterns (straight lining or inconsistent answers), outliers, and data distribution. Due to data screening processes deployed, at this stage, the data can be said to be error free and important in all types of research. The data screening has been particularly important at instance when the researcher anticipated an apparent errors using Structural Equation Modeling. Descriptive statistics including frequencies, minimum and maximum values have been used to determine the errors, including visual inspection of the data for identifying the error component of the data and remove it from that analysis point and correcting errors in the data set, identification of missing data and tests for violations of statistical assumptions such as normality and outliers [58] [59].

In the final data examination stage, the errors were corrected by checking against the questionnaire set of the particular cases involved. Luckily, no missing data were found in the data set. Nevertheless, 11 questionnaires were discarded from further analysis due to incomplete and fill straight lining. Thus, the researcher examined a total of 57 usable responses that are ready for further analysis.

4.3 Demographic Data of the respondents

Demographic Object		Frequency	Percent	Cumulative Percent
Gender	Male	45	78.9	78.9
	Female	12	21.1	100
	Total	57	100	
Age	18-24	7	12.3	12.3
	25-30	16	28.1	40.4
	31-40	27	47.4	87.7
	41-50	7	12.3	100
	Total	57	100	
Educational Level	Bachelor's Degree	40	70.2	70.2
	Master's Degree	17	29.8	100
	Total	57	100	
Current Job Title	CIO	4	7	7
	IT Manager	10	17.5	24.6
	IT Audit Manager	5	8.8	33.3
	IT Auditor	8	14	47.4
	IT Expert	30	52.6	100
	Total	57	100	
Work Experience	Below 2 Years	17	29.8	29.8
	2 - 5 Years	21	36.8	66.7
	5 - 7 Years	7	12.3	78.9
	7 – 10 Years	6	10.5	89.5
	Above 10 Years	6	10.5	100
	Total	57	100	

Table 4: Demographic data of the respondents

Five demographic variables, namely: Gender, Age, Educational Level, Current Job Title and Work Experience were used to collect respondents' profile. Table 4 presents that the gender of the majority of the respondents is male, comprising 78.9% (45) with the remaining 21.1% (12) being female. The highest percentage of 47.4% (27) of the respondent age category is "31-40" followed by age category "25-30" comprising 28.1% (16) of the respondents. Both the age categories "18-24" and "41-50" have been found to be rated 12.3% (7) of the total number of respondents.

The educational level of the respondents in the organization is summarized in table 4. The majority of respondents, i.e., 70.2% (40) have bachelor's degree; and 29.8% (17) are found to be master's degree holders. The highest percentage of the respondents, 52.6% (30), current job title is "IT Expert" followed by IT Manger, IT Auditor, IT Audit Manager and CIO, which comprise 17.5% (10), 14% (8), 8.8% (5), and 7% (4), respectively. This shows that the survey incorporates employees with different levels of positions to ensure the fair representation of the sample.

The distribution of the respondents with respect to their work experience in the organization is depicted in table 4 as well. The work experience category of 2-5 years and below 2 years was found out to be the category to which 36.8% (21) of the respondents belonged. Next to that, 12.3% (7) of the respondents are found to have work experiences of 5-7 years. The work experience categories of 7-10 years and over 10 years were found to be 10.5% (6) of the respondents.

4.4 Evaluation of Measurement Model

To evaluate the structural model estimation, SmartPLS 3.2.7 has been used as it provides the outer loadings and/or outer weights for the measurement models, the path coefficients for the structural model relationships and the R^2 values of the latent variables. The reliability and validity tests were conducted correspondingly as well. For testing reliability, the researcher used composite reliability value similar to Cronbach's α reliability which was used to check the internal consistency reliability of the instrument [59] [60]. Moreover, for testing convergent validity and discriminant validity, average variance extracted (AVE) and Fornell-Larcker criterion were used, respectively.

After the data quality has been evaluated, the researcher executed the PLS algorithm (i.e., path weighting scheme) to determine the model parameter's estimates and explicitly considers the direction of relationships as specified in the predictive path model. Model validation represents the process of systematically evaluating whether the hypotheses expressed by the structural model are supported by the data or not. Overall, the model validation is an attempt to determine whether the measurement models as well as the structural model fulfill the quality criteria for empirical work [61].

4.4.1 Validity and Reliability of Survey Instrument

Internal consistency reliability could be evaluated by Cronbach's alpha based on the perceived indicator variables on the inter-correlations [59]. Cronbach's alpha, (i.e., Cronbach's $\alpha > 0.7$ is a threshold value) assumes that all indicators are equally reliable. Moreover, Cronbach's alpha tends to underestimate the internal consistency reliability and sensitive to the number of items in the scale [59] [60].

The reliability test was checked using Cronbach's Alpha, as shown in table 6 (which is calculated to be 0.893 for Role of IT Auditors, 0.872 for IT Audit Quality, 0.779 for structures, 0.73 for processes and 0.785 for relational mechanisms). Overall, all the latent variables computed have resulted in Cronbach's alpha values greater than 0.70.

Criterion-related validity, sometimes known as predictive validity, is concerned with the ability of the measures (questions) to make accurate predictions. In assessing criterion-related validity, the task should be one of first comparing the data from the questionnaire with that specified in the criterion in some way. Often this is undertaken using statistical analysis such as correlation [62].

Based on outer loading value those who have less than 0.70 have been discarded. As indicated in Table 4, 5 items from EGIT Structures (S) construct, 8 items from EGIT Processes (P) construct, 5 items from EGIT Relational Mechanisms (R) construct, 1 item from Financial (FP) construct and 4 items from Non-Financial (NFP) construct are removed from further analysis (see Appendix C).

Subsequently, after removing items for which the indicator has been below the threshold value (<0.70), as indicated in Appendix C, items in the outer loading have been recalculated using SmartPLS algorithm and then the result of all individual items of outer loading values were found to be above 0.70 as indicated shown in table 5. The composite reliability value of each of the constructs is also shown in table 5.

Construct	Number of Items Before Reliability Test	Number of Items After Reliability Test (α>0.7)	Composite Reliability
Role of IT Auditors	5	5	0.907
IT Audit Quality	6	6	0.918
IT Auditing	11	11	0.920
EGIT Structures	9	3	0.871
EGIT Processes	10	2	0.881
EGIT Relational Mechanisms	9	3	0.874
EGIT Mechanisms	28	8	0.847
EGIT Performance	39	19	0.866
Firm Performance	11	5	0.904

Table 5 Reliability Test

4.4.2 Composite reliability

Composite reliability is a preferred alternative to Cronbach's alpha (see table 6). It may be preferred as a measure of reliability because Cronbach's alpha underestimates and tends to be a lower bound estimate of reliability based on the above results [59] [58]. For this reason, the researcher chose composite reliability, which is preferred to Cronbach's alpha, as it is apparent that it leads to higher estimates of true reliability, at least as far as this research is concerned.

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Role of IT Auditors	0.872	0.907	0.662
IT Audit Quality	0.893	0.918	0.651
IT Auditing	0.901	0.920	0.590
Structures	0.779	0.871	0.693
Processes	0.730	0.881	0.787
Relational Mechanisms	0.785	0.874	0.699
EGIT Mechanisms	0.759	0.847	0.585
EGIT Performance	0.770	0.866	0.683
Firm Performance	0.860	0.904	0.703

Table 6 : Reliability and Validity Test

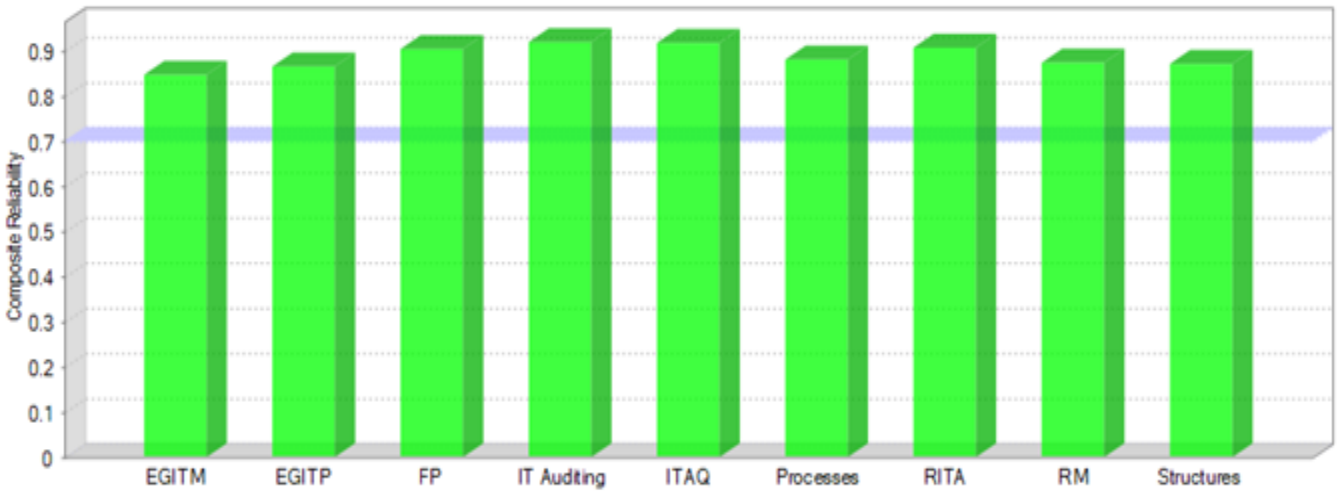


Figure 4: Composite reliability

In a model adequate for exploratory purposes, composite reliability items (see figure 4) should be equal to or greater than 0.60; equal to or greater than 0.70 for an adequate model for confirmatory purposes; and equal to or greater than 0.80 is considered good for confirmatory research. Consequently, very high composite reliability (> 0.90) is considered that the multiple indicators are minor wording variants of each representative [59]. Thus, IT Audit Quality, Role of IT Auditors, IT Auditing and Firm Performance are those whose values have been obtained to be greater than 0.90. On the other hand, Structures, Processes, Relational Mechanisms, EGIT Mechanisms and EGIT Performance are those whose values were obtained to be greater than 0.80 accordingly.

This session depicts the result of the empirical study. The data of this study was successfully tested and is considered reliable and valid based on the results of the reliability test and validity test using SmartPLS version 3.2.7. The path model is estimated with the path weighting scheme for the inner weights estimation. The significance of composite indicators' weights and path coefficients were tested by applying the bootstrapping procedure with 5000 bootstrap samples; two-sided significant test [59]. PLS path modeling's tests of model fit rely on the bootstrap to determine the likelihood of obtaining, if any, an inconsistency between the empirical and the model implied by the correlation matrix that is as high as the one obtained for the sample at hand if the hypothesized model was indeed correct [60].

4.4.3 Convergent validity

Convergent validity used to measure different construct items and to which individual items should be related [59] [60]. A commonly applied criterion of convergent validity is the average variance extracted (AVE) [60]. Due to measurement error of latent variable component, AVE attempts to measure the amount of variance [59]. An AVE value which is greater than 0.50 or higher indicates that, on average, the construct explains more than half of the variance of its indicators and, thus, demonstrates sufficient convergent validity (see figure 5) [58] [59] [60] [61].



Figure 5: Average Variance Extracted (AVE)

Table 7 show the AVE value of this research. The value of Role of IT Auditors (0.662), IT Audit Quality (0.651), IT Auditing (0.590), EGIT Structures (0.693), EGIT Processes (0.787), EGIT Relational Mechanisms (0.699), EGIT Mechanisms (0.585), EGIT Performance (0.683) and Firm Performance (0.706) are above the threshold value of 0.50.

Overall, the whole latent variables showed that there was high level of convergent validity in the data with the items included in each scale having moderate to very high factor loadings (all above 0.50 of threshold). This indicated that the scales were measuring the proposed concepts.

Latent Variables	Average Variance Extracted (AVE)
Role of IT Auditors	0.662
IT Audit Quality	0.651
IT Auditing	0.590
EGIT Structures	0.693
EGIT Processes	0.787
EGIT Relational Mechanisms	0.699
EGIT Mechanisms	0.585
EGIT Performance	0.683
Firm Performance	0.703

Table 7: Average Variance Extracted (AVE) values

4.4.4 Discriminant validity

Discriminant validity is distinct from each other construct items by empirical standards and concerned with the degree to which the measures of different constructs differ from one another [59]. Thus, forming discriminant validity indicates that a construct is unique and captures phenomena not represented by other constructs in the model [59].

In SEM using PLS, Fornell-Larcker criterion (table 8) measures of discriminant validity have been proposed. The logic of this method is based on the idea that a construct shares more variance with its associated indicators than with any other construct. Accordingly, the AVE of each latent variable should be greater than the latent variable's highest squared correlation with any other construct (Fornell-Larcker criterion) [59] [61].

	EGIT Mechanisms	**EGIT Performance**	**Firm Performance**	**IT Audit Quality**	**IT Auditing**	**Processes**	**Role of IT Auditors**	**Relational Mechanisms**	**Structures**
EGIT Mecha-nisms	AVE= 0.765 $\sqrt{AVE} =$ **0.875**								
EGIT Perfor-mance	0.437	AVE= 0.827 $\sqrt{AVE} =$ **0.909**							
Firm Perfor-mance	0.352	0.918	AVE= 0.838 $\sqrt{AVE} =$ **0.915**						
IT Audit Quality	0.299	0.835	0.957	AVE= 0.807 $\sqrt{AVE} =$ **0.898**					
IT Auditing	0.235	0.708	0.870	0.913	AVE= 0.768 $\sqrt{AVE} =$ **0.876**				
Pro-cesses	0.411	0.214	0.229	0.259	0.316	AVE= 0.887 $\sqrt{AVE} =$ **0.942**			
Relation-al Mecha-nisms	0.374	0.151	0.191	0.211	0.183	0.168	AVE= 0.836 $\sqrt{AVE} =$ **0.914**		
Role of IT Auditors	0.117	0.441	0.579	0.649	0.882	0.298	0.129	AVE= 0.814 $\sqrt{AVE} =$ **0.902**	
Struc-tures	0.978	0.410	0.260	0.260	0.207	0.405	0.248	0.098	AVE= 0.833 $\sqrt{AVE} =$ **0.913**

Table 8: Fornell-Larcker Criterion

The diagonal terms (in bold and shaded) are square roots of the average variance extracted. Off-diagonal terms are the correlation of latent constructs.

4.4.5 Coefficients of determination (R^2)

The primary goal of the PLS-SEM method is prediction [61]. Particularly, predictive power of the structural model is assessed by the PLS-SEM is coefficient of determination (R^2). In the ordinary least squares regression, PLS R^2 result indicates the amount of variance in the construct in question that is explained by the model [58]. Thus, R^2 measures the relationship of a latent variable's explained variance to its total variance.

The value of R^2 needs to lies between 0 and 1. If the value is closer to 1 the exogenous variable explains the dependent variable well and if it is closer to zero it is weak. R^2 is generally expected to have a values of 0.75 and above. Thus, R^2 values of 0.75, 0.50 and 0.25 are considered to be substantial, moderate, and weak respectively [59]. In this research findings (table 9) of the R- Squared value of prediction by the PLS path model is 0.843 of the firm performance. This value means that the total constructs contribute 84.3% for the effect of firm performance, which is considered to be substantial.

	R Square	R Square Adjusted
IT Auditing	0.978	0.977
EGIT Mechanisms	0.975	0.973
EGIT Performance	0.579	0.563
Firm Performance	0.843	0.840

Table 9: R-Square and R-Square Adjusted value

The adjusted R^2 values take into account model complexity and sample size and are thus helpful to compare different models or the explanatory power of a model across different datasets [60].

4.4.6 Assessment of predictive Relevance (Q^2)

The Q-square statistic has been the primary option to help assess the predictive validity. This statistic is typically provided as a result of a blindfolding algorithm [59]. This blindfolding algorithm is used to examine if the model or a single effect of it can predict values of reflective indicators [60]. $Q^2 > 0$ implies the model has predictive relevance whereas $Q^2 < 0$ represents a lack of predictive relevance [58]. In the PLS-SEM, the proposed threshold value of Q^2 larger than zero and the latent variable indicate the path model's is predictive [59] [61] [60].

Predictive relevance for this specific construct confirms that, in accordance with the presence of predictive relevance latent variable's indication, that result is (obtained by using the blindfolding) Q^2 value of 0.530 for IT Auditing, 0.519 for EGIT Mechanisms, 0.366 for EGIT Performance and 0.536 for Firm Performance, as is presented in table 10. In table 10, all the values that are above zero confirm that the structural model exhibits predictive relevance for firm performance.

	Q^2
EGIT Mechanisms	0.519
EGIT Performance	0.366
Firm Performance	0.536
IT Auditing	0.530

Table 10: Predictive relevance (Q^2) values

4.4.7 Variance Inflation Factor (VIF)

Indicators weights have unexpected signs or are insignificant, and this can be due to multicollinearity. It is, therefore, recommendable to assess the Variance Inflation Factor (VIF) of the indicators [60]. Collinearity is the measurement of VIF, which has value of 5 and higher indicates a potential collinearity problem. The measurement models were analyzed for their significance and relevance only if collinearity is not at a critical level [59]. The result (outlined table 11) shows that the VIF values were uniformly below the threshold value of 5 and the data were free from any problem of

collinearity. Hence, the researcher detected that collinearity does not reach critical levels in any of the latent variables and is not an issue for the estimation of the PLS path model.

Latent Variables	Collinearity Statistics (VIF)
Role of IT Auditors	1.729
IT Audit Quality	1.729
IT Auditing	1.058
EGIT Structures	1.246
EGIT Processes	1.204
EGIT Relational Mechanisms	1.072
EGIT Mechanisms	1.058
EGIT Performance	1.000

Table 11: Collinearity Statistics (VIF) values

4.5 Hypotheses testing

Using a bootstrapping technique with a re-sampling of 5000, this number is sufficiently close to infinity for usual situations, the path estimates and t-statistics were calculated for the hypothesized relationships. This bootstrap samples are drawn from modified sample data [60]. The researcher derived eight hypotheses for this research based on literature review.

The coefficient of the relationship of observable latent variables (RITA, ITAQ, IT Auditing, Structures, Processes, Relational Mechanisms, EGIT Mechanisms, and EGIT Performance) to dependent variable Firm Performance, along with its significance levels, is reported in table 12. The accepted significance level is $t > 1.96$ or $p < 0.05$. Therefore, the size of t- value result above 1.96 considered that the path coefficient is significantly different from zero at a significance level of 5% ($a= 0.05$; two-tailed test) [59] [60].

Table 12 shows that the result of the structural model assessment with bootstrapping (5000 resamples, two-tailed) was used to generate standard errors, t-statistics, and percentile 95% confidence intervals. Based on the data collected from the respondents examining the proposed

hypotheses with the parameter whose t-values are greater than 1.96 were considered statistically significant at the 0.05 level, and path coefficients with a 5% or less probability of error were also considered to be significant [59].

The result is presented below, and except for that of H4 (i.e., Processes → EGIT Mechanisms), the proposed relationships and hypotheses were found significant and supported in this study.

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Decisions
H1: RITA→ IT Auditing	0.500	13.043	0.000	Supported
H2: ITAQ → IT Auditing	0.588	12.056	0.000	Supported
H3: Structures → EGIT Mechanisms	0.941	30.371	0.000	Supported
H4: Processes → EGIT Mechanisms	0.006	0.250	0.802	Not Supported
H5: Relational Mechanisms → EGIT Mechanisms	0.139	3.369	0.001	Supported
H6: IT Auditing → EGIT Performance	0.641	7.018	0.000	Supported
H7: EGIT Mechanisms → EGIT Performance	0.286	3.089	0.002	Supported
H8: EGIT Performance → Firm Performance	0.918	76.309	0.000	Supported

Table 12: T-value and p-value

4.6 Size and significance of path coefficients

	EGIT Mechanisms	EGIT Performance	IT Auditing	Firm Performance
Role of IT Auditors			0.500	
IT Audit Quality			0.588	
IT Auditing		0.641		
EGIT Structures	0.941			
EGIT Processes	0.006			
EGIT Relational Mechanisms	0.139			
EGIT Mechanisms		0.286		
EGIT Performance				0.918

Table 13: Total path coefficients

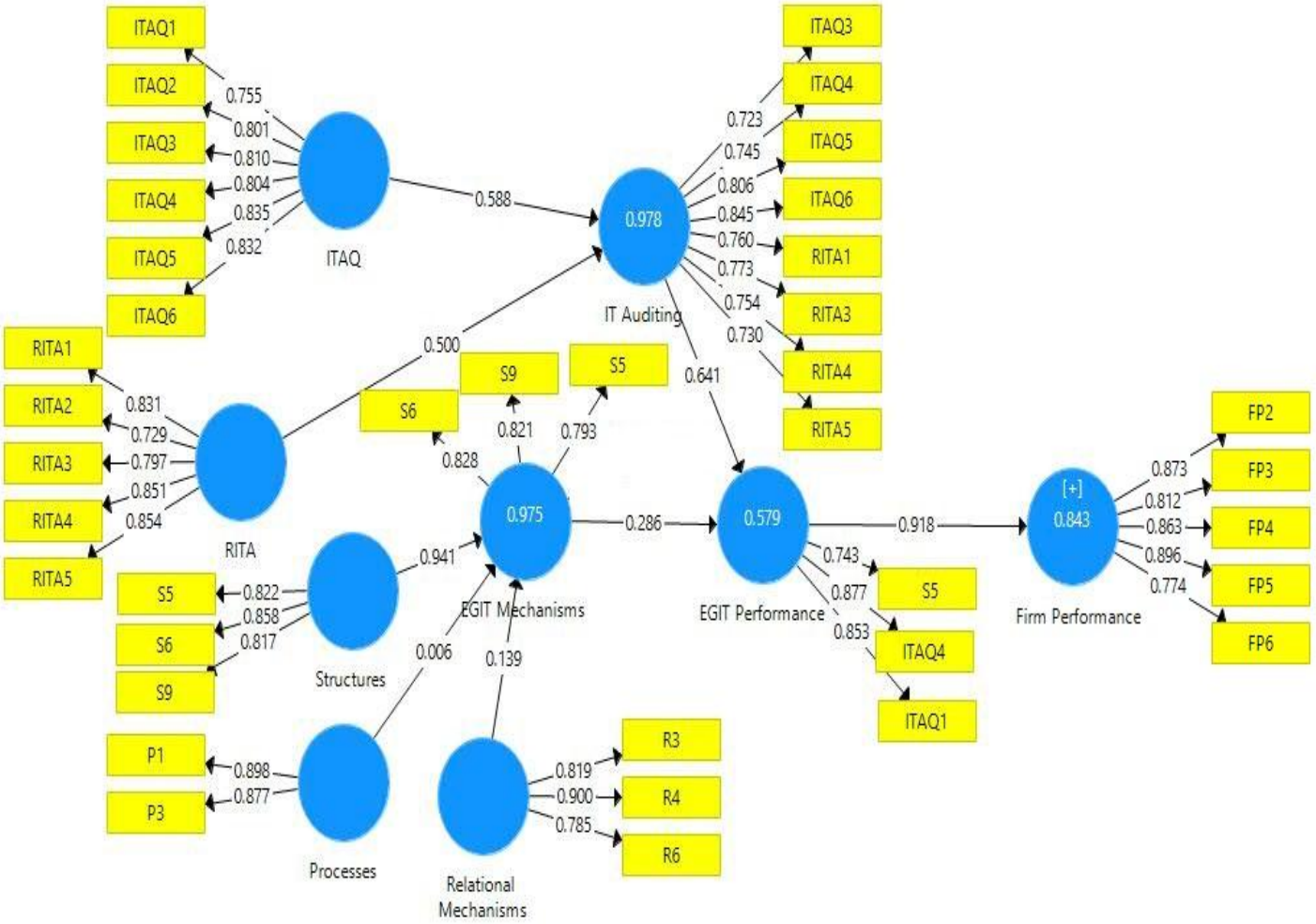


Figure 6: Path Estimation

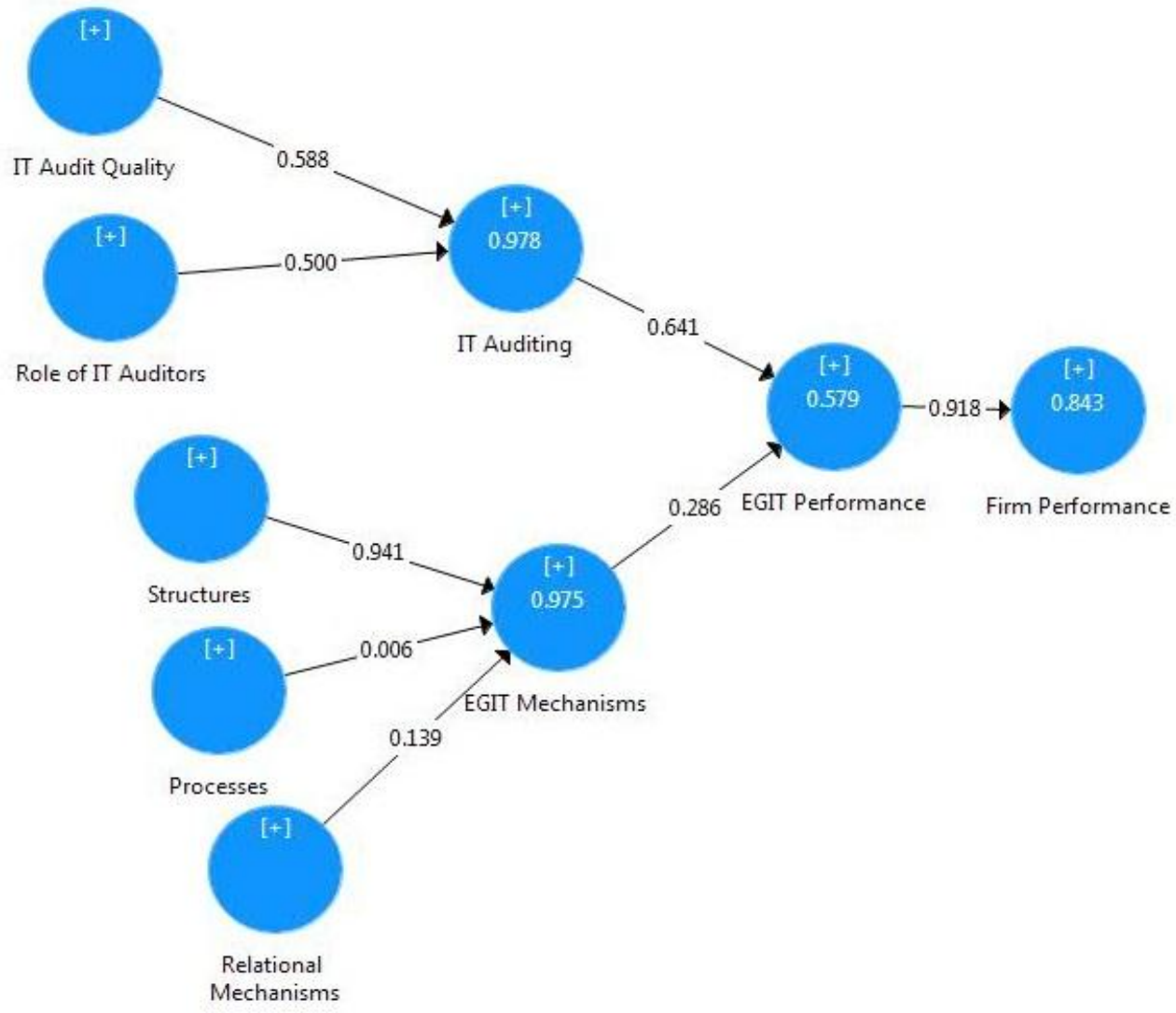


Figure 7: Path model

The path coefficient (see table 13) explains the relative importance of exogenous construct (IT Audit Quality, Role of IT Auditors, EGIT Structures, EGIT Processes and EGIT Relational Mechanisms) on endogenous construct (Firm performance). The estimated path coefficient (as the value of path coefficient ranges between -1 to +1) value of close to +1 represents a strong relationships and statistical significance. Contrarily, a value closer to 0 implies a weak relationship between the constructs. As indicated in figures 6 and 7, all of the link headed for EGIT performance depict positive values.

4.7 Discussion of Findings

4.7.1 The Influence of IT Auditing on EGIT Performance

In this section, findings are discussed in accordance with three hypotheses (H1, H2 and H6) tested to examine the influence that Role of IT Auditors and IT Audit Quality have, and what influence IT Auditing has on EGIT performance.

4.7.1.1 The Influence of Role of IT Auditor on IT Auditing

This section explains the results of hypothesis testing with respect to the influence of Role of IT Auditors on IT Auditing. It was hypothesized that Role of IT Auditors has a positive influence on IT Auditing. The first hypothesis was:

H1: The Role of IT Auditors is positively and strongly correlated to IT Auditing.

H1 claims that there is a positive and significant relationship between the Role of IT Auditors and IT Auditing. This claim was supported by the research. The path coefficient measuring the path from Role of IT Auditors to IT Auditing in the model was 0.50 with t-value of 13.043 and p-value of 0.000 (table 12). The suggested positive relationship between Role of IT Auditors and IT Auditing was proved and it was statistically significant.

This finding is consistent with prior research works that show Role of IT Auditors as having positive and statistically significant influence on IT Auditing. Spremic [37] claimed that internal IT Auditors are significantly important and responsible for performing IT Auditing. The number of years of IT audit experience and IT auditors are critical components of IT Auditing [2] [19]. A similar finding has also been observed by Axelsen et al [51]; D'Onza [13]; and Gheorghe [30]. Hence, the conclusion reached from testing this hypothesis is found to be in line with the above previous research works. Thus, the Role of IT Auditors has positive influence on IT Auditing and statistically significant.

In summary, all hypotheses that linked to IT Auditing are supported on this study. As indicated on the above subsequent section all of the elements of IT Auditing have positive and statistically

significant influence on EGIT Performance. IT Audit Quality has greater and positive influence (58.8%) on IT Auditing, followed by the Role of IT Auditors (50%).

4.7.1.2 The Influence of IT Audit Quality on IT Auditing

One of the objectives of this thesis is to understand the influence of IT Audit Quality on IT Auditing which leads to the hypothesis that IT Audit Quality has a positive influence on IT Auditing. Therefore, the second proposed hypothesis was:

H2: IT Audit Quality is positively and strongly correlated to IT Auditing.

H2 claims that there is a positive and significant relationship between IT Audit Quality and IT Auditing. This claim was supported by the research. The path coefficient measuring the path from IT Audit Quality to IT Auditing in the model was 0.588 with t-value of 12.056 and p-value of 0.000 (table 12). The suggested positive relationship between IT Audit Quality and IT Auditing was confirmed and was statistically significant.

This finding, again, is in line with previous research works that show IT Audit Quality to have significant influence on IT Auditing. Farouk and Hassan [42] explain IT Audit Quality should attempt to maximize the overall audit quality and minimize the cost as related to their specific IT audit objectives. Merhout and Havelka [20] also confirmed this claim stating that, by ensuing IT Audit Quality, it is possible to meet the requirements of IT Audit methodology. Hence, for this hypothesis IT Audit Quality has positive influence on IT Auditing and is statistically significant.

4.7.1.3 The Influence IT Auditing has on EGIT Performance

This section explains the results of hypothesis testing with respect to the influence of IT Auditing on EGIT Performance. It was hypothesized that IT Auditing has a positive influence on EGIT Performance. The *sixth hypothesis* was:

H6: IT Auditing is positively and strongly correlated to EGIT performance.

H6 states that there is a positive and significant relationship between IT Auditing and EGIT Performance. Sufficient evidence was found to support the significance of this hypothesis. The path coefficient measuring the path of IT Auditing to EGIT Performance in the model was 0.641 with t-value of 7.018 and p-value of 0.000 (table 12). Based on these, it can be safely concluded that the hypothesized positive and significant relationship between IT Auditing and EGIT Performance was well established in this research. IT Auditing was found to reveal the expected positive and significant influence it has on EGIT Performance.

Therefore, H6 is statistically supported in this research. An empirical research studies by Mengistu [26], Gheorghe [30] and Mueller [4], which explain that IT Auditing has a positive and significant influence on ITG Performance. Therefore, the suggested positive relationship between IT Auditing and EGIT Performance was confirmed and it was found to be statistically significant.

4.7.2 The Influence of EGIT Mechanisms on EGIT Performance

In this section, findings are discussed in accordance with four hypotheses (H3, H4, H5 and H7) tested to investigate the influence of EGIT Structures, EGIT Processes and EGIT Relational Mechanisms on EGIT Mechanisms.

4.7.2.1 The Influence of EGIT Structures on EGIT Mechanisms

This section explains the results of hypothesis testing with respect to the influence of EGIT Structures on EGIT Mechanisms. It was hypothesized that EGIT Structures have a positive influence on EGIT Mechanisms. The third hypothesis was:

H3: EGIT Structures are positively and strongly correlated to EGIT Mechanisms.

H3 states that there is a positive and significant relationship between EGIT Structures and EGIT Mechanisms. There was sufficient evidence to support the validity of this hypothesis. The path coefficient measuring the path of EGIT Structures to EGIT Mechanisms in the model was found to be 0.941 (94.1%) with t-value of 30.371 and p-value of 0.000 (table 12). Hence, it can be safely concluded that the hypothesized positive and significant relationship between EGIT Structures and EGIT Mechanisms was well developed in this research. EGIT Structures were found to reveal the

expected positive and significant influence on EGIT Mechanisms. Therefore, H4 is statistically supported in this research.

As a matter of fact, there is empirical research supporting the validity of this hypothesis, by Haes and Grembergen [7], which explains that EGIT Structures that strengthen the connection and integration affect EGIT Mechanisms positively. Carsten [4], Haes and Grembergen [7], Gheorghe [30] and Supriyadi [35] also claimed that the most visible EGIT mechanisms are enterprise governance of IT structures. Therefore, the suggested positive relationship between EGIT Structures and EGIT Mechanisms is confirmed, and it was found to be statistically significant.

4.7.2.2 The Influence of EGIT processes on EGIT Mechanisms

This section explains the results of hypothesis testing with respect to the influence of EGIT processes on EGIT Mechanisms. It was hypothesized that EGIT processes have a positive influence on EGIT Mechanisms. The fourth hypothesis was:

H4: EGIT Processes are positively and strongly correlated to EGIT Mechanisms.

The *fourth hypothesis* for this study which claimed that EGIT processes are positively and strongly correlated to EGIT Mechanisms, was not well supported. The path coefficient measuring the path from EGIT processes to EGIT Mechanisms in the model was found to be 0.006, with t-value of 0.250 and p-value of 0.802 (table 12). Consequently, the fourth hypothesis for this study which proposed that EGIT processes are positively correlated with EGIT Mechanisms was not supported. It was previously reported that there was statistically significant correlation between EGIT processes and EGIT Mechanisms against the claim made by prior studies [9] [17] [30] [35].

4.7.2.3 The Influence of EGIT Relational Mechanisms on EGIT Mechanisms

This section explains the results of hypothesis testing with respect to the influence of EGIT Relational Mechanisms on EGIT Mechanisms. It was hypothesized that EGIT Relational Mechanisms have a positive influence on EGIT Mechanisms. The fifth hypothesis was:

H5: EGIT Relational Mechanisms are positively and strongly correlated to EGIT Mechanisms.

In the discussions so far, antecedents of EGIT Relational Mechanisms have been shown to be positive and significant relationship between EGIT Relational Mechanisms and EGIT Mechanisms have been exhibited. There is enough evidence to support the significance of this hypothesis as well. The path coefficient measuring the path of EGIT Relational Mechanisms to EGIT Mechanisms in the model was found to be 0.139 (13.9%) with t-value of 3.369 and P-value of 0.001 (table 12). It can be safely concluded that the hypothesized positive and significant relationship between EGIT Relational Mechanisms and EGIT Mechanisms is well developed in this research. EGIT Relational Mechanisms were found to reveal the expected positive and significant influence on EGIT Mechanisms. Therefore, H6 is statistically supported in this research.

This, too, is in line with prior studies (Héroux and Fortin [2]; Haes and Grembergen [7]; Supriyadi [35]) who state the EGIT Relational Mechanisms are used to improve association with EGIT mechanisms. In addition, Grembergen and Haes [8] state that relational mechanisms, such as training, awareness building, etc., are crucial and receive a lot of attention in the Enterprise Governance of IT mechanisms. Therefore, the suggested positive relationship between EGIT relational mechanisms and EGIT Mechanisms have been confirmed and it found to be statistically significant.

4.7.2.4 The Influence EGIT Mechanisms on EGIT Performance

This section explains the results of hypothesis testing with respect to the influence of EGIT Mechanisms on EGIT performance. It was hypothesized that EGIT Mechanisms are positively and strongly correlated to EGIT performance. The seventh hypothesis was:

H7: EGIT Mechanisms are positively and strongly correlated to EGIT performance.

H7 suggests that there is a positive and significant relationship between EGIT Mechanisms and EGIT performance. This suggestion was well supported by the statistical results. The path coefficient measuring the path from EGIT Mechanisms to EGIT performance in the model was 0.286, showing path coefficient and t-value of 3.089 (table 12). Thus, it can be said that H7 is supported (t=3.089 and p=0.002). This finding is in agreement with the findings of the previous literature. Researchers who tested the influence of EGIT Mechanisms on the EGIT performance found a positive link between

the two latent variables (Mueller [4]; Mengistu [26]; Spremic [37]). Therefore, EGIT Mechanisms have significant and positive influence on EGIT performance.

4.7.3 The Influence of EGIT Performance on Firm Performance.

This section explains the results of hypothesis testing with respect to the influence of EGIT performance on Firm performance. It was hypothesized that EGIT performance is positively and strongly correlated to Firm performance. The eighth hypothesis was:

H8: EGIT performance is positively and strongly correlated to Firm performance.

H8 suggests that there is a positive and significant relationship between EGIT performance and Firm performance. Furthermore, the hypothesis was statistically supported from the analysis. The path coefficient measuring the path from EGIT performance to Firm performance in the model was 0.918 with t-value of 76.309 and p-value 0.000. Therefore, H8 is supported (t=76.309 and p=0.000).
This result is in agreement with the findings of the previous literature and a path of 0.90 or above would indicate an extremely strong result [58].

There is sufficient empirical research support for a positive influence relationship between IT governance, which itself increases firm performance [28]. Another similar academic research Lazic et al. [32] claimed that good IT governance draws on corporate governance principles to manage and use IT to achieve corporate performance goals. Thus, EGIT performance does have a positive influence on Firm performance, and this influence is statistically significant.

In a prior research, Mengistu [26], concluded that the influence of IT governance performance on firm performance was indicated by the correlation between IT governance performance and organizational performance being positively correlated. Thus, elements of IT Auditing; IT Audit Quality and Role of IT Auditors have positive influences respective degree. Similarly, element of EGIT Mechanisms; EGIT Structures and EGIT Relational Mechanisms have strong positive influence on EGIT Mechanisms as well. However, EGIT Processes are not statistically supported. In general, EGIT Performance has positive and strong correlation to Firm performance.

The hypotheses of this study were well tested based on the data gathered. Summarizing it all, table 12 indicates that except for H4 (i.e., Processes → EGIT Mechanisms), the remaining hypotheses were all supported: IT Audit Quality strongly related (0.588) to IT Auditing; EGIT Structures more strongly related (0.941) to EGIT Mechanisms than Relational Mechanisms (0.139) are; IT Auditing more strongly related (0.641) to EGIT Performance than EGIT Mechanisms (0.286) are; EGIT Performance strongly related (0.918) to Firm Performance.

4.7.4 Discussion in light of research questions

This section describes the results in light of research questions which are intended to answer accordingly. The first research question raised at onset of the study was, "How are IT Auditing and EGIT Performance related?" In relation to this, as 64.1% of the path coefficient of IT Auditing to EGIT Performance points toward, the result shows that IT Auditing is positively and strongly related to EGIT Performance more strongly than EGIT Mechanisms are.

The second research question was, "How are EGIT Mechanisms and EGIT Performance related?" In relation to this, the path coefficient of EGIT Mechanisms to EGIT Performance was 28.6%. This shows that, statistically, there is a positive and strong correlation to EGIT Performance. Hence, IT Auditing has more influence on firm performance than EGIT Mechanisms. Both IT Auditing and EGIT Mechanisms have positive influence on EGIT Performance. However, the influence of IT Auditing on EGIT Performance is stronger than EGIT Mechanisms.

The third and last research question was, "How does EGIT Performance affect firm performance?" As discussed in the above subsequent sections, EGIT Performance has a positive and strong correlation to firm performance. The path coefficient of EGIT Performance has a strong correlation to firm performance was found to be 91.8%. This, value indicates that EGIT Performance has a strong correlation to firm performance. The R-Squared value of prediction by the PLS-SEM path model was found to be 0.843 of the firm performance. This value means that the total constructs contribute 84.3% for the effect of firm performance, which is substantial.

4.8 Summary

This chapter discussed the data analysis and findings presented in chapter four. The data of this research was successfully tested and is considered reliable and valid based on the results of the reliability as well as validity tests. The path coefficient of IT Audit Quality strongly related (58.8%) to IT Auditing than Role of IT Auditors (50%). In the other hand of EGIT Mechanisms, the path coefficient of EGIT Structure strongly related (94.1%) to EGIT Mechanisms followed by EGIT Relational Mechanisms (13.9%) and EGIT Processes (0.6%). The relationship between IT Auditing and EGIT Mechanisms influencing the Firm Performance through EGIT Performance, IT Auditing strongly related (64.1%) to EGIT Performance.

Consequently, all hypotheses of the research were tested. In general, all hypotheses of the test indicate that except for H4 (i.e., Processes → EGIT Mechanisms), the remaining hypotheses were all supported in this research study. The research questions were also discussed. The next chapter presents the conclusions from this study, recommendations and the directions for future research.

Chapter Five

Conclusions, Recommendations and Directions for Future

This chapter presents the theoretical (conceptual) and practical contribution, some recommendations based on the evidences presented during the course of the study, and area of recommendation for further research are also discussed.

5.1 Conclusions

This research identified and empirically tested a conceptual model that related to IT auditing practices and EGIT mechanisms, and their influence on firm performance through EGIT Performance in the context of the Ethiopian commercial banking industry. In this research, firm performance of latent variable has been measured based on financial and non-financial performance. The major findings of this study can be summarized as follows.

Overall, both IT Auditing factor constructs (IT Audit Quality and Role of IT Auditors) have been found to be positively and strongly correlated with IT Auditing. Nevertheless, IT Audit Quality has more positive influence on IT Auditing than Role of IT Auditors has. On the other side, among EGIT Mechanisms, constructs (Structures and Relational Mechanisms) were positively and strongly correlated with EGIT mechanisms. Comparatively, EGIT Structures are stronger than Relational Mechanisms.

The study's results indicate that the relationship between Relational Mechanisms and EGIT Mechanisms to be 13% of path coefficient. Hence, board of directors, senior executive managers and/or CIOs should consider the implementation of Relational Mechanisms to address the gap properly. However, in this research, EGIT Processes have not been found statistically significant and substantial when compared to the other latent variables of EGIT Mechanisms.

Both IT Auditing and EGIT Mechanisms have positive influence on EGIT Performance. However, the influence of IT Auditing on EGIT Performance is stronger than EGIT Mechanisms. The findings of this research also revealed the statistical significance of the relationship between EGIT performance and

firm performance (financial and non-financial performance). Moreover, the result was also indicative of EGIT Performance's positive influence on Firm Performance.

IT Auditing and EGIT Mechanisms can also serve as a model for enhancing the performance of an organization. The research, in this regard, contributes to theoretical foundations of the relationship between IT Auditing and Enterprise Governance of IT Mechanisms, and can strengthen EGIT performance for continuous improvement in its firms. Consequently, board of directors and senior executive managers in the Ethiopian banking industry should look for some solutions for the constructs of EGIT Mechanisms, specifically certain EGIT Processes and Relational Mechanisms to address the consequences.

Enterprises are progressively making tangible and intangible investments in improving enterprise governance of IT. EGIT has substantial advantages for the integration of IT resources with other organizational resources, subsequently leading to improved competitive benefits. Contrarily, lack of effective EGIT may lead to inability to comply with regulatory requirements, delivery of poor quality IT product/service, weakened competitive position and lower customer satisfaction.

Finally, for firms to implement an IT Audit efficiently and effectively, they must make appropriate decisions regarding IT Audit Quality and the Role of IT Auditors, which undoubtedly influence organizational performance. Thus, based on the results of the research, it can be concluded that Enterprise Governance of IT performance significantly and positively improves firm performance, and is a most worthy consideration for such firms.

5.2 Contribution of the Study

This research, attempts to fill the gap in regards to concerns which have not been addressed in previous research works. On top of this, this research model also highlighted the relationship between Enterprise Governance of IT performance with firm performance. Based on the above context, the contribution of this research work can be deliberated in the list below:

- It provides board of directors, senior executive managers, CIOs and IT Audit managers with new insights that might enable them to use EGIT and IT Auditing as corporate strategic positions for better organizational performance and competitive advantage.

- The National Bank of Ethiopia (NBE) can use the findings of this research study as an input to introduce IT Auditing and Enterprise Governance IT practices into the financial industry (i.e., insurance, banking sectors, and micro finance) of Ethiopia.

- The number of commercial banks and insurance companies in Ethiopia has shown a steady increase in recent years [15]. However, new banks seem to continue IT practices that have already been in place in the banks that existed before them. Hence, the inputs that can be found from this study, while the study remains to be done on the already existing and relatively easier to consider number of commercial banks, can be relevant and informative for the decision-making process of commercial banks yet to be opened in the future, in the area of EGIT and IT Auditing practices.

- Ethiopia is on the verge of joining World Trade Organization (WTO), the financial industry in Ethiopia will eventually be open for international commercial banks. Since these banks are generally assumed to be well equipped regarding Enterprise Governance of IT and IT Auditing practices, this study, beforehand, can be instrumental in indicating for local commercial banks gaps and opportunities they need to fill regarding this specific area.

- This research study contributes to the foundational theoretical framework that can be used in future empirical researches for researches who might be interested to work in a related topic.

5.3 Recommendations for Future Research

Based on the findings of this study, the researcher offers the following recommendations for future research, especially for the commercial banks in the Ethiopian banking industry:

- The influence of EGIT Processes on EGIT Mechanisms, specifically those that didn't show statistically significant relationship, should be further examined by other researchers.
- The relationship of Relational Mechanisms and EGIT Mechanisms which were indicated by 13.9% of path coefficient need to be further examined by other researchers in the future.
- In terms industry, this study focused only on commercial banks in Ethiopia. Hence, further studies are required in other IT/IS intensive sectors such as Insurance, Manufacturing, Aviation and Telecom.
- Another crucial area for future research is operationalizing input based indicators such as EGIT implementation, IT Audit time and IT Audit methodology.

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Appendix A: Sampling frame of the study

No	List of Banks	Ownership
1	Abay Bank	Private
2	Addis International Bank	Private
3	Awash Bank	Private
4	Bank of Abyssinia	Private
5	Birhan Bank	Private
6	Buna International Bank	Private
7	Commercial Bank of Ethiopia	State
8	Cooperative Bank of Oromia	Private
9	Dashen Bank	Private
10	Debub Global Bank	Private
11	Enat Bank	Private
12	Lion International Bank	Private
13	Nib International Bank	Private
14	Oromia International Bank	Private
15	United Bank	Private
16	Wegagen Bank	Private
17	Zemen Bank	Private

Appendix B: Population of target respondents from nine commercial banks.

No	Bank's employees	Quantity	Banks	Total Populations
1	CIO	1	9	9
2	IT Audit Manager	1	9	9
3	IT Manager	3	9	27
4	IT Auditor	2	9	18
5	IT Expert	5	9	45
			Grand total populations	**108**

Appendix C: Outer loading value

Construct	Indictors	Loading	Status	Construct	Indictors	Loading	Status
IT Audit Quality	ITAQ1	**0.767**	Retained	EGIT Processes	P1	**0.728**	Retained
	ITAQ2	**0.816**	Retained		P2	0.685	Deleted
	ITAQ3	**0.823**	Retained		P3	**0.748**	Retained
	ITAQ4	**0.795**	Retained		P4	0.671	Deleted
	ITAQ5	**0.820**	Retained		P5	0.484	Deleted
	ITAQ6	**0.821**	Retained		P6	0.568	Deleted
Role of IT Auditors	RITA1	**0.832**	Retained		P7	0.507	Deleted
	RITA2	**0.740**	Retained		P8	0.693	Deleted
	RITA3	**0.796**	Retained		P9	0.635	Deleted
	RITA4	**0.846**	Retained		P10	0.672	Deleted
	RITA5	**0.852**	Retained	EGIT Relational Mechanisms	R1	0.575	Deleted
EGIT Structures	S1	**0.701**	Retained		R2	0.622	Deleted
	S2	0.649	Deleted		R3	**0.740**	Retained
	S3	0.680	Deleted		R4	**0.831**	Retained
	S4	0.444	Deleted		R5	0.674	Deleted
	S5	**0.804**	Retained		R6	**0.764**	Retained
	S6	**0.786**	Retained		R7	0.562	Deleted
	S7	0.645	Deleted		R8	**0.706**	Retained
	S8	0.640	Deleted		R9	0.681	Deleted
	S9	**0.737**	Retained	Financial Performance	FP1	0.685	Deleted
Non-Financial Performance	NFP1	0.430	Deleted		FP2	**0.825**	Retained
	NFP2	-0.459	Deleted		FP3	**0.767**	Retained
	NFP3	0.522	Deleted		FP4	**0.754**	Retained
	NFP4	0.399	Deleted		FP5	**0.823**	Retained
					FP6	**0.756**	Retained

Appendix D: Questionnaire

Addis Ababa University
College of Natural Science
School of Information Science

Dear Respondent,

I am Biniam Gedlie a postgraduate student at Addis Ababa University. This questionnaire is prepared to collect data on a research study entitled **"IT Auditing and Enterprise Governance of IT Mechanisms in the Banking Industry of Ethiopia"** for my Master's thesis.

The questionnaire should take you about Twenty-Five minutes to complete. The purpose of the survey is to identify the effect of IT Auditing (IT Audit Quality and Role of IT Auditor) and EGIT Mechanisms (Structure, Processes and Relational Mechanisms) on firm performance.

We guarantee you that your responses will be strictly confidential and used for the purpose of academic purpose only. All of the data will be summarized and no one will be identified from these summarized results. As the result of the survey, we will generate some conclusion and recommendations for the organizations in their IT Auditing and Enterprise Governance of IT determination.

Your dedication is most valued and appreciated. Thank you in advance for your kind participation.

Best Regards,

Biniam Gedlie
E-mail: biniam.gedlie@aau.edu.et

INSTRUCTIONS:

This questionnaire consists of two parts, Part I deals with background of respondents and Part II consists of the main survey questions of the research. PLEASE FILL, CIRCLE, OR TICK (√) AS APPROPRIATE ANSWER.

PART I: Demographic Information of the Respondent

1. Gender:

   Male ☐ Female ☐

2. Age:

   18-24 ☐ 25 -30 ☐ 31 - 40 ☐ 41 - 50 ☐ 51 – 60 ☐

3. Educational level

   Diploma ☐ Bachelor Degree ☐ Masters ☐ PhD ☐

4. Which of the following categories indicate your current position in organization?

   CIO ☐ IT Manager ☐ IT Audit Manager ☐ IT Auditor ☐ IT Expert ☐

5. How long have you been worked in the organization?

   Below 2 Years ☐ 2 -5 Years ☐ 5 - 7 Years ☐

   7 – 10 Years ☐ Above 10 Years ☐

PART II: IT Auditing

Code	**Please indicate your agreement or disagreement with the statements below. There are no wrong answers. Your views on IT Audit Quality Attributes**	**Strongly Disagree (1)**	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
ITAQ1	Effectiveness of IT audit performed in the organization					
ITAQ2	Reliability of IT audit conducted					
ITAQ3	Efficiency of IT audit in the organization					
ITAQ4	The IT Audit is adequately planned					
ITAQ5	Sufficient resources exist to meet audit scope and timeframe					
ITAQ6	Overall perception of IT Audit Quality					

Role of IT Auditors (RITA) Attributes (RITAx)

Code	**Your views on Role of IT Auditors(RITA) Attributes**	**Strongly Disagree (1)**	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
RITA1	IT Auditee understands the IT audit process and purpose of the audit					
RITA2	IT Audit team has good communication skills (oral and written)					
RITA3	The IT audit team members have high ethical standards					
RITA4	IT Audit team members are very knowledgeable about internal controls and business processes					
RITA5	IT Audit team members are knowledgeable about unique business practices and processes in your industry					

PART III: Enterprise Governance of IT

Enterprise Governance of IT Mechanisms- EGIT Structures (Sx)

Code	How do you personally rate your views on Enterprise Governance of IT Mechanisms- EGIT Structures?	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
S1	There is IT strategy committee at level of board of directors					
S2	There is IT expertise at level of board of directors					
S3	There is CIO on executive committee					
S4	CIO reporting to CEO (Chief Executive Officer) and/or COO (Chief Operational Officer)					
S5	There is IT steering committee					
S6	There is IT governance function / officer					
S7	There is security / compliance / risk officer					
S8	There is architecture steering committee					
S9	There is integration of governance/alignment tasks in roles & responsibilities					

Enterprise Governance of IT Mechanisms- EGIT Processes (Px)

Code	How do you personally rate your views on Enterprise Governance of IT Mechanisms- EGIT Processes?	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
P1	There is Strategic information systems planning					
P2	There is IT performance measurement (e.g Return on investment (ROI), IT balanced scorecard)					
P3	There is portfolio management (incl. business cases, information economics, ROI, payback)					

P4	There is charge back arrangement - total cost of ownership (e.g. activity based costing)					
P5	Service level agreements (Formal agreement to delivery IT service to both internal and/or external customers)					
P6	My organization uses IT governance frameworks like COBIT, ITIL, ISO, COSO or tailored					
P7	There is IT governance assurance and self-assessment					
P8	There is IT Project management/governance methodologies					
P9	There is formal IT budget control and reporting practice					
P10	Benefits management and reporting					

Enterprise Governance of IT Mechanisms- EGIT Relational Mechanisms (RMx)

Code	How do you personally rate your views on Enterprise Governance of IT Mechanisms- EGIT Relational Mechanisms?	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
R1	There is job-rotation between Business and IT to promote continued learning					
R2	There is co-location business and IT					
R3	There is cross-training between business and IT					
R4	Knowledge management on IT Governance (Platform to share and distribute knowledge about IT Governance roles and responsibilities)					

R5	There is business/IT account management					
R6	Executive / senior management giving the good example (Senior business and IT management working as partners)					
R7	There is informal meeting between business and IT executive/ senior management					
R8	There is corporate internal communication addressing IT on a regular basis					
R9	There is IT governance awareness campaigns					

PART IV: Firm Performance

Firm performance- Financial aspect (FPx)

Code	Statement about the financial aspect of firm performance	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
FP1	The return on investment (ROI)					
FP2	Sales Revenue Increase					
FP3	Market Share Increase					
FP4	Cost Savings					
FP5	Operating efficiency					
FP6	Process Improvement					

Firm performance- Non-Financial aspect (NFPx)

Code	Statement for Measures of customer-related aspect of firm performance.	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
NFP1	Our services are considered leaders in the market					
NFP2	Our customers are leaving due to poor services					
NFP3	The quality of services that we provide has improved					
NFP4	Consistently meets the expectations of our customers					

WHEN YOU HAVE COMPLETED THE QUESTIONNAIRE, PLEASE RETURN IT TO ME

I hope you find completing the questionnaire enjoyable, and thank you for taking the time to help me. A summary of the findings will be published on the digital library of Addis Ababa University. If you have any queries or would like further information about this thesis, please email me on biniam.gedlie@aau.edu.et.

Thank you for your help.

Appendix E: Supporting Letter

አዲስ አበባ ዩኒቨርሲቲ
የተፈጥሮ ሳይንስ ኮሌጅ
የኢንፎርሜሽን ሳይንስ ት/ቤት

ADDIS ABABA UNIVERSITY
College of Natural Science
School of Information Science

Date February 2 /2018
Ref:-SIS/ 03/2010

To:- Abay Bank
Awash Bank
Birhan Bank
Commercial Bank of Ethiopia
Dashen Bank
Enat bank
Nib International Bank
United Bank
Zemen Bank
Addis Ababa

Dear Sir / Madam

Student Biniam Gedlie (ID. No. GSE/0357/08) is a graduate student at the School of Information Science, Addis Ababa University. He is currently conducting a MSc thesis research under the title "It Auditing & Enterprise Governance of It in the Banking Industry of Ethiopia".

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

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