ANALYSIS OF THE RELATIONSHIP BETWEEN GOVERNANCE OF ENTERPRISE INFORMATION TECHNOLOGY (IT) AND STRATEGIC BUSINESS-IT ALIGNMENT USING COBIT 5 IN THE CASE OF THE COMMERCIAL BANK OF ETHIOPIA

by

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DECLARATION

I declare the “ANALYSIS OF THE RELATIONSHIP BETWEEN GOVERNANCE OF ENTERPRISE INFORMATION TECHNOLOGY (IT) AND STRATEGIC BUSINESS-IT ALIGNMENT USING COBIT 5 IN THE CASE OF THE COMMERCIAL BANK OF ETHIOPIA (CBE)” is my own work and that all the sources used or quoted have been indicated and acknowledged by means of complete references.

I declare that I have not previously submitted this work or part of it, for examination at UNISA for another qualification or at any other higher education institution.

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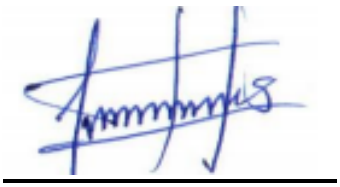

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ABSTRACT

Effective Governance of Enterprise Information Technology (GEIT) is very important for an enterprise that has a huge investment in IT infrastructure. Implementing effective GEIT helps an enterprise to meet stakeholder needs by creating business value through strategic business-IT alignment. This study focuses on the analysis of GEIT implementation related to strategic business-IT alignment using Control Objectives for Information and Related Technology (COBIT 5), using the Commercial Bank of Ethiopia (CBE) as a case study. Strategic alignment is found to be the main concern of GEIT and strong alignment between business objectives and IT capabilities as a means of creating an effective foundation for business execution.

There are various internationally accepted GEIT good practices and standards. In this study, COBIT 5 is selected for its strong aspects of control objectives for strategic business-IT alignment that help enterprises' security, risk and compliance guidance and serves as a tool for leveraging GEIT. COBIT 5 is the leading business framework for the GEIT by making clear that there is a separation between governance and management of IT. This is a single integrated framework that covers the enterprise holistically and integrates with other important frameworks and standards at an advanced level. In addition to this, the use of COBIT 5 Balanced Score Card (BSC) for performance measurement tool (goals cascade), Process Reference Model (PRM), Process Assessment Model (PAM), principles and enablers and Capability Maturity Model (CMM) tool also utilise IT investments more effectively and accurately and measure performance with lower costs through stronger governance.

This study analysed how enterprises effectively implement GEIT practices using COBIT 5 to achieve strong strategic business-IT alignment. The target groups of the study were the top management and IT management of CBE. The researcher used explanatory sequential mixed methods (both quantitative

and qualitative) data collection techniques and analysis procedures. In the quantitative data collection, data were collected and analysed using GEIT practices maturity assessment tool, Luftman Strategic Alignment Maturity Model (LAMM) tool and the data analysed using Statistical Package for the Social Science (SPSS). In the qualitative phase of the study, evidence was collected and examined from observation and participation, document review, focus group, formal and informal discussions with selected managements of CBE and gap assessment using COBIT 5.

Finally, the researcher integrated results to combine the quantitative and qualitative methods. The finidngs of the quantitative analysis indicate that the maturity level of GEIT practices implementation was 1.77, around level 2 maturity level (repeatable but intuitive), whereas the business-IT alignment maturity level of 53.13% agrees that strategic alignment business-IT was good level 3 (established, focused processes) in the case of CBE. GEIT practices implementation regarding strategic business-IT alignment is found to be positive. The data qualitative analysis indicates that the achievement of the capability level of GEIT processes is not defined and deployed based on international best practices and also confirms that the GEIT BSC is not yet implemented. The achievement capability level of GEIT processes implementation using COBIT 5 is under level 2. In this study, the gap between the existing GEIT practices processes and desirable level 4 (managed and measurable) using COBIT 5 was identified and a method to fill the gap was proposed.

KEYWORDS: Business-IT Alignment; BSC; COBIT; GEIT; ISACA; ISO/IEC 15504; LAMM; PRM; PAM; Performance Measurement

ACRONYMS

API	Application Programming Interface
ATM	Automated Teller Machine
BITA	Business and IT Alignment
BSC	Balanced Scorecard
CAB	Change Advisory Board
CBE	Commercial Bank of Ethiopia
CEO	Chief Executive Officer
CIO	Chief Information Officer
CMM	Capability Maturity Model
COBIT	Control Objectives for Information and Related Technology
COSO	Committee of Sponsoring Organisations of the Treadway Commission
GEIT	Governance of Enterprise IT
IS	Information Systems
ISACA	Information System Audit and Control Association
ISO	International Organisation for Standardisation
ITGI	Information Technology Governance Institute
ITIL	Information Technology Infrastructure Library
LAMM	Luftman Strategic Alignment Maturity Model
OECD	Organisation for Economic Co-operation and Development
PAM	Process Assessment Model
PBRM	Plans, Builds, Runs and Monitors
PCI-DSS	Payment Card Industry Data Security Standard
PMO	Programme Management Office
PRINCE2	PRojects IN Controlled Environments
PRM	Process Reference Model
SAM	Strategic Alignment Model
SPSS	Statistical Package for the Social Sciences
TOGAF	The Open Group Architecture Framework
VP	Vice-President

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CHAPTER1: INTRODUCTION

1.1 INTRODUCTION

This study investigated the analysis of the Governance of Enterprise Information Technology (GEIT) related to strategic business-IT alignment using COBIT 5 using the Commercial Bank of Ethiopia (CBE) as a case study. Ethiopia has been registering consistent upward economic growth that could help her to become a low middle-income country by 2025 (World Bank 2015). This rapid growth also applies to the banking industry, which contributes to the building of a strong financial sector. The CBE has been continuously passing through the change process, aiming "*to become a world-class commercial bank by the year 2025*". Banking started in Ethiopia with the establishment of a private bank called the Bank of Abyssinia in 1905 (Mauri 2010). At around 1930, however, the bank went into liquidation. On 29 August 1931, an Imperial Decree was issued that chartered a new bank, the State Bank of Ethiopia (Mauri 2010). Though, the State Bank of Ethiopia was established in 1942, it handled both commercial and regulatory banking activities. The government split the State Bank of Ethiopia into two, realising the need for separation of commercial and regulatory functions. Therefore, CBE was legally established as a share company in 1963 (CBE 2014).

The CBE was a share company that co-existed along with other private share company banks that emerged at the time. Among those were Addis Bank, Banco di Roma, Bancuo di Napoli Ethiopia and Banque de l`Indochine. In 1975, nonetheless, the socialist government nationalised all private-owned banks; until the present government allowed the establishment of private banks. There are now 16 private banks owned by Ethiopians and two government banks in Ethiopia (NBE 2018). Of these, the government-owned bank CBE was established with less than Birr 250 million capital (NBE 2018). CBE has a huge investment and is the leading and largest bank in Ethiopia

and merging Construction Business and Housing Bank (CBB) since 01 April 2016. CBE 75 fruitful years is, as shown in Figure 1-1.

Figure 1-1: CBE 75 fruitful years

The bank is 75 years old and one of the largest and the leading banks in Ethiopia with Birr 495.4 billion worth of assets, Birr 14.6 billion annual profit,

Birr 382.2 billion deposit, 1,235 branches under 15 districts and over 33,365 employees. It includes more than 16.6 million account holders, 1.7 million mobile bank users and 36,768 internet bank users; 3.7 million active VISA card-holders, 1,589 Automated Teller Machines (ATMs) and 6,985 Point of Sale (POS) machines. Moreover, the bank has three subsidiary banks in other African countries (i.e.) two branches in South Sudan and one in Djibouti (CBE 2017). CBE has Relationship Management Authority (RMA) with 720 correspondent banks, of which the Bank has 50 accounts in different currencies. Over 50 correspondent banks with which it has accounts include Royal Bank of Canada, Commerz Bank A.G., City Bank and HSBC Bank among others (CBE2014). Technologically, CBE is a pioneer bank that has been introducing useful up-to-date technologies in Ethiopia. In 1974, it installed NCR 299 with a memory of 8 kilo (k) for a stored program and 8 k for data. CBE was also the first bank to acquire NCR 8,565 mainframe computer and the pioneer in introducing ATM to Ethiopia in 2002 (CBE-IS 2013).

Currently, CBE is implementing various IT initiatives to reach a world-class commercial bank by 2025. Accordingly, IS Programme Management Office (PMO) is implementing several IT project initiatives to meet stakeholders requirements. Among them, Enterprise Resource Planning (ERP), Mobile Money Solution (CBE Birr), Customer Relationship Management (CRM), Enterprise Monitoring Tool (EMT), Electronic Document and Record Management System (EDRMS), IT helpdesk tool and upgrade T24 core banking application.

This chapter outlines the background and motivation, the literature review, the research problem, the research questions as well as the objectives of the study. It also includes a broad overview of the research methods, ethical consideration, limitation, layout and conclusion of the study. The background and motivation is discussed in the next section.

1.2 BACKGROUND AND MOTIVATION

Today, GEIT is a hot topic in the IT sector and various businesses are implementing it to achieve better strategic business-IT alignment (Haes & Grembergen 2008). GEIT is responsible for ensuring alignment and prioritisation of projects based on the strategic goals of an enterprise (Bernard 2012). The main driver for this research is that the strategic business-IT alignment is one of the key focus areas of GEIT and very crucial to an enterprise (ITGI 2007; Silva & Chaix, 2008; Silvius & Smit 2011). The researcher is motivated by misalignment as one of the main reasons why enterprises fail to create business value from their IT investments (Hu & Huang 2005). Consequently, many enterprises seek practical guidance in strategic business-IT alignment. CBE's knowledge sharing from Ethiopian Airlines, the country's benchmarking enterprise, in the field of IT auditing and GEIT frameworks and standards a chance to membership to Information System Audit and Control Association (ISACA[1]). It is also familiar to the affiliated Information Technology Governance Institute (ITGI). Finally, the researcher was motivated to conduct this study and review literature in the area of GEIT, strategic business-IT alignment one of GEIT focus areas and use of COBIT 5 BSC. This study measured and analysed the implementation of GEIT practices, strategic business-IT alignment and their relationship using COBIT 5 in the case of CBE. CBE has huge investments in IT projects to become a world-class commercial bank. In a dynamic and competitive environment, enterprises need to improve their business by using internationally accepted GEIT good practices and standards.

Enterprises with effective GEIT have at least 20% higher profits than

[1]ISACA the lead of IT control community, serve their practitioners by providing internationally accepted practices for information systems.

enterprises with poor governance given the same strategic objectives (Van Grembergen & Haes 2015). Accordingly, more than 50% of today's IT investments are wasted or fail to deliver returns to the business (Dintrans et al. 2013). Studies in the business and IT alignment show that lack of business and IT alignment is one of the top-ten most challenging problems for many enterprises (Van Grembergen & De Haes 2005; Cumps et al. 2006). The authors also show that the persistent nature of lack of alignment between business and IT makes it the most challenging problem of many enterprises fail to realise business value in their IT investments (Hu & Huang 2005; Musuka 2006; Luftman & Kempaiah 2007; Samanta 2007). Misalignment is unacceptable, since in the end, the enterprise may fail owing to the lack of effectiveness of IT activities (Pham 2013).

LAMM assessment tool used to evaluate strategic business-IT alignment maturity in six alignment criteria namely: communication, competency, governance, partnership, scope and architecture and skill. Strong alignment between business and IT indicated that effective communication, understanding of the business and technical environments; good working relationships; strong leadership; appropriate prioritisation and trust are essential (Luftman 2000). Good competency between business and IT indicated that the business contribution to IT and IT contribution to business and both. Service Level Agreements (SLAs) between IT and businesses are defined (i.e.) including partners. There is IT investment review. Benchmarking or industry best practices are exercised. GEIT practices processes should be defined and implemented using best practices and standards such as IT strategic planning, IT portfolio management, IT project management. There are formal and continuous improvements in place that enhance partnership between IT and businesses. The association between business and IT partnership and valued service provider; change readiness programmes are in place at the corporate level; this created business and IT change resistance. Moreover, there are shared goals, risks and rewards/penalties associated with

IT-based initiatives. Changes in business and IT can be transparent throughout an enterprise if its scope and architecture is well defined. Innovation is also encouraged at every level with business partners. There is skill alignment between business and IT through job rotation and cross-functional training at the corporate level. Furthermore, career crossover opportunities are defined across the enterprise.

Many enterprises are implementing GEIT practices using a mix of structures, processes and relational mechanisms in their day-to-day operations to achieve strong business-IT alignment. Studies revealed that enterprises with mature GEIT practices in the enterprise are expected to reach a higher degree of strategic alignment maturity (De Haes & Van Grembergen 2008; 2009). The method on how an enterprise effectively implement GEIT practices to achieve strong strategic alignment using COBIT 5 is the main objective of this study. To achieve the research objectives, the researcher selected a case study strategy and followed an explanatory sequential mixed method (both quantitative and qualitative) studies type. The literature review is discussed in the next section.

1.3 LITERATURE REVIEW

This section presents a brief introduction of GEIT practices implementation, the relationship between GEIT practices implementation and strategic business-IT alignment, Strategic Alignment Model (SAM) and COBIT 5.

1.3.1 Implementation of GEIT practices

Information Technology Governance (ITG) is the original but still popular term for the Governance of Enterprise Information Technology (GEIT) (Hamer 2009). GEIT is defined as the responsibility of executives and the board of directors and consists of the leadership, organisational structures and

processes that ensure whether the enterprise's IT sustains and extends the organisation's strategies and objectives (ITGI 2007).

Various enterprises are implementing GEIT practices using a mix of processes, structures, relational mechanisms in day-to-day operations to achieve strategic business-IT alignment (Van Grembergen & De Haes 2015). GEIT practices a maturity assessment tool in three domains, namely; relational mechanisms, processes, structures which consist of 33 questions on GEIT maturity (De Haes & Van Grembergen 2008).

The benefits of implementing good GEIT include better alignment between business and IT; effective controls of IT processes and functions; effective management of IT investments; clear allocation of roles and responsibilities for IT processes and functions; increase business competency; prioritisation of IT initiatives and competitive advantage among others (Othman & Chan 2013; Ralha & Gostinski 2008; Ross et al. 2006).

In contrast, poor GEIT leads to unsatisfied customers; higher costs; poorer quality; schedules not met; damaged reputations and weakened competitive positions; business losses and disruptions (Selig 2008b). As a consequence, there is a lack of coordination between the projects and management of the related business change (Othman & Chan 2013). GEIT must be a top concern in the chief information officers (CIO) agenda in order to create and improve the degree of alignment between IT resources and capabilities (people, process and technology) with the strategic business goals (Sledgianowski & Luftman 2005; Ross et al. 2006; Kuruzovich et al. 2012). The next section provided a brief explanation of strategic business-IT alignment.

1.3.2 Strategic business-IT alignment

Strategic business-IT alignment concept was initially developed in the late 1970s (Hu & Huang 2005). According to Luftman and Rajkumar (2007), strategic business-IT alignment pertains to how IT and the business are aligned or integrated with each other; IT can both drive and enable business change. Strategic alignment process is one of the core processes of GEIT practices that ensure alignment of IT and its controls with business goals to meet stakeholder requirements (Ramlaoui & Semma 2014). In today's dynamic world, IT must be strongly aligned with business objectives than ever before. Tight strategic alignment between business objectives and IT capabilities create effective foundation for business execution (Ross, Weill, & Robertson 2006). Doing so helps to effectively manage IT assets, control risks both strategic and operational. It also continuously improve IT performance (Dintrans et al. 2013).

On the other hand, misalignment between business and IT is one of the top-ten most challenging problems for many enterprises (Van Grembergen & De Haes 2005; Hu & Huang 2005; Cumps et al. 2006). Any enterprises must create strategic business-IT alignment, which do not waste time, energy, or money on frivolous activities (Papke 2014; Guerra-Lopez & Hicks 2017).

1.3.3 Strategic Alignment Model

Strategic Alignment Model (SAM) is a model of business-IT alignment. The first model for business-IT alignment is SAM developed by Henderson to conceptualise and direct the area of strategic management of IT (Henderson & Venkatraman 1999). Luftman recognises Strategic Alignment Maturity Model (SAMM or LAMM) which uses six alignment criteria namely; communication, competency, governance, partnership, scope and architecture and skill for evaluating strategic business-IT alignment maturity. The LAMM six alignment

criteria cover 38 questions with five maturity levels to represent the enterprise's business-IT alignment maturity (Luftman & Kempaiah 2007).

1.3.4 COBIT 5

COBIT 5 (fifth edition) formerly called as Control Objectives for Information and related Technology (COBIT) and developed by Information System Audit and Control Association (ISACA) and IT Governance Institute (ITGI). COBIT 5 is a single integrated, internationally accepted framework for governance and management of enterprise IT that supports enterprise executives and management in the definition and achievement of business goals and related IT goals (ISACA 2012a).

There are various internationally accepted GEIT frameworks and standards enabling effective GEIT activities, which help Governance, Risk and Compliance (GRC) guidance and serve as tools for leveraging strategic business-IT alignment (ITGI & OGC 2005; Hardy 2006). In this study, the use of COBIT 5 is addressed in terms of its strong aspects of control objectives for GEIT practices implementation and strategic alignment. In addition to this, COBIT 5 BSC for performance measurement tool (goals cascade), Process Reference Model (PRM), Process Assessment Model (PAM), principles, enablers and Capability Maturity Model (CMM) tool also utilise IT investments more effectively and accurately and measure performance with lower costs through stronger governance (ISACA 2012b, 2013a). COBIT 5 integrates with other important frameworks and standards at an advanced level (Harmer 2009). Some of these frameworks and standards include International Organisation for Standardisation/International Electrotechnical Commission (ISO/IEC) 27000 series, Information Technology Infrastructure Library (ITIL), PRojects IN Controlled Environments (PRINCE2), The Open Group Architecture Framework (TOGAF 9), ISO/IEC 38500 and King III (ISACA 2012b).

An extensive literature review and analysis on GEIT practices implementation, strategic business-IT alignment, GEIT and its frameworks, as well as a detailed summary of the literature concerning COBIT 5, is presented in chapter 2 section 2.8. The main sources of literature review information include published literature in journals and textbooks both print and electronic from the University of South Africa (UNISA) library and the ISACA website. The problem statement of the study is discussed in the next section.

1.4 PROBLEM STATEMENT

Numerous studies have been conducted on GEIT practices related to strategic business-IT alignment, but study in this field suggests more work remains to be done in order to implement effective GEIT to achieve strong strategic business-IT alignment (De Haes & Van Grembergen 2012). According to Silva and Chaix (2008), for academics and IT practitioners, the key question regarding how to achieve strategic business-IT alignment in the complex and dynamic environment of the real world remains a great unanswered challenge for the Chief Executive Officer (CEO) and Chief Information Officer (CIO).

The researcher selected a case study strategy and followed an explanatory sequential mixed method (both quantitative and qualitative) studies type to investigate on how enterprises are effectively implementing GEIT practices to achieve strong strategic alignment using COBIT 5 BSC. The research questions are discussed in the next section.

1.5 RESEARCH QUESTIONS

The main research question in this study is: "*How Governance of Enterprise IT (GEIT) practices could be effectively implemented to achieve strong business-IT strategic alignment using COBIT 5?*" This main research question can be answered by the formulation of sub-questions listed below.

RQ1: How is CBE effectively implementing GEIT practices?

RQ2: What is the level of strategic business-IT alignment maturity in CBE according to the LAMM?

RQ3: What is the relationship between GEIT practices implementation and strategic business-IT alignment maturity?

RQ4: How is CBE trying to achieve strong strategic business-IT alignment by implementing effective GEIT practices processes using COBIT 5 BSC?

1.6 RESEARCH OBJECTIVES

This study investigated the method on how enterprises are effectively implementing GEIT practices to achieve strong strategic alignment using COBIT 5 to meet their stakeholder requirements. The main objective of the study was to develop a method how to implement effective GEIT practices processes to achieve strong strategic business-IT alignment using COBIT 5 in the case of Commercial Bank of Ethiopia (CBE), as shown in Figure 1-2. The study has the following specific sub-objectives:

RO1: To determine CBE's GEIT practices implementation;

RO2: To assess the strategic business-IT alignment maturity of CBE according to Luftman Strategic Alignment Maturity Model (LAMM);

RO3: To measure the relationship between GEIT practices implementation and strategic business-IT alignment maturity in CBE;

RO4: To analyse the gaps and provide the methods how CBE implement GEIT practices processes to achieve strong strategic business-IT alignment using COBIT 5 BSC.

The research methodology is discussed in the next section.

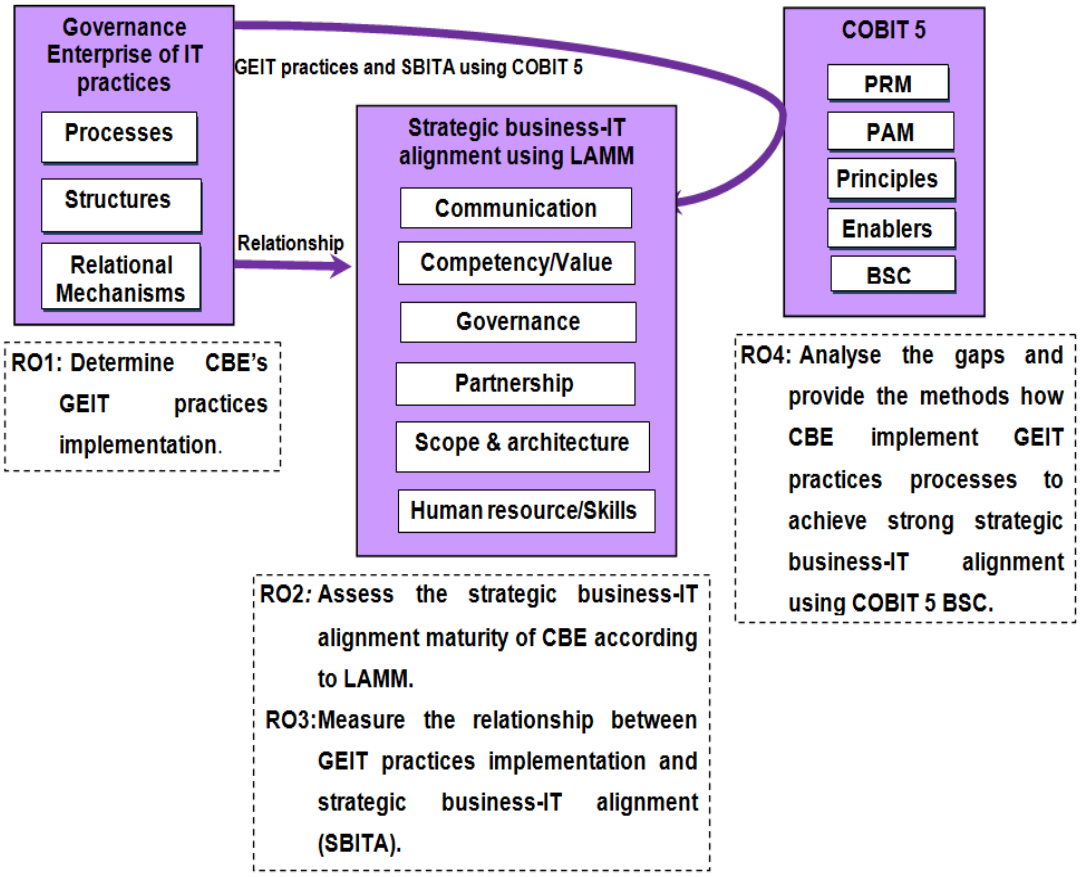

Figure 1-2: Research objectives

1.7 RESEARCH METHODOLOGY

Research methods contain data collection, analysis and interpretation that researchers propose for their studies (Creswell 2014). The researcher used a mixed method case study strategy that is made through in-depth use of multiple sources of data collection methods that integrate both quantitative and

qualitative sequentially. In this regard, the researcher could help to obtain richer insight into reality, unique opportunity and convenience (Oates 2006). Research strategy is the overall approach to answering the research questions (Oates 2006). According to Oates (2006), there are six research strategies in IS and computing, namely:

1. **Survey** is a way that will obtain the same kinds of data from a large group of people in a standardised and systematic manner;
2. **Experiment** is mean try something out and find out what happens;
3. **Action research** has been used particularly by professionals who want to investigate and improve their own working practices;
4. **Design and creation** strategy focuses on developing new IT products or artefacts;
5. **Ethnography** is means a description of peoples or cultures;
6. **Case study** is made through in-depth use of single or multiple sources of data collection methods within qualitative, quantitative and mixed methods (both quantitative and qualitative). Mixed methods case study strategy uses both quantitative and qualitative data collection and analysis procedures, either one after the other (sequential) or at the same time (parallel) (Saunders et al. 2009).

An explanatory sequential mixed methods case study strategy is considered sequential (Quan→Qual design strands) in sequence; first with the purpose of using follow-up qualitative data to explain based on initial quantitative results (Creswell 2014; Clark & Ivankova 2016). The research framework of this study is as shown in Figure 1-3.

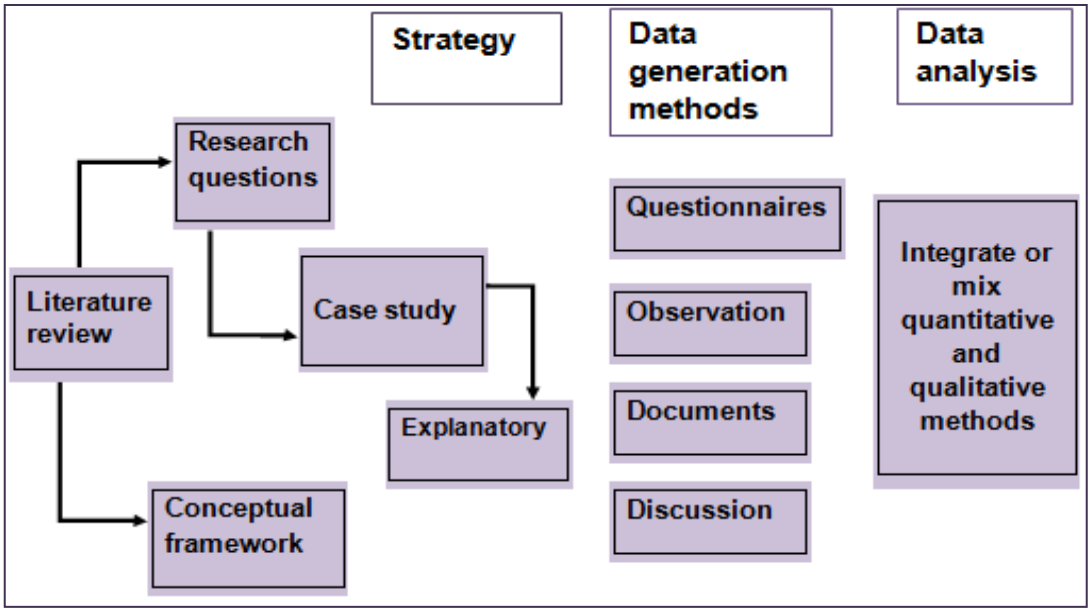

Figure 1-3: Research framework

The research framework is the interconnection of worldviews, strategy and research methods (Creswell 2014). This study used an explanatory sequential mixed methods case study strategy (both quantitative and qualitative) data to analyse GEIT practices related to strategic business-IT alignment using COBIT 5 in the case of CBE. Explanatory sequential mixed methods of data collection and analysis would help the researcher to address the research problem and to obtain answers to mix both quantitative and qualitative data collection and analysis. In the quantitative data collection, the data were collected using two questionnaires. The first questionnaires used the GEIT assessment tool, which consists of 33 lists questions in three domains namely; processes, structures, relational mechanisms, using a 6-point maturity level from 0 to 5, to determine CBE's GEIT practices implementation. The second questionnaire used LAMM, a well-known tool, which covers 38 questions in six domains with five maturity levels to assess the strategic business-IT alignment maturity of CBE. In the qualitative phase of the study, evidence was collected using focus group discussion, observation and participation, document analysis and gap assessment using COBIT 5. Moreover, this was done by

mapping COBIT 5 processes to GEIT practices' processes, then identify and review the gap between the existing GEIT practices processes and desirable level 4 (managed and measurable) and a method to fill the gap is provided.

The quantitative data analysis of validity and reliability as survey instruments is tested. The liability of the survey instruments was measured using Cronbach's alpha (α). Test of normality uses hypotheses testing on the sample data are normal or not. Moreover, regression analysis is a technique used to show relationships between one or more independent (predictor) variables with a dependent (predicted) variable (Field 2009; Saunders, Lewis & Thornhill 2009). In this study, one measured the correlation between the GEIT practices predictor variable (independent variable) and strategic business-IT alignment predicted variable (dependent variable). The recommended sample size was needed to employ multiple regression, the required sample size $n > 50 + 8m$ (where m = number of independent variables) (Pallant 2011). In this study, the number of independent variable is one (strategic business-IT alignment). The sample size required for multiple regression more than 58 cases for every independent variable are needed if the dependent variable is skewed for stepwise regression. Therefore, in this study, the sample size was 100. Out of 100 participants, only 68 questionnaires were valid. The limitation of the study is discussed in the next section.

1.8 LIMITATIONS OF THE STUDY

There are some limitations in this study. The study focuses on one of GEIT focus areas that is, strategic business-IT alignment using COBIT 5 in the case of CBE. Since GEIT has been one of the top concerns of senior management and IS/IT managements of CBE. The focus group has been limited to the top management and IS/IT management of CBE, about 100 participants in total. Primarily, the respondents will be limited to senior management and IS/IT managements who have been selected from CBE; they are so busy.

1.9 ETHICAL CONSIDERATIONS

An ethical clearance certificate for this study was issued by the Research and Ethics Committee of UNISA, College of Science, Engineering and Technology (CSET). A copy of this certificate is provided in Appendix B.

1.10 LAYOUT OF THE STUDY

This study is divided into five chapters. The layout of this study is depicted in Figure 1-4.

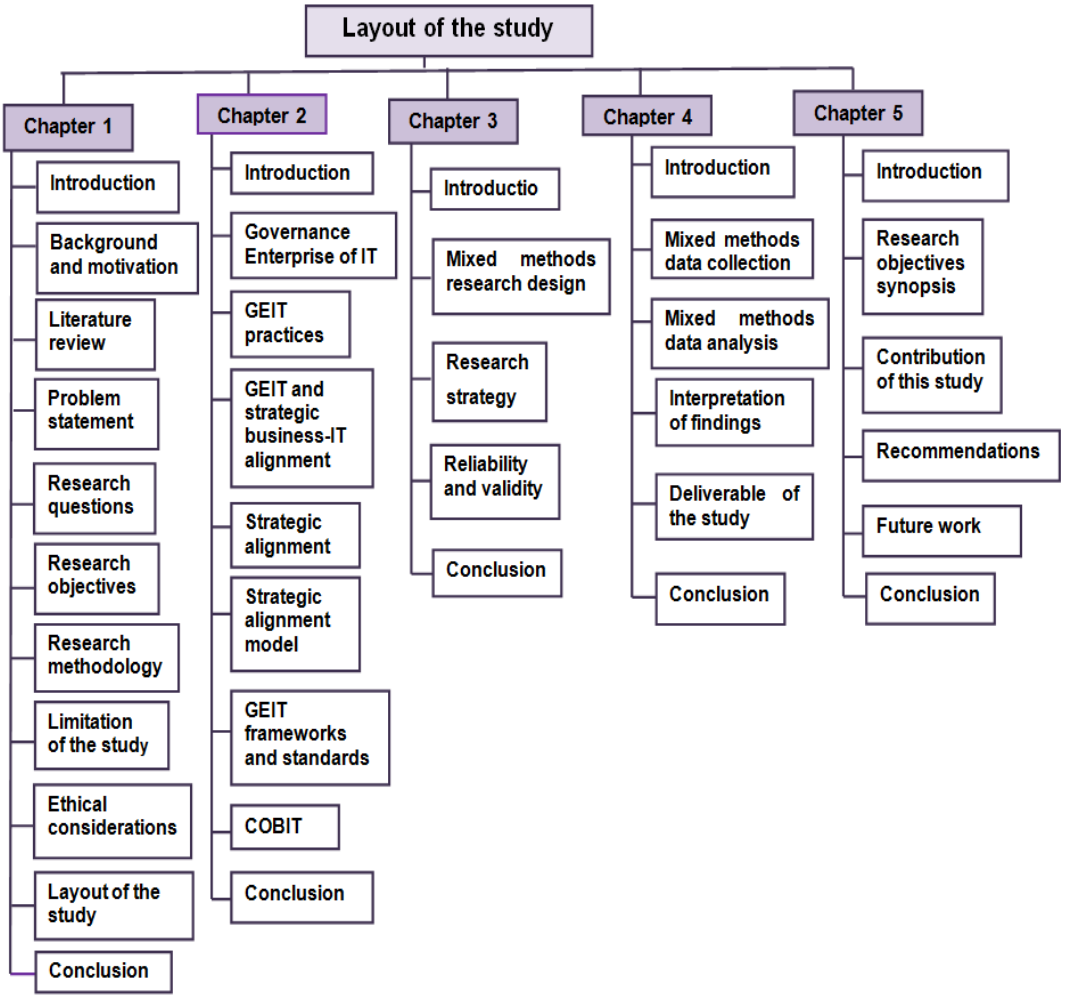

Figure 1-4: Layout of the study

Chapter 1: Introduction

This chapter provides the introduction of the research, background and motivation, literature review, problem statement, research question and research objectives of the study. This chapter also includes a broad overview of the research methods, limitations of the study, ethical considerations, layout of the study, and conclusion.

Chapter 2: Literature Review

This chapter provides the literature review on GEIT practices implementation, strategic business-IT alignment, SAM, the use of COBIT 5 and GEIT standards and frameworks.

Chapter 3: Research Methodology

This chapter provides the research methodology, mixed methods design and also includes data generation, research strategy, reliability, validity of survey instruments related to data quality.

Chapter 4: Data Collection and Analysis

This chapter provides the presentation of data, preliminary analysis, mixed methods both quantitative and qualitative data analysis, summary of findings and proposed method on how to implement effective GEIT practices to achieve strong strategic business-IT alignment using COBIT 5 performance measurement in the CBE.

Chapter 5: Conclusion and Recommendations

This chapter provides the research objectives synopsis, contributions of this study, research limitation and future work. It also includes the summary of findings, conclusion and recommendations.

At the end of this dissertation, references using Mendeley Referencing Harvard format, questionnaires, Ethical Clarence Certificate, CBE's organisational structure and appendixes are annexed.

1.11 CONCLUSION

This chapter provided a brief description of the introduction of the research, research motivation and background, problem statement, research question and research objectives of the study. Additionally, a broad overview of the research methods, limitations of the study and ethical considerations were discussed. The study is envisaged to be invaluable to practitioners in handling misalignment problems by providing methods on how enterprises are effectively implementing GEIT practices to achieve strong strategic alignment using COBIT 5. COBIT 5 consists of a set of IT control objectives for implementing effective GEIT and control framework within the enterprise. In the next chapter, a literature review of related works conducted in the area of GEIT is discussed.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The chapter critically discusses relevant literature that will help the researcher to fully understand how enterprises implement effective GEIT to achieve strong strategic business-IT alignment, using international best practices. The three pillars of this study, namely; GEIT practices, strategic business-IT alignment and uses of COBIT 5 are elaborated. This chapter provides a detailed background of GEIT; the difference between IT management and ITG; various definitions of GEIT; GEIT focus areas of the study and key assets of governance. It also provides related works conducted in the area of GEIT practices implementation processes, relational mechanisms and structures. It also provides theoretical background of strategic alignment and deals with the Strategic Alignment Model (SAM), from SAM to Luftman Strategic Alignment Maturity Model (SAMM or LAMM) uses six alignment criteria such as communication, competency, governance, partnership, scope and architecture and skill for evaluating strategic business-IT alignment maturity. GEIT frameworks and standards are discussed in this chapter. Last but not the least, this chapter provides COBIT evolution, COBIT 5 principles and enablers, governance domains and processes, management domains and processes, PRM, performance measurement tool (goals cascade) and PAM for assessing the capability of each COBIT 5 process. It also includes uses of COBIT 5. Finally, this chapter provides the conclusion of the chapter.

2.2 GOVERNANCE OF ENTERPRISE IT

IT Governance (ITG) is the original, but still popular term for Governance of Enterprise IT (GEIT) (Hamer 2009). The ITGI was established in 1998 in directing and monitoring an enterprise's IT. GEIT is a new topic and still in inits

infancy in Ethiopia as well as in the world. In Ethiopia, few studies have been reported on GEIT (Berihu 2011; Ayele 2016). ITG has one of the top concerns of the executive management team and ensures effective utilisation of IT by aligning IT with the enterprise's objectives (ITGI 2007; Selig 2008a; Chaudhuri 2011). The difference between IT management and ITG has been unclear (Van Grembergen, De Haes & Guldentops 2004; Salle 2004). ITG and IT management is shown in Figure 2-1.

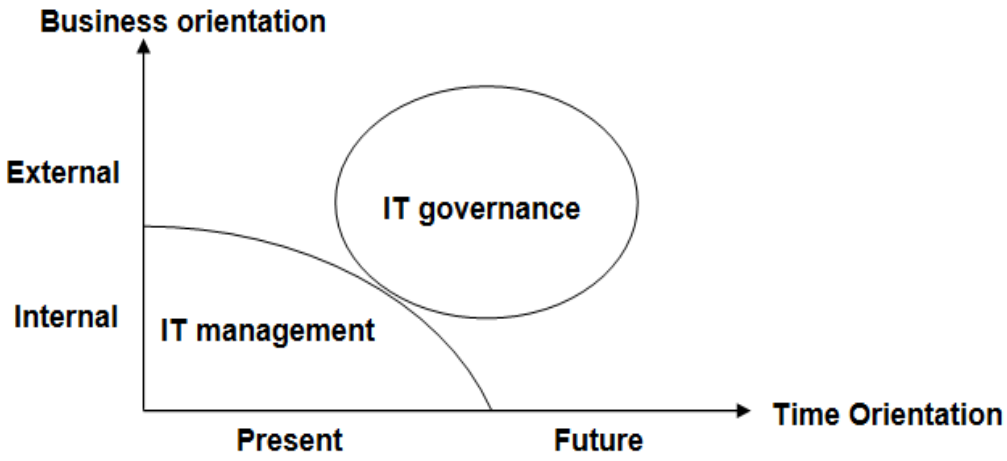

Figure 2-1: IT management and IT governance 'Adapted from: (Salle2004)'

ITG focuses on the principle that managers, directors and others in charge of an enterprise must establish key roles and responsibilities to control IT risks (Ramlaoui & Semma 2014; Gregg & Johnson 2017). In contrast, the domain of IT management is focused on managing present IT operations and the effective and efficient internal delivery of IT services and products (Van Grembergen & De Haes 2005). ITG is much broad and has an internal focus on performing and transforming IT to meet the present and the future demands of business and external focus on business customers (Salle 2004; Castillo 2011). Besides, ITG is future and the external point of view (Kouakou 2013). IT management must implement rules and policies to control IT infrastructure

and develop practices to distribute responsibilities (Gregg & Johnson 2017). Various definitions of GEIT recognises more business responsibilities (Harmer, 2009).

According to Van Grembergen and De Haes (2009, p. 3), GEIT is defined as follows:

> *an integral part of corporate governance and addresses the definition and implementation of processes, structures and relational mechanisms in the organisation that enables 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.*

Effective GEIT helps to ensure that stakeholder transparency, resource optimisation, benefits delivery, risk optimisation and governance framework setting and maintenance are met (ISACA 2012b). The four critical pillars of effective GEIT include organisation and decision rights, leadership, scalable and flexible processes and the use of enabling technology (Selig 2008b). The six key assets of governance include information and IT, human, financial, relationship, physical and intellectual property (IP) assets (Weill & Ross 2004a), as shown in Figure 2-2.

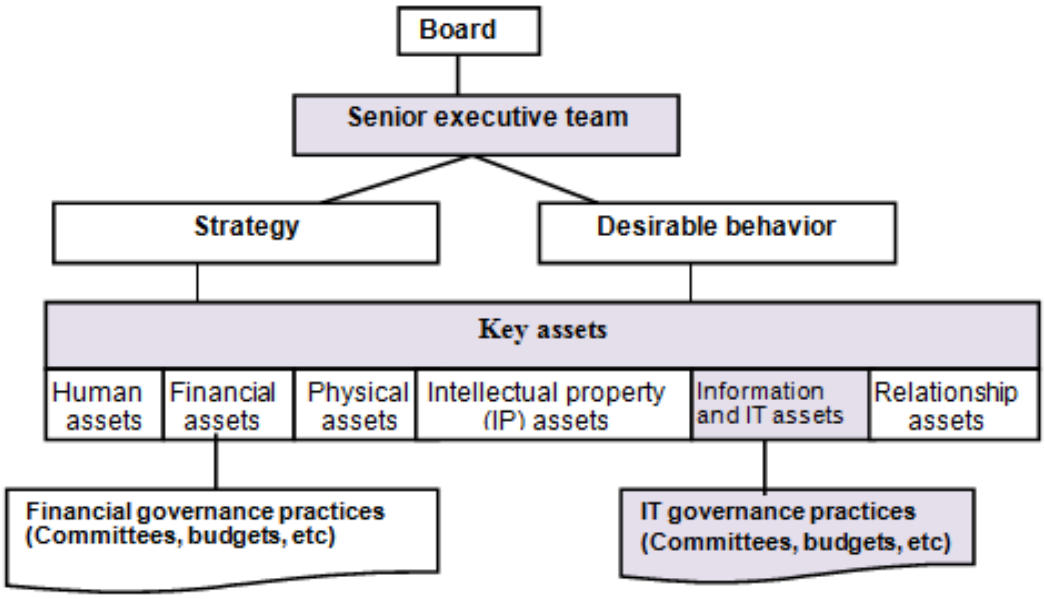

Figure 2-2: Key asset governance 'Adapted from: (Weill & Ross 2004a)'

Governance of the key assets occurs by a large number of organisational mechanisms, for example, structures, processes, procedures, and audits (Van Grembergen & De Haes 2009). Senior management create common governance mechanisms across the key assets to create value by setting different approvals (Weill & Ross 2004a). Furthermore, effective GEIT has actively designed a set of governance mechanisms that support the enterprise's mission, strategy, values, culture and norms. GEIT practices relational mechanisms such as executive committees and budget processes with other asset governance processes for coordinating enterprise-wide decision-making processes (Weill & Ross 2004a). According to ITGI (2008b), GEIT is the responsibility of the board of directors and executives. Therefore, the senior management team need to be educated about governance mechanisms and ongoing task for effective governance (Weill & Ross 2004a). The two persons (i.e. the CEO and the CIO) play a critical role in implementing an effective GEIT framework (Calder 2008). The next section deals with three main elements of GEIT practices.

2.3 GOVERNANCE OF ENTERPRISE IT PRACTICES

Effective GEIT practices are very crucial in day-to-day operations to achieve strong strategic business-IT alignment to manage considerably huge IT investments and to meet stakeholder requirements. Enterprises can deploy GEIT practices by using a combination of processes, relational mechanisms and structures (Van Grembergen & De Haes 2015). Some examples of the main elements of GEIT are shown in Figure 2-3.

GEIT practices implementation maturity assessment in three domains, namely; relational mechanisms, processes, structures which consist of 33 questions on GEIT practices implementation maturity (De Haes & Van Grembergen 2008).

Structures are vital for GEIT for enabling relationships between business and IT management decision-making functions (De Haes & Van Grembergen 2004). Enterprises with proper GEIT structures can acquire higher rates of Return on Investment (ROI) compared to enterprises with poor or no GEIT structures (Weill & Ross 2004b). In addition, structures include organisational units and roles responsible, such as CIO on executive committee, IT organisational structure, IT change management committee, architecture committee, IT strategy committee and IT steering committee (De Haes & Van Grembergen 2004; Van Grembergen & De Haes 2015). These committees are a means of communication between senior management and IT management for decision-making purposes and ensure that the IT department's goals are properly aligned with the goals of the business (Gregg & Johnson 2017). According to Van Grembergen and De Haes (2005), GEIT structures are relevant to the governance processes and provide facilitating relational mechanisms between IT and the Board of Directors. GEIT expresses preferred actions to guide IT-related decision-making, both business and IT people (De Haes & Van Grembergen 2013). The COBIT 5 business framework for GEIT

provides Responsible, Accountable, Informed and Consulted (RACI) charts for all the IT processes under five domains (ITGI 2007).

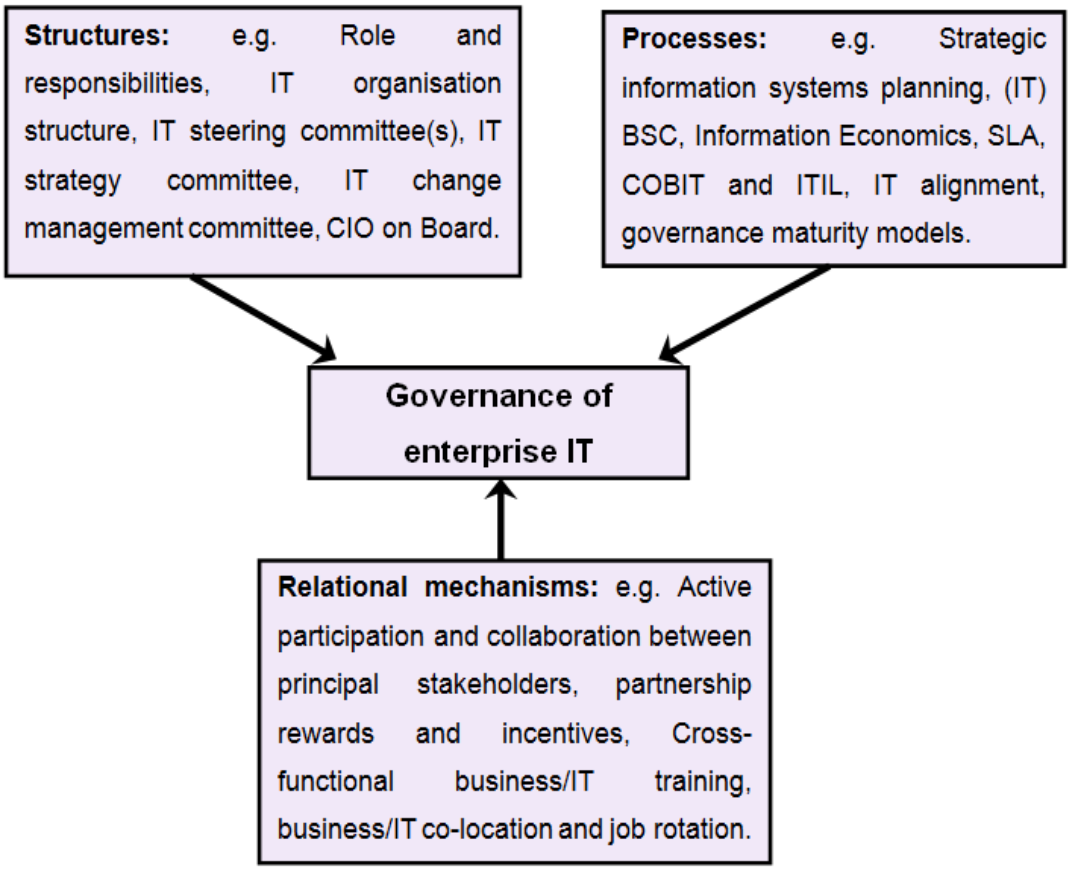

Figure 2-3: Main elements of GEIT 'Adapted from: (Van Grembergen & De Haes 2015)'

Processes can be defined as a structured set of activities designed to achieve a specific objective and provide input back to decisions such as Strategic Information Systems Planning (SISP), portfolio management, performance measurement, and service agreements management (Van Grembergen & De Haes 2015). These processes are used for strategic decision-making, monitoring and managing different activities related to IT within the enterprise (De Haes & Van Grembergen 2004). A process has one or more inputs and outputs, roles and responsibilities as well as tools and control objectives to manage, execute and monitor different activities related to IT. Previous studies

have revealed that GEIT practices processes play an important role in driving overall IT alignment (Kuruzovich et al. 2012). Accordingly, COBIT 5 defines IT processes end-to-end by separating them into governance and management 'areas' in a standardised manner, which contains five governance processes and 32 management processes grouped under one governance domain and four management domains (Harmer 2009; ISACA 2012a).

Finally, the **relational mechanisms** are regarding the active participation of collaborative relationships among senior executives, IT management and business management, which include knowledge sharing across departments, career crossover and continuous education and cross-training. It also includes advocacy, job-rotation, announcements, channels and education efforts that enable better integration across the enterprises (De Haes & Van Grembergen 2004; Weill & Ross 2004b; Van Grembergen & De Haes 2005, 2015). Therefore, enterprises should establish a common communication channel to align IT and business people. Relational mechanisms are key GEIT practices important for achieving better business-IT alignment. According to De Haes and Van Grembergen (2004), relational mechanisms are very important. It is possible that an enterprise has all the GEIT structures and processes in place, but without relational mechanisms, business and IT processes do not align. The next section deals with the relationship between GEIT and strategic business-IT alignment.

2.4 GEIT AND STRATEGIC BUSINESS-IT ALIGNMENT

Strategic alignment is one of the key GEIT focus areas (ITGI 2007a). There are numerous studies on the relationship between GEIT and strategic business-IT alignment (Reich & Benbasat 2000; Luftman 2003; Chaudhuri 2011). Key GEIT focus areas are shown in Figure 2-4.

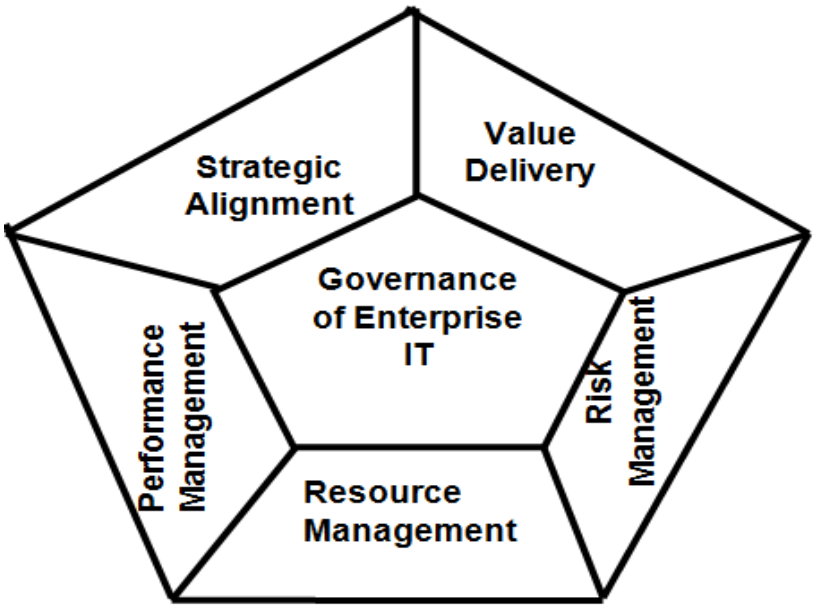

Figure 2-4: GEIT focus areas 'Adapted from: (ITGI 2007)'

The five key focus areas of GEIT are presented as follows (ITGI 2007):

1) **Strategic alignment** is a mechanism of aligning business and IT mutual benefits (Iskandar & Salleh 2010). Strategic alignment covers the alignment of the enterprise's and IT's plans, patterns, perspective and position (Bernard 2012).
2) **Performance measurement** is monitoring IT services and tracking project delivery (Iskandar & Salleh 2010). Performance measurement gauges cost optimisation and provision of IT essential value in terms of quantitative (objective) or qualitative (subjective) (ITGI 2007; Bernard 2012).
3) **Value creation and delivery** optimising and proving IT value enables business benefits to be realised from IT investments (ITGI 2007).

4) **Resource management** is a proper management of critical IT resources, enterprises must develop and maintain the following capabilities[2] namely; funding, management, enterprise, people, processes, applications, infrastructure and knowledge (ITGI 2007; Bernard 2012).

5) **Risk management** is alleviating the risk connected to information technology (ITGI 2007). GEIT links a company's objectives, business goals and IT management (Calder 2008).

GEIT is concerned with two main goals: strategic business-IT alignment (which is the means) and value delivery (which is the end goal). GEIT main goals are shown in Figure 2-5.

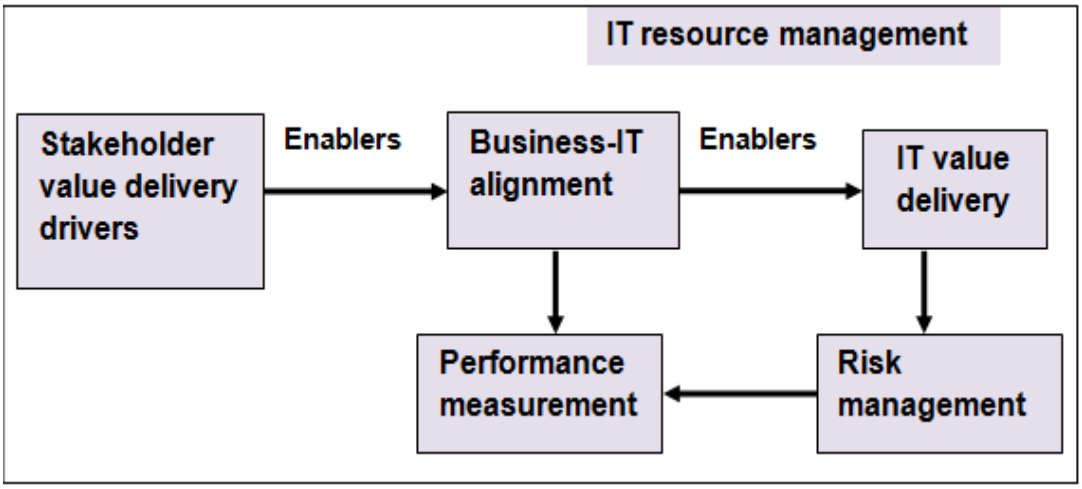

Figure 2-5: GEIT main goals 'Adapted from: (Van Grembergen et al. 2004)'

Strategic business-IT alignment is an important driving force to achieve business value through investments in IT (Castillo 2011; Van Grembergen et al. 2004). Two of them are drivers: strategic alignment and performance

[2] Capability is defined as the strategic use of capabilities, which is developed to achieve organisational goals by adopting, integrating, and re-structuring internal and external organisational competencies, different resources and numerous tasks to encounter change (Saetang & Haider, 2013).

measurements (Castillo 2011; Van Grembergen et al. 2004). Strategic alignment and value delivery need measurement and measured by a BSC. This leads to the four main focus areas for GEIT, all driven by stakeholder value. Two of them are outcomes: the first being value delivery to business driven by strategic alignment; and the next mitigation of risk driven by setting responsibility into the enterprise.

Therefore, GEIT ensures that strategic alignment, improved capabilities in the business through effectively managed IT assets, continuously improved IT performance, reduce IT-related risk and realise benefit. The next section discusses strategic alignment, one of the key focuses of GEIT.

2.5 STRATEGIC ALIGNMENT

Strategic business-IT alignment is an important component of GEIT, especially for large companies. The strategic business-IT alignment concept was initially developed in the late 1970s (Hu & Huang 2005). The strategic business-IT alignment is crucial to an enterprise (Silvius & Smit 2011). The business-IT alignment has been studied over the last two decades and it is one of the main concerns of GEIT (Henderson & Venkatraman 1999; Luftman 2003; Silva & Chaix, 2008; Silvius 2009). Empirical studies have shown that the inability to achieve value from IT investments is the result of misalignment between IT and business strategies (Hu & Huang 2005; Ramlaoui & Semma 2014). According to Luftman and Rajkumar (2007), alignment is defined as how IT is aligned, linked, synchronised, converged, in harmony and integrated with the business. Alignment is evolutionary and dynamic. Strategic alignment must focus on how business and IT are aligned to each other and IT can both enable and drive business change (Luftman & Kempaiah 2007; De Haes & Van Grembergen 2009).

Strategic alliances can also be helpful when one enterprise processes a capability that can benefit another and enterprises can benefit by leveraging their strengths to add greater value to customers, employees, communities and shareholders (Guerra-Lopez & Hicks 2017). Strategic alignment has internal and external elements. The internal elements of strategic alignment are systems, structure, staff, skills, finances and shared values and practices (Guerra-Lopez & Hicks 2017). In contrast, the external elements of strategic alignment to its external environment are government laws, environment policies, customer needs and technology trends among others (Guerra-Lopez & Hicks 2017). There is no silver-bullet solution, but achieving alignment is possible (Luftman 2003).

Strategic business-IT alignment has a positive impact on performance, which is one of the responsibilities for top management (Reich & Benbasat 2000; Silvius & Smit 2011; Wagner et al. 2006). Achieving and sustaining alignment that fosters the integration of IT and business demands focusing on maximising the enablers and minimising the inhibitors (Luftman 2000). The components of LAMM form the building blocks for the strategic alignment maturity assessment method. Luftman (2000) has also identified some enablers and inhibitors that help and hinder this alignment process (Van Grembergen et al. 2004) (See Table 2-1).

Table 2-1: Enablers and inhibitors of strategic alignment

'Adapted from: (Luftman 2000)'

No.	Enablers	Inhibitors
1.	Senior executive support for IT	IT/business lack close relationship
2.	IT involved in strategy development	IT does not prioritise well
3.	IT understands the business	IT fails to meet commitments
4.	Business-IT partnership	IT does not understand business
5.	Well-prioritised IT projects	Senior executives do not support IT
6.	IT demonstrates leadership	IT management lacks leadership

Strategic business-IT alignment is an important component of GEIT, especially for large companies. Without correct business-IT alignment, companies face serious competitive and regulatory threats (Ross et al. 2006). Studies have shown that misalignment between business and IT is one of the main reasons why enterprises fail to realise business value in their IT investments (Hu & Huang 2005). Misalignment or lack of alignment between business and IT is one of the top-ten most challenging problems for many enterprises, complexes and multidimensional nature (Van Grembergen & De Haes 2005; Hu & Huang 2005; Cumps et al. 2006). The authors also show that the persistent nature of misalignment between business and IT makes it the most challenging problem of many enterprises, which fail to realise business value in their IT investments (Hu & Huang 2005; Musuka 2006; Luftman & Kempaiah 2007; Samanta, 2007).

The consequences of misalignment are critical risks such as unmet promises to the customer; unmet goals and objectives; missed opportunities and a myriad other failures that result from in-effective communication within a group, team, or company and restrains ability to reach their desired levels of performance (IIA 2012; Papke 2014). Misalignment is unacceptable, since in

the end, the enterprise may fail owing to the lack of effectiveness of IT activities (Pham, 2013).

The advantages of correct alignment include effective controls of IT processes, responsibility and accountability for IT processes, effective management of IT investments, prioritisation of IT initiatives and competitive advantage (Othman & Chan 2013). Creating alignment between IT resources and capabilities with the strategic business goals has been a topic of serious concern by IT executives for over two decades (Sledgianowski & Luftman 2005). The next section deals with the Strategic Alignment Model (SAM).

2.6 STRATEGIC ALIGNMENT MODEL

Strategic Alignment Model (SAM) is a model of business and IT alignment assessment tool. The first model for business-IT alignment is SAM developed by Henderson to conceptualise and direct the area of strategic management of IT (Henderson & Venkatraman 1999). The SAM presents business and IT alignment both in constituting factors and in levels of organisational maturity (Silvius 2013). The SAM has two business-IT alignment conceptualisations. The first conceptualisation recommends strategic business-IT alignment as the degree to which the business mission, objectives and plans are supported by the IT mission, objectives and plans. The second conceptualisation integrates four fundamental domains: IT strategy, business strategy, IT infrastructure, organisational infrastructure and two building blocks: strategic integration in terms of external and internal domain and functional integration distinguishes the business and IT domains (Henderson & Venkatraman 1999; De Haes & Van Grembergen 2004). The internal focus, directed towards administrative structures and external focus, directed towards the business environment. On the strategic level: competences, scope and governance and on the enterprise level: processes, infrastructure and skills (Silvius 2013). The Henderson and Venkatraman SAM is shown in Figure 2-6.

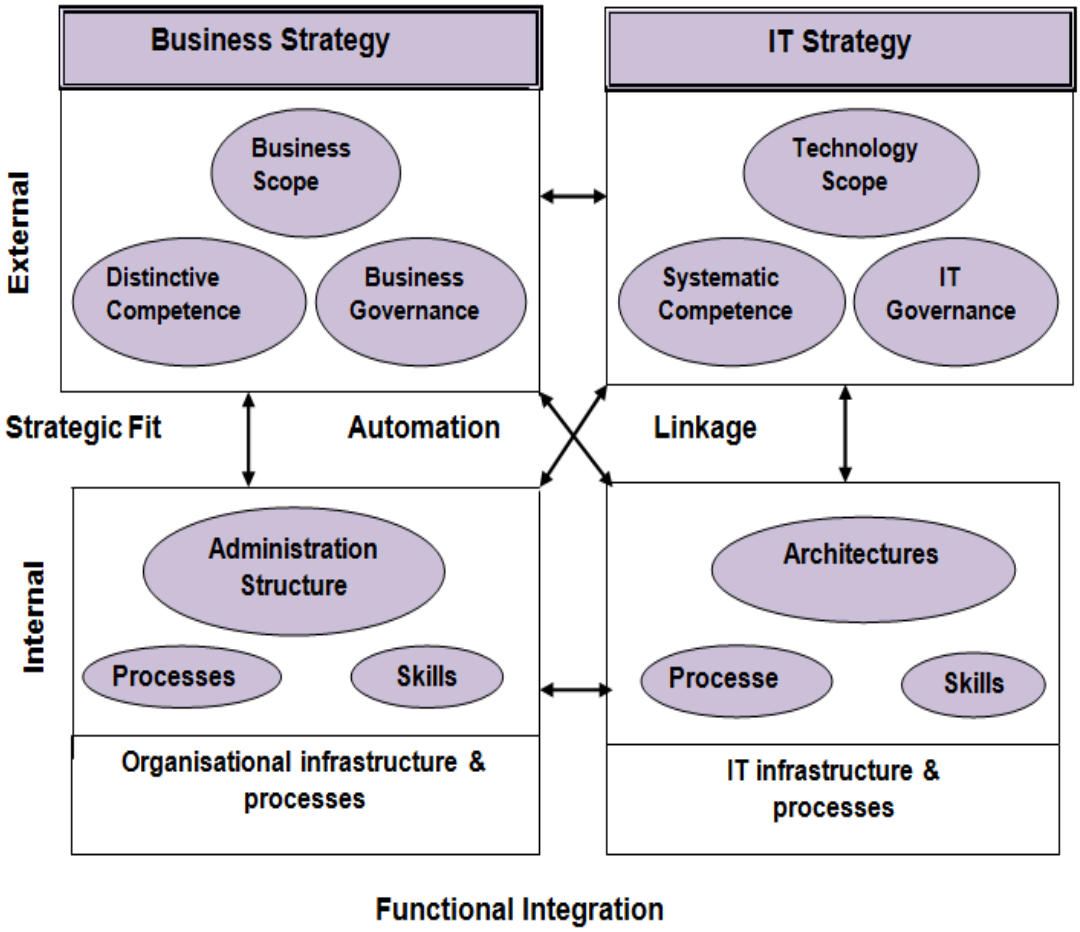

Figure 2-6: The Henderson and Venkatraman SAM

The 12 components of SAM that further define business-IT alignment in Table 2-2. Moreover, the twelve components focus on the activities that management performs to achieve consistent goals across the IT and other functional enterprises (e.g. finance, marketing, HR, manufacturing). Therefore, strategic business-IT alignment addresses both how IT is in harmony with the business, and how the business should, or could be in harmony with IT (Luftman 2000). The SAM model provides not just an empirical conceptualisation of alignment, but also a path of action and operationalisation for enterprises that aim to develop alignment maturity (Silvius 2013).

From SAM model to SAMM or LAMM, the assessment method of business-IT alignment famous and popular model was developed by Luftman and ITIG in practical level (Sledgianowski & Luftman 2005; Hosseinbeig et al. 2011; Salim & Arman 2014). LAMM model presents business and IT alignment both in constituting factors and in levels of organisational maturity (Silviu, 2013).

Table 2-2: The 12 components of alignment 'Adapted from: (Luftman 2000)'

I.	**Business strategy**	
1.	Business scope	Includes the markets, products, services, groups of customers/clients, and locations where an enterprise competes as well as the competitors and potential competitors that affect the business environment.
2.	Distinctive competencies	The critical success factors and core competencies that provide a firm with a potential competitive edge. This includes brand, research, manufacturing and product development, cost and pricing structure, and sales and distribution channels.
3.	Business governance	How companies set the relationship between management, stockholders, and the board of directors. Also included are how the company is affected by government regulations, and how the firm manages its relationships and alliances with strategic partners.
II.	**Organisation infrastructure and processes**	
4.	Administrative structure	The way the firm organises its businesses. Examples include central, decentral, matrix, horizontal, vertical, geographic, federal, and functional.
5.	Processes	How the firm's business activities (the work performed by employees) operate or flow. Major issues include value added activities and process improvement.
6.	Skills	Human Resource (HR) considerations such as how to hire/fire, motivate, train/educate, and culture.
III.	**IT strategy**	
7.	Technology scope	The important information applications and technologies.
8.	Systemic competencies	Those capabilities (e.g., access to information that is important to the creation/achievement of a company's strategies) that distinguishes the IT services.
9.	IT governance	How the authority for resources, risk, conflict resolution, and responsibility for IT is shared among business partners, IT management, and service providers. Project selection and prioritisation issues are included here.
IV.	**IT infrastructure and processes**	
10.	Architecture	The technology priorities, policies, and choices that allow applications, software, networks, hardware, and data management to be integrated into a cohesive platform.
11.	Processes	Those practices and activities carried out to develop and maintain applications and manage IT infrastructure.
12.	Skills	IT human resource considerations such as how to hire/fire, motivate, train/educate, and culture.

The LAMM six criteria are communications, value measurements, IT governance, partnership, IT scope and skills and 38 attributes for evaluating strategic business-IT alignment maturity (Luftman et al. 1993; Van Grembergen et al. 2004; Sledgianowski et al. 2006; Luftman & Kempaiah 2007; Luftman et al. 2010) as shown in Figure 2-7.

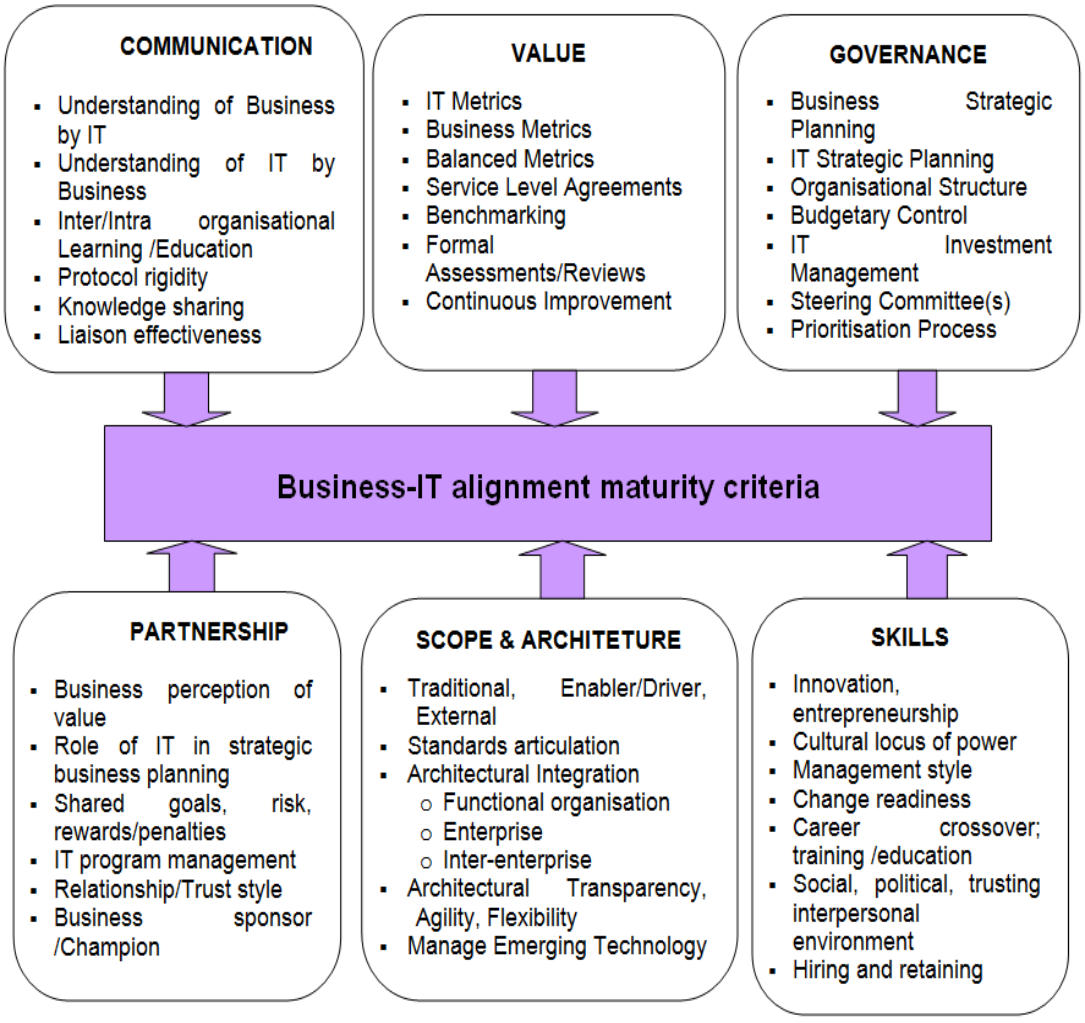

Figure 2-7: Business-IT alignment maturity criteria 'Adapted from: (Luftman & Kempaiah 2007)'

1) **Communication alignment criteria**: explain how IT and business executives understand each other (mutual communication between business by IT and IT by business) (Luftman & Kempaiah 2007);

2) **Competency/value alignment criteria**: measure balanced "dashboard" measures the contribution in terms both the business and IT (Luftman & Kempaiah 2007);
3) **Governance alignment criteria:** describe the authority of level of decision-making of IT and business processes;
4) **Partnership alignment criteria** entail the relationship between the IT and business and sharing of risks, mutual trust and rewards are key attributes (Luftman & Kempaiah 2007);
5) **Scope and architecture alignment criteria**: measure emerging technologies, promote business process change, delivers value to the business, customers, partners and evaluates flexibility of IT infrastructure and the only technical component in the model (Luftman & Kempaiah 2007);
6) **Human resources/Skills alignment criteria:** measure the enterprise's HR practices and capability for learning, ability to leverage new ideas and readiness for change. This criteria cover all IT HR practices, such as how to hire, retain and fire, train, educate, motivate, career opportunities, culture and developing the skills of employees (Luftman & Kempaiah 2007). The Bank's Human Resource (HR) both at leadership and professional levels must uphold critical competencies that match world-class standards.

The six alignment criteria maturity scores compared to a five-level maturity model to denote the enterprise's business-IT alignment maturity (Luftman & Kempaiah 2007). The five levels of strategic business-IT alignment maturity are summarised in Figure 2-8.

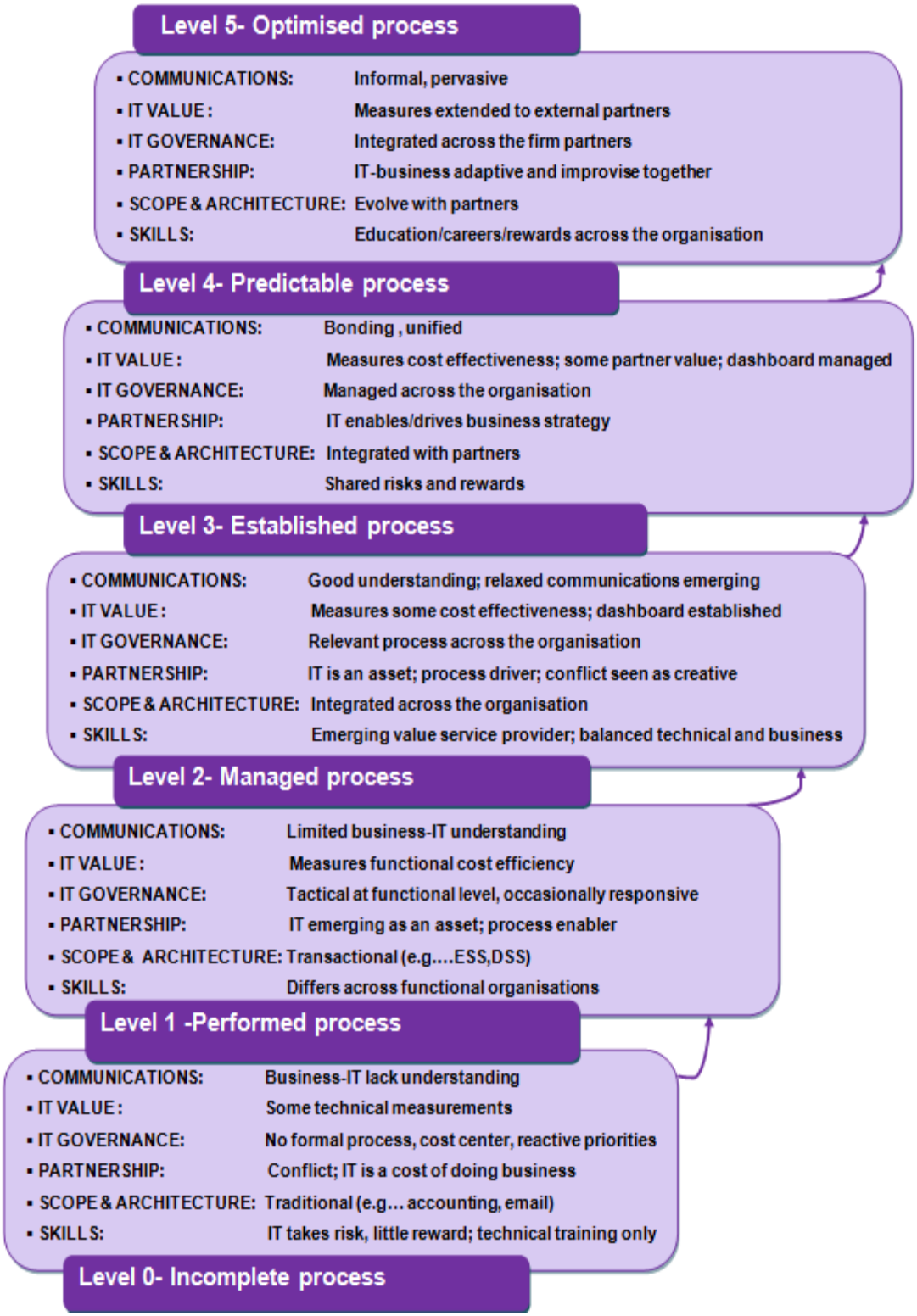

Figure 2-8: Summarised business-IT alignment maturity assessment model 'Adapted from: (Luftman & Kempaiah 2007)'

The five levels of strategic business-IT alignment maturity are:

1. **Initial or ad hoc processes** – At Level 1 maturity indicated that enterprises have poor communications between business and the IT and also a poor understanding of the value the other provides;
2. **Committed processes** – At Level 2 maturity indicated that enterprises have begun enhancing their business-IT relationship;
3. **Established, focused processes –** At Level 3 maturity, IT assets become more integrated enterprise-wide;
4. **Predictable/improved, managed processes** – At Level 4 maturity, manage the processes they need for strategic business-IT alignment within the enterprise;
5. **Optimised processes** – At Level 5 maturity indicated that enterprises have optimised strategic business-IT alignment through correct governance processes that integrate strategic business planning and IT planning.

The LAMM assessment related to the role of GEIT practices processes in achieving strategic business-IT alignment, LAMM set nine GEIT elements (Luftman et al. 2010) shown in Table 2-3. The strategic alignment process is one of the core processes of GEIT practices that ensure alignment of IT and its controls with business goals to meet stakeholder needs (Ramlaoui & Semma 2014). Studies reveal that GEIT and strategic business-IT alignment have a direct relationship (De Haes & Van Grembergen 2009). When business and IT are strategically aligned, IT maturity increases, IT department is as a strategic partner to enterprise, GEIT initiatives and high IT investments (Spremic 2012). The most known GEIT frameworks and standards are presented in the next section.

Table 2-3: The relationship between GEIT practices and LAMM

	LAMM measurement of IT governance	GEIT practices
ITG1	Business strategic planning	P1- Strategic information systems planning process
ITG2	IT strategic planning	
ITG3	IT organisational structure	GEIT structures
ITG4	IT reporting	P9- IT budgets of control and report
ITG5	IT budgeting	
ITG6	IT investment decisions	P3- IT portfolio management
ITG7	IT steering committee(s)	S6- IT steering committee
ITG8	IT project prioritisation process	P8- Manage IT projects
ITG9	IT reaction capability	S9- IT project/portfolio

2.7 GEIT FRAMEWORKS AND STANDARDS

According to the Institute of Internal Auditors Research Foundation (IIARF), an internal control framework is defined as "*a recognised system of control categories that covers all internal controls expected in an enterprise*" (Zhang & Fever 2013). The objectives of IT control frameworks include rendering IT services accessible to customers at the desired level of security, quality and fiduciary requirements. There are three types of control frameworks (Zhang & Fever 2013).

1) Business-oriented controls

- Committee of Sponsoring Organisation (COSO)
- Statement of Auditing Standards (SAS)

2) IT-focused controls

- Information Technology Infrastructure Library (ITIL)
- ISO/IEC17799:2000; ISO 27000 series

3) Business-IT alignment focused controls

- COBIT

The three known best practices and standards for GEIT are ISO 27002, ITIL and COBIT (Bartens et al. 2014). These serve as tools for leveraging GEIT (Harryparshad 2011) and require the enterprise to meet specific goals (ITGI 2007a; Guerra-Lopez & Hicks 2017). The use of best practices and standards are to:

- align the goals of IT to the goals of the enterprise.
- establish accountability.
- define supporting policies and processes.

In this study, the use of COBIT is addressed in terms of its strong aspects of control objectives for strategic alignment. COBIT covers the entire enterprise but is not limited to the IT department. While, other IT-related good practices and standards such as ISO/IEC 27000 series, ITIL and PRINCE2 cover the enterprise only specific parts of IT activities. The next section deals with the COBIT framework.

2.8 COBIT

COBIT has become very popular in recent years and globally accepted set of tools (Harmer 2009; ISACA 2012a; Khanyile & Abdullah 2012). It is a good practice framework produced by the international professional association of ISACA.COBIT promotes goals alignment, better collaboration and agility, and, as a result, it reduces IT risks.

2.8.1 Evolution of COBIT 5

The COBIT framework was designed to address IT concerns observed in COSO (Hardy 2006; Harmer 2009). The COBIT evolution is shown in Figure 2-9. In 1996 COBIT 1 was initially developed by the ISACF (Information

Systems Audit and Control Foundation) as part of the COSO evaluation framework (Harmer 2009). The ITGI was founded by ISACA in 1998 and in 2000, it released the second and third editions of COBIT 2 and COBIT 3 respectively.

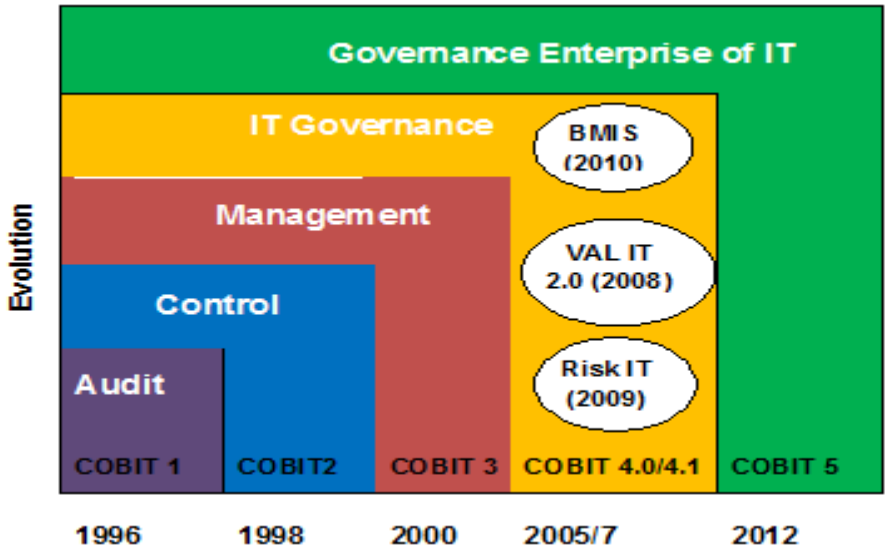

Figure 2-9: The evolution of COBIT 'Adapted from: (Harmer 2009)'

In 2005, the fourth edition was released and revised as COBIT 4.1 in 2007. The new process reference model COBIT 5, was released in April 2012. COBIT 5 is a single integrated leading business framework for governance and management of enterprise IT (Harmer 2009; ISACA 2012a). COBIT 5 was developed by integrating COBIT 4.1, Risk IT for risk framework, Governance Board Briefing, Val IT framework 2.0, ITIL V3 and other related standards from ISO, including ISO 38500 provided by ISACA (Harmer 2009; ISACA 2012a). It is also integrated with other important standards and frameworks at an advanced level. Some of these frameworks and standards include ISO/IEC 27000 series, PRINCE2, ISO/IEC 38500, TOGAF 9, King III, COSO and OECD (Harmer, 2009; Sylvester, 2011; ISACA 2012b). The comparison of the versions of COBIT since 1996 is shown in Table 2-4.

Table 2-4: Comparisons of versions of COBIT 'Adapted from: (ISACA 2012b 2019)'

Version Name	Date of Release	Domain Names	Number of Processes		No. of Control Objectives/Practices	Remark
COBIT	April 1996	Planning and Organisation Acquisition and Implementation Deliver and Support Monitoring	(32)		271	Designed for IS audit purposes
COBIT 2nd Edition	April 1998	Planning and Organisation Acquisition and Implementation Deliver and Support Monitoring	11 6 13 4	(34)	302 detailed and 34 high level	Designed for IS control purposes
COBIT 3rd Edition	July 2000	Planning and Organisation (PO) Acquisition and Implementation (AI) Deliver and Support (DS) Monitoring (M)	11 6 13 4	(34)	318 detailed and 34 high level	Management guidelines and maturity methods added
COBIT 4	4.0 Dec 2005 and 4.1 May 2007	Planning and Organisation (PO) Acquisition and Implementation (AI) Deliver and Support (DS) Monitoring and Evaluate (ME)	10 7 13 4	(34)	Version 4.0 =215 and Version 4.1=210	Verbs replace nouns in process names
COBIT 5	April 2012	Evaluate, Direct and Monitor (EDM) Align, Plan and Organise (APO) Build, Acquire and Implement (BAI) Deliver, Service and Support (DSS) Monitor, Evaluate and Access (MEA)	5 13 10 6 3	(37)	Governance practices (15) and Management practices (195).	Total 210 governance and management practices/controls in five domains
COBIT 2019	2019	Evaluate, Direct and Monitor (EDM)) Align, Plan and Organise (APO) Build, Acquire and Implement (BAI) Deliver, Service and Support (DSS) Monitor, Evaluate and Access (MEA)	5 14 11 6 4	(40)	Total 231 governance and management practices/controls in five domains.	More comprehensive, more practical framework for the management and governance of IT systems.

In addition to this, the use of COBIT 5 BSC for performance measurement tool (goals cascade), PRM, PAM, principles, enablers and CMM tool also utilise IT investments more effectively and accurately and measure performance with lower costs through stronger governance (ISACA 2012b, 2013b, 2019). Key frameworks and standards supporting GEIT are shown in Appendix C.

COBIT 5 shows core governance principles in terms of enabler requirements that help an enterprise to meet stakeholder needs by creating business value through risk mitigation, resource optimisation and benefit relation. There is a major significance on governance, responsibilities and accountability (Gregg & Johnson 2017). The COBIT 5 principles and enablers are discussed in the next section.

2.8.2 COBIT 5 principles and enablers

The key idea of COBIT 5 has five principles and defines seven categories of enablers or facilitators, which covers enterprise holistically (Harmer 2009; ISACA 2012a). COBIT 5 principles are used to build effective governance. The COBIT 5 principles are depicted in Figure 2-10.

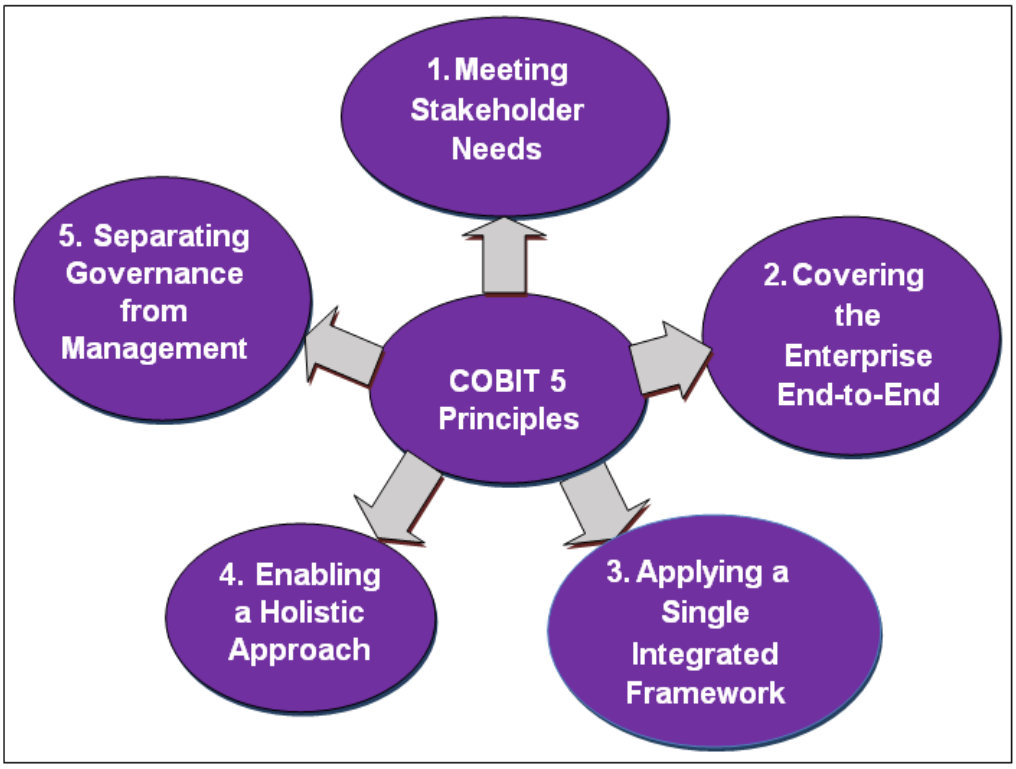

Figure 2-10: COBIT 5 principles ‘**Adapted from: (ISACA 2013a)’**

The COBIT 5 principles are:

1) **Meeting stakeholder needs:** the value for different stakeholders by using the mechanisms of optimising resources and risks together assists benefits realisation. The key governance objective of an enterprise is value creation supposed as realising benefits at optimal resource costs while optimising risks to meet their stakeholder needs (ISACA 2013a);
2) **Covering the enterprise end-to-end:** COBIT covers the entire enterprise but is not limited to the IT department;
3) **Applying a single integrated framework:** COBIT is a single integrated framework and provides results aligned with other frameworks;
4) **Enabling a holistic approach:** How GEIT enables a set of critical success factors. COBIT 5 recognises the need for seven categories of

enablers and the last three enablers (5, 6 & 7) are enterprise resources, as shown in Figure 2-11.

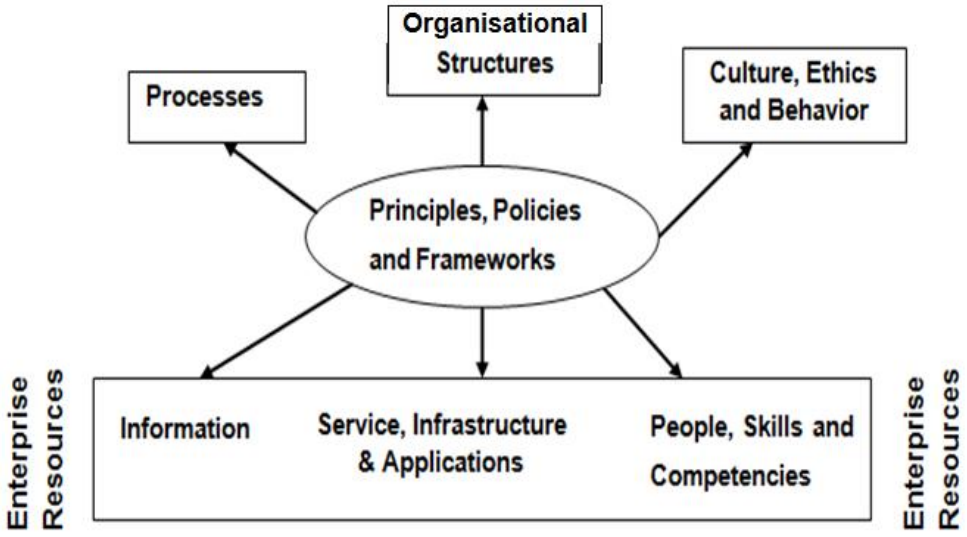

Figure 2-11: The seven enablers of COBIT 5 '**Adapted from: (ISACA 2013a)'**

The seven enablers of COBIT 5 are:

4.1 **Principles, policies and frameworks** are the means to translate the anticipated behaviour into practical guidance for day-to-day management (ISACA 2013a, 2016a).

4.2 **Processes** are defined as an organised set of practices and activities to achieve certain objectives and produce a set of inputs and outputs in support of achieving overall IT-related goals (Bernard 2012; ISACA 2013a, 2016a, 2016b).

4.3 **Organisational structures** are the key decision-making entities in an enterprise. The best way to do this is using a RACI chart (ISACA 2013a, 2016a).

4.4 **Culture, ethics and behaviour** are also key enablers of good governance and management of the enterprise. Good practices

include communication, champions, enforcement, incentives and rewards (Bernard 2012; ISACA 2013a, 2016a).

4.5 **Information** is persistent throughout any enterprise and includes all information produced and used by the enterprise (ISACA 2013a, 2016a).

4.6 **Services, infrastructure and applications** include the applications, infrastructure and technology that provide the enterprise with IT processing and services (Bernard 2012; ISACA 2013a, 2016a). For example, monitoring applications like Enterprise Monitoring Tool (EMT), monitoring applications are helpful for register, online track and monitor and follow-up for right decision-making;

4.7 **People, skills and competencies** are required for the successful completion of all activities and for taking corrective actions and making correct decisions (ISACA 2013a, 2016a).

5) **Separating governance from management:** The COBIT 5 framework adheres to the principle of corporate governance that governance and management are separate, or put more specifically; they are distinct but communicative (Harmer 2009; ISACA 2012b). Accordingly, COBIT 5 clearly separates governance processes from the management processes as shown in Figure 2-12.

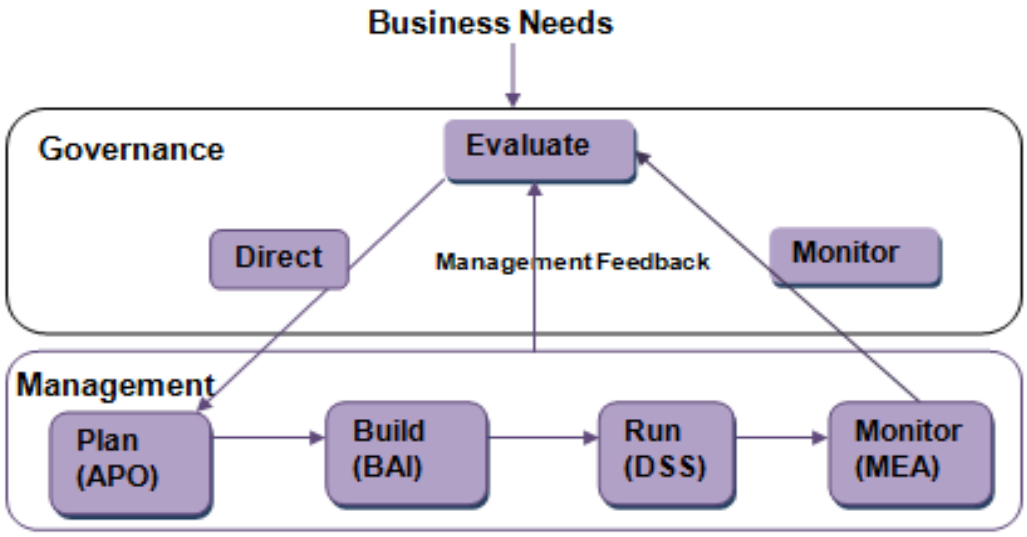

Figure 2-12: COBIT 5 governance and key management areas '**Adapted from: (ISACA 2012b)'**

COBIT 5 defines management as:

> *Management plans, builds, runs and monitors activities in alignment with the direction set by the governance body to achieve enterprise objectives* (ISACA 2013a, p. 24).

COBIT 5 defines governance as:

> *Governance ensures that stakeholder needs; setting direction through prioritisation and decision-making; agreed-on enterprise objectives to be achieved; conditions and options are evaluated to determine balanced; and monitoring performance and compliance against agreed-on direction and objectives* (ISACA 2013a, p. 24).

The COBIT 5 governance definition describes the ISO/IEC 38500 "*standard for corporate governance of information technology"* based on the definition of governance, with three key tasks (Khanyile & Abdullah 2012). The governance domain is important in line with ISO/IEC 38500 standard ideas (Calder 2008;

Chaudhuri 2011; Sylvester 2011; Khanyile & Abdullah 2012). The model for corporate governance of IT is shown in Figure 2-13.

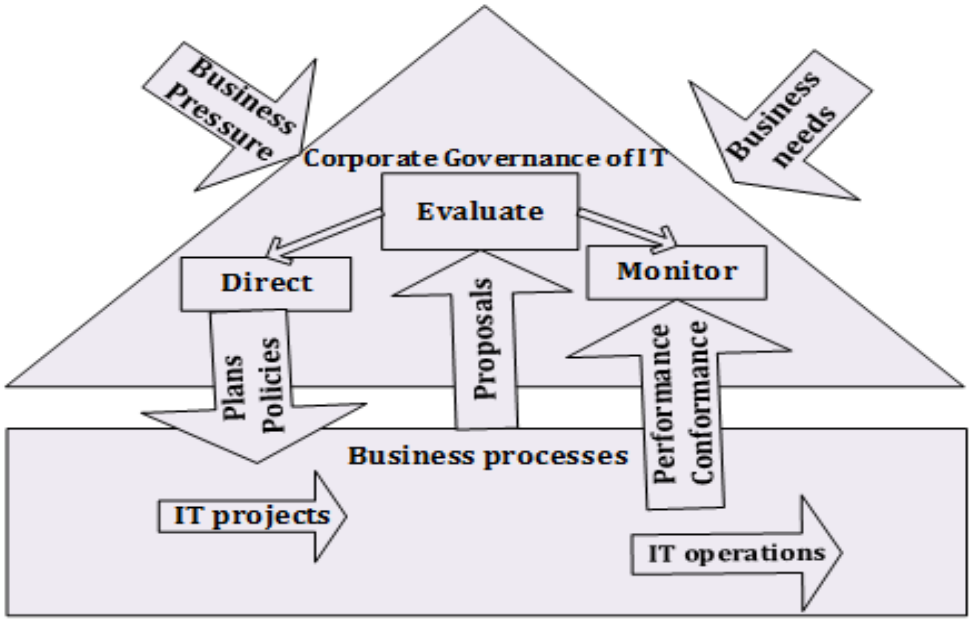

Figure 2-13: ISO/IEC 38500:2008 model for corporate governance of IT

'**Adapted from: (Chaudhuri 2011)'**

The ISO 38500:2008 suggests six principles for good GEIT (Calder, 2008; ISO/IEC38500, 2008; Chaudhuri, 2011) intended to guide the decision-making process. The principles of good governance are accountability, shareholders' rights and transparency. Moreover, every enterprise has to design and implement a corporate governance framework that fits its own business strategy, business model and business culture (Calder 2008).

The principles are:

1) **Responsibility** is the concept of ‘accountability’.
2) **Strategy** is often described as business-IT alignment.
3) **Acquisition** is transparent and clear IT investment decision-making with an appropriate balance between cost and opportunity.
4) **Performance** is fit for purpose.
5) **Conformance** requires to ensure that there is IT compliance with all contractual requirements and regulatory.
6) **Human behaviour** needs practices, IT policies and decisions to respect human behaviour.

However, the six key principles of ISO/IEC 38500 have not been formally adopted by COBIT 5. Nevertheless, COBIT 5 does support the adoption of these principles and explains how COBIT 5 guidance enables each of corporate governance principles (Hamer 2009; ISACA 2012a). The three key tasks for governing IT are evaluating the governance system in the use of IT; directing the governance system by preparation and implementation of plans and policies and monitoring the governance system by conforming to policies and performance against plans (Calder 2008; Chaudhuri 2011; Sylvester 2011; Khanyile & Abdullah 2012). The COBIT 5 PRM is discussed in the next section.

2.8.3 COBIT 5 Process Reference Model

The COBIT 5 Process Reference Model (PRM) has five domains and 37 processes. COBIT 5 separates the governance from the management processes for the processes enabler. The COBIT 5 domains and processes are shown in Table 2-5.

Table 2-5: COBIT 5 domains and processes 'Adapted from: (ISACA 2013b)'

COBIT 5				
Governance of enterprise IT	**Management of enterprise IT**			
Evaluate, Direct & Monitor (EDM)	**Align, Plan & Organise (APO)**	**Build, Acquire & Implement (BAI)**	**Deliver, Service & Support (DSS)**	**Monitor, Evaluate & Assess (MEA)**
EDM01 Ensure governance framework setting and maintenance **EDM02** Ensure benefits delivery **EDM03** Ensure risk optimisation **EDM04** Ensure resource optimisation **EDM05** Ensure stakeholder transparency	**APO01** Manage the IT management framework **APO02** Manage strategy **APO03** Manage enterprise architecture **APO04** Manage innovation **APO05** Manage portfolio. **APO06** Manage budget and costs **APO07** Manage human resources **APO08** Manage relationships **APO09** Manage service agreements **APO10** Manage suppliers **APO11** Manage quality **APO12** Manage risk **APO13** Manage security	**BAI01** Manage programmes and projects **BAI02** Manage requirements definition **BAI03** Manage solutions identification and build **BAI04** Manage availability and capacity **BAI05** Manage organisational change enablement **BAI06** Manage changes **BAI07** Manage change acceptance and transitioning **BAI08** Manage knowledge **BAI09** Manage assets **BAI10** Manage configuration	**DSS01** Manage operations **DSS02** Manage service requests and incidents **DSS03** Manage problems **DSS04** Manage continuity **DSS05** Manage security services **DSS06** Manage business process controls	**MEA01** Monitor, evaluate and assess performance and conformance **MEA02** Monitor, evaluate and assess the system of internal control **MEA03** Monitor, evaluate and assess compliance with external requirements
5 Processes	**13 processes**	**10 processes**	**6 processes**	**3 processes**

1) **Governance of enterprise IT has one governance domain:**
   - Evaluate Direct and Monitor (EDM). The COBIT 5 GEIT has governance EDM one domain and 5 processes.

2) **Management of enterprise IT has four management domains:**

Plan, build, run and monitor (PBRM) contain 32 processes:

1) Align, Plan and Organise (APO): - consists 13 processes;
2) Build, Acquire and Implement (BAI): - consists of 10 processes;
3) Deliver, Service and Support (DSS): - consists of 6 processes; and
4) Monitor, Evaluate and Assess (MEA): - consists of 3 processes.

The new governance domain (EDM1 to EDM5) is derived from the COBIT 4.1 ME4 domain by being divided into five separate processes. New or modified processes are also introduced in COBIT 5 namely; AP01- Define Management Framework for IT, APO08-Manage Relationships, APO03- Manage Enterprise Architecture and BA18- Knowledge Management among others (Harmer 2009; ISACA 2013b).

There are 37 key IT COBIT 5 processes, which consist of five governance and 32 management processes that cover 208 detailed control objectives, 129 Process Goals, 265 Related Metrics, base practices 210, RACI chart detailed role-based assignments and 1115 Activities. Furthermore, COBIT framework components include five principles, seven enablers architecture, COBIT 5 BSC for performance measurement tool consists of 17 enterprise and IT goals cascade, implementation guidance; and it uses a PAM designed in agreement with the set of technical standards ISO 15504 (Harmer 2009; ISACA 2013b).

The single COBIT 5 process has a process label, process name, area of the process and domain name. The sample “EDM05- Ensure Stakeholder Transparency” COBIT 5 process in the management area is depicted in Table 2-6.

Table 2-6: EDM05 COBIT 5 process 'Adapted from: (ISACA 2013b)'

Process ID	EDM05		
Process Name	Ensure Stakeholder Transparency		
Process Description	Ensure that enterprise IT performance and conformance measurement and reporting are transparent, with stakeholders approving the goals and metrics and the necessary remedial actions.		
Process Purpose Statement	Make sure that the communication to stakeholders is effective and timely and the basis for reporting is established to increase performance, identify areas for improvement, and confirm that IT-related objectives and strategies are in line with the enterprise's strategy.		
Outcomes (Os)			
Number	**Description**		
EDM05-O1	Stakeholder reporting is in line with stakeholder requirements.		
EDM05-O2	Reporting is complete, timely and accurate.		
EDM05-O3	Communication is effective and stakeholders are satisfied.		
Base Practices (BPs)			
Number	**Description**		**Supports**
EDM05-BP1	**Evaluate stakeholder reporting requirements.** Continually examine and make judgment on the current and future requirements for stakeholder communication and reporting, including both mandatory reporting requirements (e.g., regulatory) and communication to other stakeholders. Establish the principles for communication.		EDM05-O1/O2
EDM05-BP2	**Direct stakeholder communication and reporting.** Ensure the establishment of effective stakeholder communication and reporting, including mechanisms for ensuring the quality and completeness of information, oversight of mandatory reporting, and creating a communication strategy for stakeholders.		EDM05-O2/O3
EDM05-BP3	**Monitor stakeholder communication.** Monitor the effectiveness of stakeholder communication. Assess mechanisms for ensuring accuracy, reliability, and effectiveness, and ascertain whether the requirements of different stakeholders are met.		
Work Products (WPs)			
Inputs			
Number	**Description**		**Supports**
EDM02-WP6	Actions to improve value delivery		EDM05-BP1 EDM03-WP8 EDM05-O1/O2
EDM03-WP8	Risk management issues for the board		
EDM04-WP7	Feedback on allocation and effectiveness of resources and capabilities		
MEA02-WP16	Refined scope		
APO12-WP9	Risk analysis and risk profile reports for stakeholders		EDM05-BP2 EDM05-O2/O3
MEA02-WP17	Assurance review results		EDM05-BP3 MEA02-WP18 EDM05-O2/O3
MEA02-WP18	Assurance review report		
Outputs			
Number	**Description**	**Input to**	**Supports**
EDM05-WP1	Evaluation of enterprise reporting requirements	MEA01.01	EDM05-BP1 EDM05-O1/O2
EDM05-WP2	Reporting and communications principles	MEA01.01	
EDM05-WP3	Rules for validating and approving mandatory reports	MEA01.01 MEA03.04	EDM05-BP2 EDM05-O2/O3
EDM05-WP4	Escalation guidelines	MEA01.05	
EDM05-WP5	Assessment of reporting effectiveness	MEA01.01 MEA03.04	EDM05-BP3 EDM05-O2/O3

The COBIT 5 PRM contains process description, purpose, outcomes, base practices (BPs), work product tasks (inputs and outputs) and activities. Each base practice is made up of a list of activities. COBIT 5 EDM01.02 governance practice of and EDM01 process related guidance are shown in Table 2-7.

Table 2-7: EDM01.02 governance practice, inputs/outputs, activities and EDM01 related guidance 'Adapted from: (ISACA 2012b)'

Governance practice	Inputs		Outputs	
	From	Description outputs	Description outputs	To
EDM01.02 Direct the governance system. Inform leaders and obtain their support, buy-in and commitment. Guide the structures, processes and practices for the governance of IT in line with agreed-on governance design principles, decision-making models and authority levels. Define the information required for informed decision making.			Enterprise governance communications	▪ All EDM ▪ APO01.04
			Reward system approach	▪ APO07.03 ▪ APO07.04
Activities				
1. Communicate governance of IT principles and agree with executive management on the way to establish informed and committed leadership				
2. Establish or delegate the establishment of governance structures, processes and practices in line with agreed-on design principles.				
3. Allocate responsibility, authority and accountability in line with agreed-on governance design principles, decision-making models and delegation.				
4. Ensure that communication and reporting mechanisms provide those responsible for oversight and decision-making with appropriate information.				
Direct that staff follow relevant guidelines for ethical and professional behaviour and ensure that consequences of noncompliance are known and enforced.				
6. Direct the establishment of a reward system to promote desirable cultural change.				
EDM01 Related Guidance				
Related Standard	**Detailed Reference**			
Committee of Sponsoring Organizations of the Treadway Commission (COSO)				
ISO/IEC 38500				
King III	▪ 5.1. The board should be responsible for information technology (IT) governance. ▪ 5.3. The board should delegate to management the responsibility for the implementation of an IT governance framework.			
Organisation for Economic Co-operation and Development (OECD)	Corporate Governance Principles			

Sample IT-related goal and related metrics; process goal and related metrics for EDM01-Performance and conformance process is depicted in Table 2-8.

Table 2-8: EDM01 goals cascade information and metrics

'Adapted from: (ISACA 2012b)'

EDM01 Ensure Governance Framework Setting and Maintenance	Area: Governance Domain: Evaluate, Direct and Monitor
The process supports the achievement of a set of primary IT-related goals:	
IT-related Goal	**Related Metrics**
01 Alignment of IT and business strategy	▪ Percent of enterprise strategic goals and requirements supported by IT strategic goals ▪ Level of stakeholder satisfaction with scope of the planned portfolio of programmes and services ▪ Percent of IT value drivers mapped to business value drivers
03 Commitment of executive management for making IT-related decisions	▪ Percent of executive management roles with clearly defined accountabilities for IT decisions ▪ Number of times IT is on the board agenda in a proactive manner ▪ Frequency of IT strategy (executive) committee meetings ▪ Rate of execution of executive IT-related decisions
07 Delivery of IT services in line with business requirements	▪ Number of business disruptions due to IT service incidents ▪ Percent of business stakeholders satisfied that IT service delivery meets agreed-on service levels ▪ Percent of users satisfied with the quality of IT service delivery
Process Goals and Metrics	
Process Goal	**Related Metrics**
1. Strategic decision-making model for IT is effective and aligned with the enterprise's internal and external environment and stakeholder requirements.	▪ Actual vs. target cycle time for key decisions ▪ Level of stakeholder satisfaction (measured through surveys)
2. The governance system for IT is embedded in the enterprise.	▪ Number of roles, responsibilities and authorities that are defined, assigned and accepted by appropriate business and IT management ▪ Degree by which agreed-on governance principles for IT are evidenced in processes and practices (percentage of processes and practices with clear traceability to principles) ▪ Number of instances of non-compliance with ethical and professional behaviour guidelines

The next section deals with the COBIT 5 BSC for performance measurement tool (goals cascade).

2.8.4 COBIT 5 BSC for performance measurement

Any successful large company we see today can be considered to have effective alignment mechanism, while it may be using different strategic alignment methods. There are several relational mechanisms that have been built and utilised in enterprises to achieve the business and IT alignment, among them BSC, BPR and the value chain of Michael Porter (Van Grembergen & De Haes 2005).

The first concept of the BSC system was introduced by Kaplan and Norton (Rouyet et al. 2010). The traditional financial accounting measures can only give indications for competitive business activities. However, the BSC evaluates a firm, is not limited to a traditional financial evaluation and it added measures relating to internal processes, customer satisfaction and learning and growth (Van Grembergen & De Haes 2005). BSC is a performance measurement and management system that link intangible and tangible assets for describing value-creating strategies (Van Grembergen & De Haes 2005). The key strength of IT BSC is a unifying framework to support strategic business-IT alignment, which provides cascading capability (Hu & Huang 2005).

ITGI is providing COBIT 5 BSC for performance measurement tool (Niven 2008). ISACA is built on the BSC tool to govern and manage the alignment of IT related goals with enterprise goals. The COBIT framework and IT BSC are two relevant tools that support GEIT and they can be used to realise the desired business-IT alignment (Rouyet et al. 2010). Hence, BSC is another methodology of strategic alignment that can support GEIT and measures and manages the system that results in financial success for the company.

The four perspectives of BSC are operational excellence, stakeholders orientation, corporate contribution and future orientation and their cause and effect relationships, as shown in Figure 2-14 (Van Grembergen & De Haes 2005; Huang & Hu 2007).

The GEIT BSC and metrics of the key elements of GEIT practices can be found in the future orientation and operational excellence perspectives (Van Grembergen & De Haes 2005). The objectives of the IT BSC are as follows (Jahankhani & Ekeigwe 2005):

1) Aligning IT goal with business goals and requirements;
2) Attaining balanced results across stakeholders groups;
3) Aligning employee efforts towards IT objectives;
4) Creating measures for evaluating the effectiveness of the IT enterprise; and
5) Stimulating and supporting maximised IT performance.

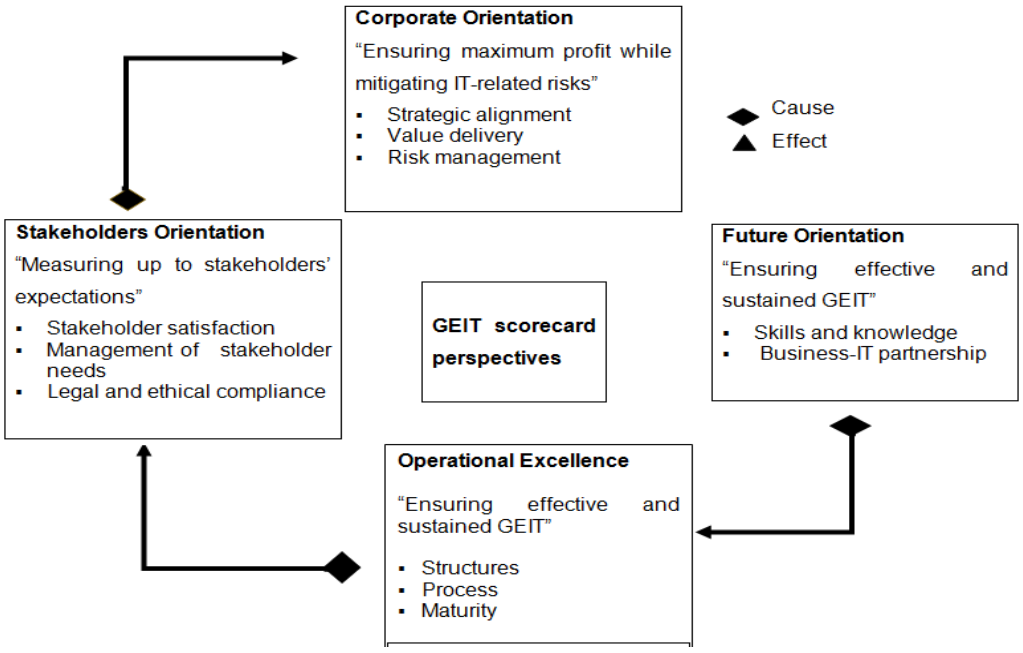

Figure 2-14: GEIT BSC relationships 'Adapted from: (Van Grembergen & De Haes, 2005)'

The advantages gained by deploying BSC are timely, usable and reliable information about process, customers and markets among others. It also gained productive and effective practices such as knowledge management, performance measurement and the ability to integrate technology. There exists a clear mapping between the BSC of the COBIT domains and the cascading model cascading as shown in Figure 2-15.

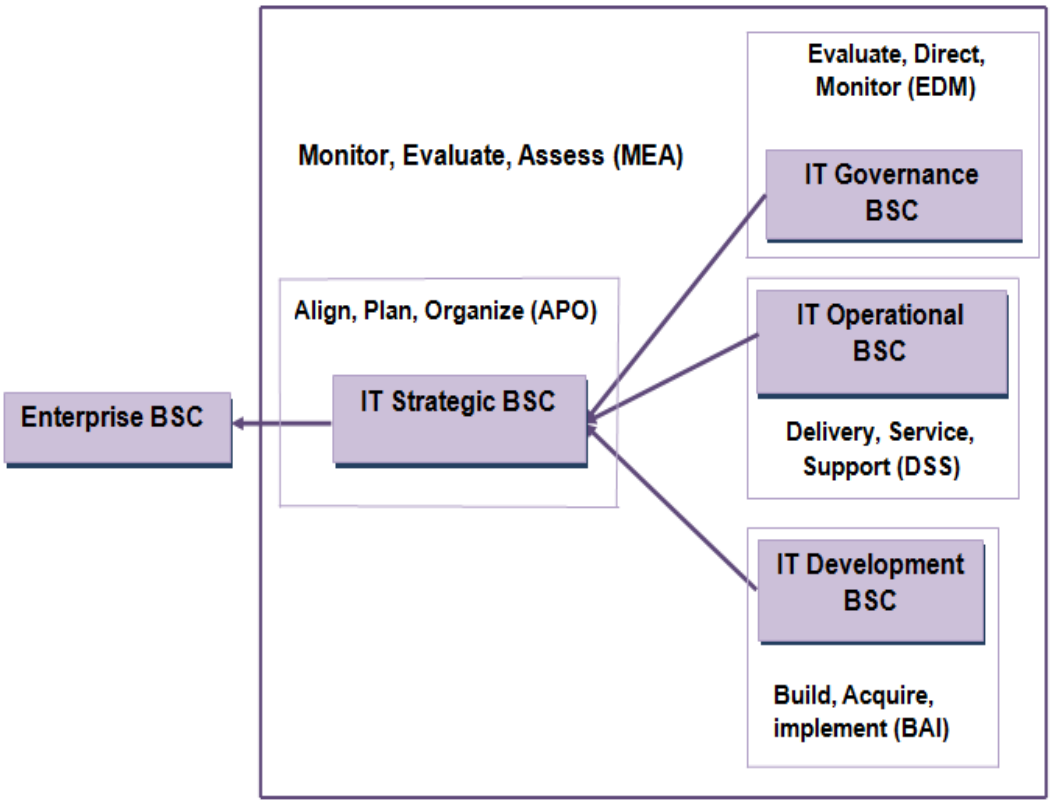

Figure 2-15: Mapping between COBIT 5 and IT BSC cascading model

The link between COBIT 5 APO, BAI, DSS, MEA management domains and EDM governance domain to IT scorecard cascading model resonates with the enterprise objectives. The COBIT 5 performance measurement tool is used as a framework to align enterprise goals to IT goals. Any enterprise has value creation as a governance objective for their stakeholder through resource optimisation, risk optimisation and benefit realisation (ISACA 2013a). The COBIT 5 goals cascade is the mechanism used to translate stakeholder needs

into tailored enterprise goals, IT-related goals and enabler goals. The key COBIT 5 Principle1; Meeting stakeholder needs; how does GEIT meet stakeholder needs? as shown in Figure 2-16 (ISACA 2012b).

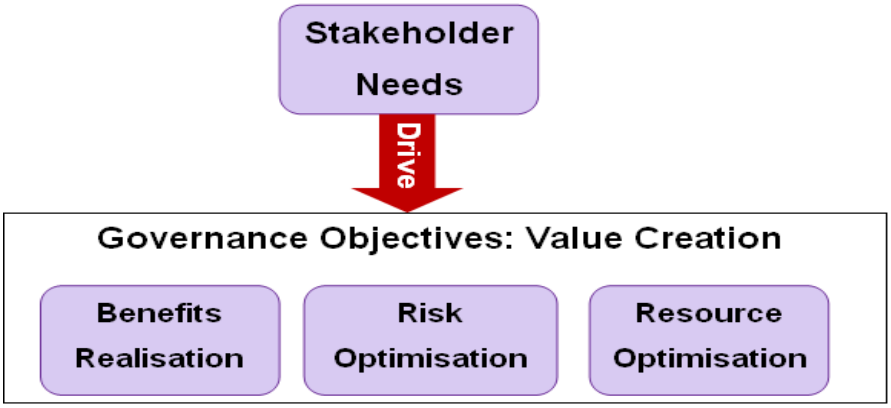

Figure 2-16: The governance objectives value creation

'Adapted from: (ISACA 2012b)'

The COBIT 5*:* Enabling processes provides the goals cascading steps are shown in Figure 2-17

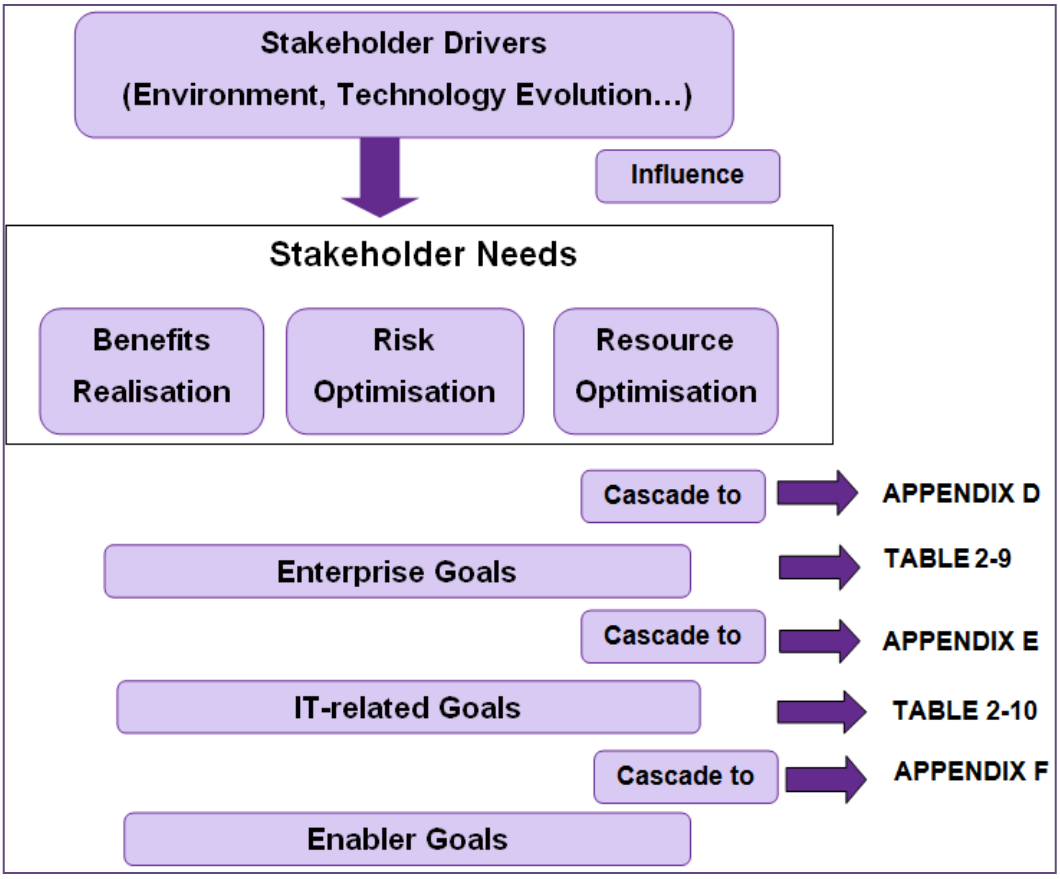

Figure 2-17: COBIT 5 goals cascade overview 'Adapted from: (ISACA 2012b)'

The enterprise goals (17) related to the three main governance objectives to meet stakeholder needs are resource optimisation, risk optimisation and benefit realisation and view organisational performance from four perspectives of BSC that are kept in balance as shown in Table 2-9. The four BSC perspectives are financial, internal, customer, and learning and growth.

Table 2-9: COBIT 5 enterprise goals 'Adapted from: (ISACA 2012b)'

BSC dimension	Enterprise goal	Relation to governance objectives		
		Benefits realisation	Risk optimisation	Resource optimisation
Financial	EG01. Stakeholder value of business investments	P		S
	EG02. Portfolio of competitive products and services	P	P	S
	EG03. Managed business risk (safeguarding of assets)		P	S
	EG04. Compliance with external laws and regulations		P	
	EG05. Financial transparency	P	S	S
Customer	EG06. Customer-oriented service culture	P		S
	EG07. Business service continuity and availability		P	
	EG08. Agile responses to a changing business environment	P		S
	EG09. Information-based strategic decision making	P	P	P
	EG10. Optimisation of service delivery costs	P		P
Internal	EG11. Optimisation of business process functionality	P		P
	EG12. Optimisation of business process costs	P		P
	EG13. Managed business change programmes	P	P	S
	EG14. Operational and staff productivity	P		P
	EG15. Compliance with internal policies		P	
Learning & growth	EG16. Skilled and motivated people	S	P	P
	EG17. Product and business innovation culture	P		

'**P**' = primary relationship '**S**' = Secondary relationship

Enterprise goals cascade to IT-related goals

Enterprise goals cascade to IT-related goals, IT-related goals cascade to IT-related processes and outcome metrics. The 17 IT-related goals are structured into four IT BSC dimensions as shown in Table 2-10.

Table 2-10: Generic IT-related goals 'Adapted from: (ISACA 2012b)'

IT BSC Dimension	Information and related technology goal
Financial	ITG01. Alignment of IT and business strategy
	ITG02. IT compliance and support for business compliance with external laws and regulations
	ITG03. Commitment of executive management for making IT-related decisions
	ITG04. Managed IT-related business risk
	ITG05. Realised benefits from IT-enabled investments and services portfolio
	ITG06. Transparency of IT costs, benefits and risk
Customer	ITG07. Delivery of IT services in line with business requirements
	ITG08. Adequate use of applications, information and technology solutions
Internal	ITG09. IT agility
	ITG10. Security of information, processing infrastructure and applications
	ITG11. Optimisation of IT assets, resources and capabilities
	ITG12. Enablement and support of business processes by integrating applications and technology into business processes
	ITG13. Delivery of programmers delivering benefits, on time, on budget, and meeting requirements and quality standards
	ITG14. Availability of reliable and useful information for decision making
	ITG15. IT compliance with internal policies
Learning & growth	ITG16. Competent and motivated business and IT personnel
	ITG17. Knowledge, expertise and initiatives for business innovation

By deploying BSC, an enterprise can achieve the following objectives (Richard & et al. 2007).

- Achieve continual operational excellence **(Internal business process),** provide efficient and effective services; deliver projects with quality, processes to acceptable standards.

- Build skills and leadership (**Learning and growth)** by delivering clear communications, developing and nurturing the talent pool, sharing knowledge and learning, building a performance culture.
- (**Customer**) driving the change in the business and being proactive about the role and value of IS
- Lead to business change by delivering agreed improvements in business.

There are four enabler dimensions: stakeholders, goals, good practices and lifecycle. The COBIT 5 generic enabler model is shown in Figure 2-18.

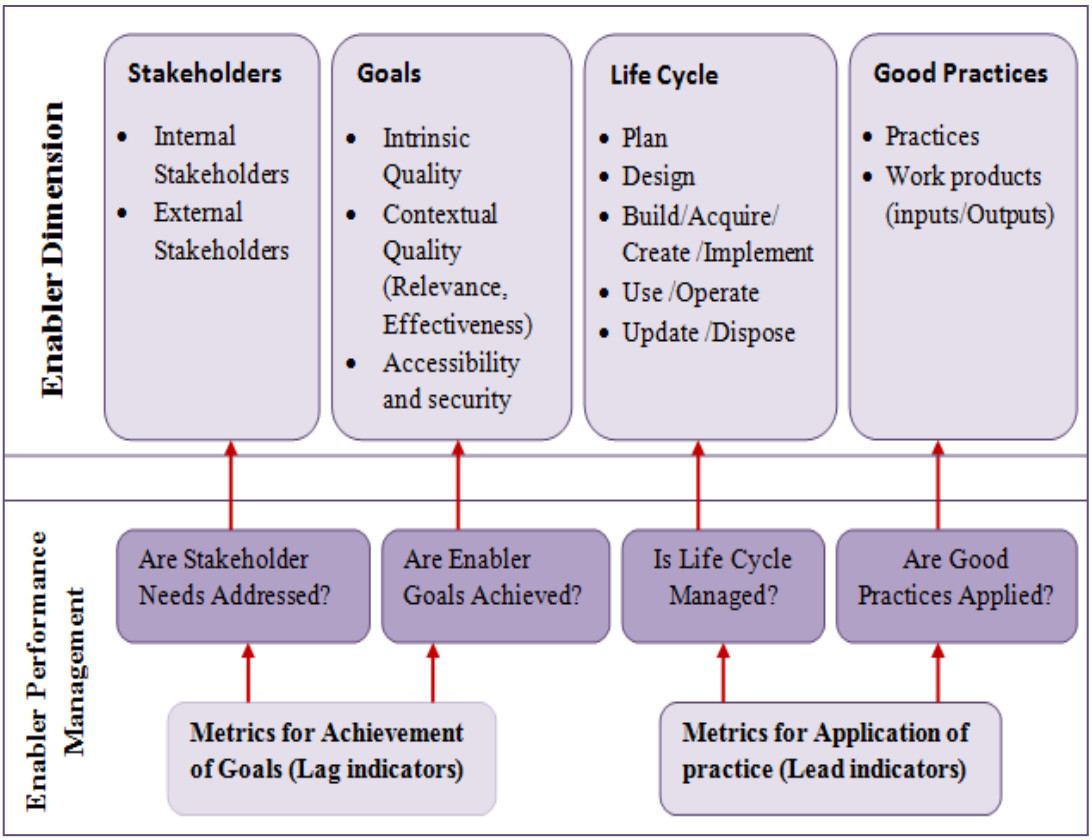

Figure 2-18: Generic enabler model 'Adapted from: (ISACA 2013a)'

COBIT 5 identifies three levels of metrics as enterprise goal level, IT goal level and process goal level (ISACA 2012b). The two types of indicators to monitor goal achievement namely; lead indicators are not measurable and predict the

achievement of life-cycle activities (Sunil, 2016). ITIL also defines three types of metrics: technology metrics (e.g. average uptime), process metrics (e.g. average incident response time in a month) and service metrics (customer satisfaction).

Activities: The activities have steps to achieve a governance practice/management practice, inputs/outputs of the process, clear roles and responsibilities and best practices (ISACA 2012b). IT management needs to be PBRM enterprise of IT.

Detailed activities: other good practices such as ITIL, Val IT, ISO 27001, PRINCE2, TOGAF should be integrated with COBIT 5 (ISACA 2012b).

Today, data translated into information is considered an important asset for the financial sector. A data analytics audit related to a financial institution environment is designed to provide an opinion of information safety, data quality and relevance of information, to support the strategic business context (Da Silva Antonio & Manotti 2016). COBIT 5 information quality criteria can be divided into three categories: intrinsic, contextual and security (COBIT 5: Enabling Information enables). COBIT 4.1 information criteria vs. COBIT 5 information quality criteria are as shown in Table 2-11.

Table 2-11: COBIT 4.1 vs. COBIT 5 information quality criteria

Seven COBIT 4.1 information criteria		COBIT 5 information quality criteria		
		Intrinsic	Contextual	Security
Quality	Effectiveness	Objectivity	Appropriate amount Relevancy Understandability Interpretability	
	Efficiency	Believability Reputation	Accessibility Ease of manipulation	
Security	Integrity	Accuracy	Completeness	
	Availability			Availability
	Confidentiality			Restricted Access
Fiduciary	Reliability	Objectivity reputation believability		
	Compliance	Accuracy	Completeness Concise representation Consistent representation Currency	

COBIT 5 covers all information quality criteria from COBIT 4.1. The COBIT 5 process assessment model is discussed in the next section.

2.8.5 COBIT 5 process assessment model

The COBIT 5 Process Assessment Model (PAM) conforms to ISO/IEC 15504-2 requirements for performing process assessment in process improvement and can be used to conduct capability assessment of each COBIT 5 process (ISACA 2013b). The lists of generic work products (GWPs) and relation to capability level (ISACA 2013b, p. 127) is shown in Figure 2-19.

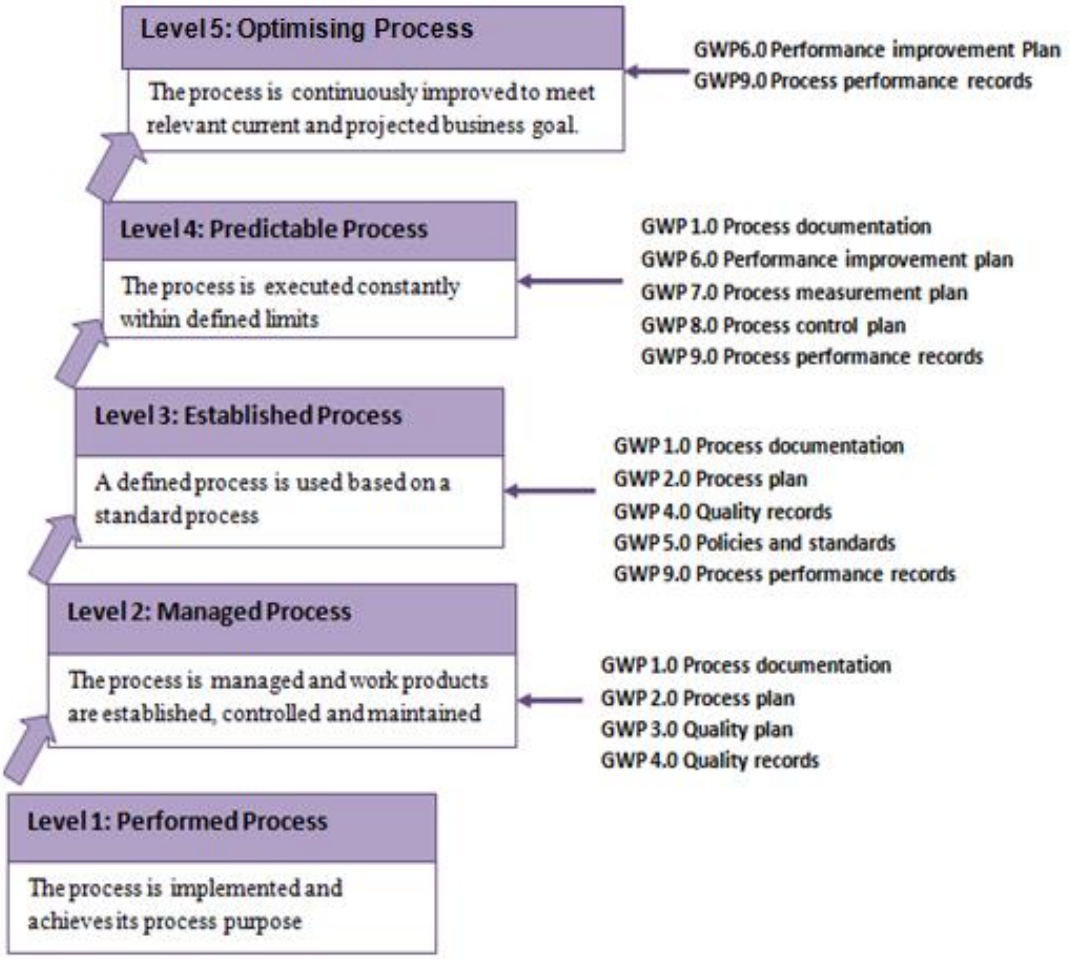

Figure 2-19: Generic work products and capability level

'Adapted from: (ISACA 2013b)'

Generic work products provide evidence for the achievement of specific process capability attributes. 'Generic' because similar work products would be expected for each process. They are indicative of the types of work products and content that will be introduced to support increased process capability. The evidence includes things such as process objectives, responsibilities, performance requirements, improvement plans and outcomes required at various levels of process capability (ISACA 2013b).

The rating scale involves six capability levels (from 0 to 5); capability level 5 (optimising process) while capability level 0 (incomplete process) indicates that the process is not implemented or fails to achieve its process purpose.

Assessment indicators

These performance indicators consist of base practices and work products and are exclusive to level 1 as shown in Figure 2-20.

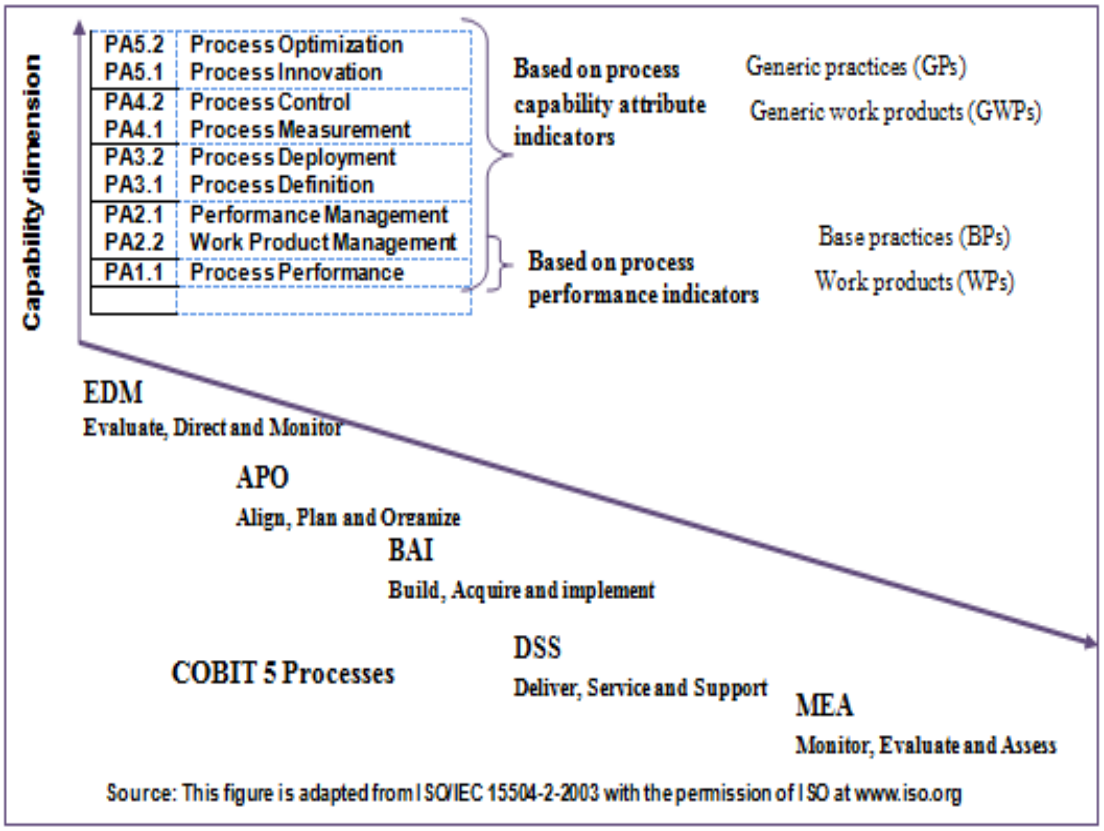

Figure 2-20: Assessment Indicators 'Adapted from: (ISACA 2013b, p. 14)'

ISO/IEC 15504 standard defines the rating scale for achievement of capability level of process is discussed in terms of the percentage achieved as shown in Table 2-12.

Table 2-12: Rating levels 'Adapted from: (ISACA 2013b)'

Abbreviation	Description	Achieved
N	Not achieved	0 to 15% achievement
P	Partially achieved	>15% to 50% achievement
L	Largely achieved	>50% to 85% achievement
F	Fully achieved	>85% to 100% achievement
Source: This figure is reproduced from ISO/IEC 15504-2:2003, with the permission of ISO/IEC at *www.iso.org*. Copyright remains with ISO/IEC		

2.8.6 Uses of COBIT 5

In this study, the use of COBIT is selected and addressed in terms of its strong aspects of control objectives for strategic alignment. The COBIT 5 framework provides a common language between IT staff and executives; using COBIT 5 IT professionals and senior managements easily understand each other, there should be an alignment for successful delivery of IT initiatives, easily monitored security and privacy requirements and successful delivery of IT projects which meet quality, cost and time (ITGI & OGC 2008). It also includes control objectives information that delivers timely, meet quality, more transparent and predictable. Benefits of using an integrated GEIT framework such as avoid re-inventing wheels, improve trust; credibility and confidence; common language; improve customer satisfaction and responsiveness; clear accountability and responsibilities and cover end-to-end. It also includes consistent, repeatable and measurable processes, faster acceptance and deployment (Selig 2008a). COBIT 5 enablers cover the enterprise holistically in terms of processes, skills and competencies, structures, policies, information, culture and services. COBIT 5 PAM is the only assessment model that provides an enterprise-level assessment of IT process capability and compliant with ISO/ IEC 15504. It has ability to create value and supports the performance of assessment (Harmer 2009; ISACA 2013b).

The COBIT 5, PRM, five key principles and seven enablers, good practices, BSC for performance measurement (goals cascade), metrics entail many opportunities implementing GEIT processes. COBIT 5 PAM based on COBIT 5 that is compliant with ISO/IEC 15504 (ISACA 2013b). The COBIT 5 PRM is composed of 37 processes, cover 208 detailed control objectives, 129 process goals, 265 related metrics, 15 governance practices, 195 management practices (210 practices in total), inputs and outputs, RACI chart detailed role-based assignments and 1115 activities describing a life-cycle for governance and management of enterprise IT for implementing effective GEIT system (ISACA 2013b).

COBIT 5 performance measurement tells us how GEIT enables a set of critical success factors. Moreover, COBIT 5 combines COBIT 4.1, Risk IT and Val IT into one framework and it works with other frameworks and standards such as ITIL, ISO/IEC 27000 series, PRINCE2, TOGAF 9, King III, COSO, OECD including ISO/IEC 38500 for good corporate governance of IT (Hamer 2009; Sylvester 2011). On the other hand, these other best practices and standards cover the enterprise's only specific parts of IT activities. Analogically, ISO 385001 is like a roof on a house, COBIT the walls (the what) and other frameworks and standards such as ITIL and PRINCE2 the foundation (the how). Without the foundation or walls, ISO 38500 would collapse. ISO 38500 does not replace ITIL, COBIT, or other standards or frameworks (Sylvester 2011).

Some of the limitations of COBIT 5 are lack of implementation guidelines and the difficulty to understand unfamiliarity of the websites for most researchers. COBIT 5 is a broad framework that can be applied to any enterprise, public or private, small or large, profit-making or non-profit making. Nowadays, many enterprises use COBIT namely; Anonymous Bank, Global Bank, Canadian Tire Financial Service LTD, U.S Department of Veterans Affairs, Government of Dubai Financial Audit Department, Ethiopia Airlines IT Audit Department,

Sun/Oracle, UNISYS Corporation USA, Middle East Bank among others are implementing COBIT 5 to achieve good strategic business-IT alignment and to improve the enterprise's information security. Middle East Bank improves information security using COBIT 5 (Abbas 2014). The ISACA website is a global association helping individuals and enterprises achieve the positive potential of IT. Today, ISACA serves 140,000 professionals in 180 countries, including more than 220 chapters worldwide and offices in both the United States and China.

2.9 CONCLUSION

This chapter provided abroad description of literature review-related works done in the area of GEIT, strategic business-IT alignment and COBIT 5. It also elaborated COBIT 5 evolution, domains and processes, PRM, PAM and uses of COBIT 5. This study uses COBIT 5 principles and enablers, COBIT 5 BSC for performance measurement tool and CMM, which provide business-IT guidance with other related standards. It includes how enterprises meet stakeholders' needs. In the next chapter, mixed methods research design and methods are discussed.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the adopted research methodology for this study and the rationale for adopting this methodology. The methodology discussed is based on research strategy and design. The next section provides a mixed methods research design of the study and explains the explanatory sequential, data collection techniques and analysis procedures. It also includes the sampling method and target groups of this study. The third section provides a research strategy, which deals with the interaction of three components namely philosophy, research designs and methods. The fourth section provides the reliability and validity of the research instruments used. The last section provides the conclusion of the chapter.

3.2 MIXED METHODS RESEARCH DESIGN

Research designs are types of inquiry within quantitative, qualitative and mixed methods approaches that provide methods of data collection and analysis procedures in a research study (Creswell 2014). Mixed methods research is becoming more popular and accepted across disciplines and countries. Mixed methods research addresses the research problem more fully by integrating both quantitative and qualitative questions within a single study (Clark & Ivankova 2016). Mixed methods attributes are discussed in Table 3-1.

Table 3-1: Mixed methods attributes

Parameter	Mixed Methods
Philosophical assumption /Paradigm	Pragmatism knowledge claims
Strategies of inquiry	Sequential, concurrent and transformative
Methods	Both open and closed ended questions, both emerging and predetermined approaches, and both quantitative and qualitative data and analysis
Practices of research	▪ Collection both quantitative and qualitative data ▪ Develops a rationale for mixing ▪ Integrates the data of different stages of inquiry ▪ Presents visual pictures of the procedures in the study ▪ Employs the practices of both quantitative and qualitative study.
Descriptive Approach	Appropriate number for quantitative analysis, appropriate number for qualitative methods
Sampling	Both purposive and probability sampling
Goal of Analysis	Comprehension and explanation
Data Source	Narrative and numeric
Type of Data Analysis	Integration of thematic and statistics data
Validity	Integrated strength of validity from qualitative strands and reliability from quantitative strand

The research paradigm for the mixed methods approach is a pragmatic worldview, collection of both quantitative and qualitative data sequentially in the design (Creswell 2014). There are three essential designs in mixed methods research (Creswell 2014):

1) **Convergent** is a form of mixed methods design in which the researcher converges quantitative and qualitative data in order to provide a full analysis of the research problem.
2) **Exploratory sequential** is considered sequential because the initial qualitative phase is followed by the quantitative phase.

3) **Explanatory sequential** is the reverse sequence from the exploratory sequential design and the researcher first begins with a quantitative phase is followed by the qualitative phase.

In order to analyse and address the research problems, the researcher selected explanatory sequential mixed methods designs is conducted through in-depth use of multiple sources of data generation and analysis methods by integrating quantitative and qualitative data that enable the researcher to obtain richer insight into reality, unique opportunity and convenience (Oates 2006). The benefits of mixed methods study ensure that it gathers rich information by integrating quantitative and qualitative data (Wisdom & Reswell, 2013).

The top management and IT managements were selected as target groups of this study to answer the research questions, since the relationship between GEIT and strategic business-IT alignment has one of the top concerns of senior managements and IT managements around the world. The total target population of the study was around 120 participants and that includes all boards of directors, executives, directors and IS managers, including IT support district managers in the case of CBE. From the total 120, 100 participants were selected using judgment sampling. Of these, 55 belonged to top management (14 process council committee (executive management), nine were members of the Board of Directors and 32 business and IT directors) and 45 members were from IT management. A sample is selected using a purposive sampling method (also judgmental sampling) and the selection follows some judgment in a non-random manner (in a non-probability sampling method), a sample of elements that represents the population (Toepoel 2016).

3.2.1 Mixed methods data collection

This study adopted an explanatory sequential mixed methods approach integrated both quantitative and qualitative data collection techniques. The data collection proceeds in two phases: In the first phase quantitative sampling with purposeful sampling and in the second phase qualitative. The study started with the quantitative data collection followed by qualitative data collection to analyse the relationship between GEIT and strategic business-IT alignment using COBIT 5 in the case of CBE. The quantitative data generation method is discussed as follows.

3.2.1.1 Quantitative data collection

In the first quantitative phase of the study, data are collected from top management and IT management at CBE, using two questionnaires. The questionnaires have been adopted and customised to CBE. The first questionnaire addresses GEIT practices maturity assessment in three domains namely; relational mechanisms, processes, structures which consist of 33 questions on GEIT practices implementation maturity, based on a generic maturity model (from 0 to 5) (De Haes & Van Grembergen 2008). The second questionnaire used LAMM in six criteria namely; partnership, communication, scope and architecture, governance, skills and competency, which covers 38 questions with five maturity levels (Luftman & Kempaiah 2007). LAMM assessment tool was applied to measure the maturity level of the business-IT alignment of CBE. Based on the alignment criteria, the level of maturity of the bank is “Good (level 3- established, focused processes)” and the questionnaire format customised from LAMM accordingly. Each question has five agreements level (strongly disagree to strongly agree). CBE top management and IT managements have been involved to complete the questionnaires. The questionnaires have been distributed to a total of 100 participant target groups in CBE; physically in hard copy (see Appendix A). As

summarised in the analysis, a total of 68 useful questionnaires were collected for analysis. The qualitative data collection is presented in the next section.

3.2.1.2 Qualitative data collection

In the second qualitative phase of the study, the researcher integrated the results to mix quantitative and qualitative methods. Based on the quantitative result, the qualitative data were collected from document review, observation and participation, focus group discussion with selected managements and gap assessment using COBIT 5 in the case of CBE.

1) Document review

Documents are collected and reviewed, these are documents such as CBE's five years corporate strategy, quarter and annual reports, IT audit findings, IS policy and procedures, implementation status of IT projects, IT performance management and GEIT structure. These documents are collected and reviewed from the CBE website, CBE public memos, outlook, portal and Graphical Intelligence Electronic Operational Management (GEIOM). It also includes CBE financial and non-financial facts and figures. The researcher assessed and reviewed eight years of performance (scorecards) report from 2011 to 2019. It includes IT project performance, IS support service, ATM performance and T24 (core banking application) production monitoring reports. Other related documents collected and reviewed are from IT and business perspectives. However, some of the review of GEIT related to strategic business and IT alignment is derived from my own experience using COBIT 5 at CBE. The related literature searches were conducted from the ISACA website and the UNISA library.

2) Group discussion

The researcher conducted formal and informal discussion, formal discussion with 15 districts IT support managers and managers, under the strategic management office (monitoring and evaluation work unit). Informal discussion were held with IS/IT managers and collected IS performance report, budget and other related information. From IS, project managers the researcher collected IS project status and performance report. As a result, the researcher's understanding and level of IS support in IS and district level in CBE, monitoring and tracking tools, IS performance measurement system in CBE.

3) Observation and participation

The researcher participated in weekly Change Advisory Board (CAB) meeting, IS policy and procedures preparation, IS performance management preparation and review, IT competence revision, annual IS plan preparation, IT audit rectification follow-up, quarter and annual reports preparation and observed and understand overall IS activities. Furthermore, the researcher participated in ITIL processes, including incident and change management processes design data collection and implementation workshops. The researcher collected IS performance, project status and other relevant information. Table 3-2 provides an overview of the research questions, research objectives, research methods, participants and data strategies and instruments (case study using mixed methods multiple sources of data generation methods).

Table 3-2: Overview of research questions, research objectives, research methods, participants and instruments

Research questions	Research objectives	Participants/Sources	Data strategies and instruments				
			Quantitative	Qualitative			
			Questionnaire	Document Review	Group Discussion	Observation & Participation	Gap assessment using COBIT 5
RQ1: How are GEIT practices implementing in CBE?	To determine GEIT practices implementation in CBE.	Board of directors	√				
		Executive management committee	√				
RQ2.What is the level of strategic business-IT alignment maturity in CBE according to the LAMM?	To assess the strategic business-IT alignment maturity of CBE according to LAMM.	IS/IT and business managements	√		√		
		District IT support managers	√		√		
		Managers under strategic management office	√		√		
RQ3.What is the relationship between GEIT practices implementation and strategic business-IT alignment maturity in CBE?	To measure the relationship between GEIT practices implementation and strategic business-IT alignment in CBE.	Subject matter expertise	√				
		Various IS/IT workshops				√	
		IT audit findings rectification follow-up				√	
RQ4. How is CBE trying to achieve strong strategic business-IT alignment by implementing effective GEIT practices processes using COBIT 5 BSC?	To analyse the gaps and provide the methods how CBE implement GEIT practices processes to achieve strong strategic business-IT alignment using COBIT 5 BSC.	GEIT processes vs. COBIT 5 processes					√
		5 years CBE strategic document		√		√	√
		Attending CAB meeting		√		√	√
		IS policy procedure preparation & revision		√		√	
		ITIL project implementation				√	√
		IS/IT plan/budget preparation and BSC preparation and revision				√	√
		Literature search from ISACA website and UNISA library		√			

4) Gap assessment using COBIT 5

The researcher mapped GEIT practices processes with COBIT 5 processes, assessed and identified gaps on current and desirable level GEIT practices processes capability level by and propose a method to fill the gap using COBIT 5 BSC.

3.2.2 Mixed methods data analysis

This study analyses the relationship between GEIT and strategic business-IT alignment using COBIT 5, according to explanatory sequential mixed methods by integrating quantitative and qualitative data analysis methods. In quantitative evidence, data are collected, classified, coded, tabulated and charted by using Statistical Packages for Social Sciences (SPSS). Preliminary analysis was tested using Cronbach's α for reliability and validity of the survey instrument followed by Kolmogorov-Smirnov (KMO) or Shapiro-Wilk in SPSS Q-Q plots Normality Test (K-S Test) for both GEIT and strategic business-IT alignment quantitative data. The quantitative data analysis is discussed in the next section.

3.2.2.1 Quantitative data analysis

Firstly, quantitative phase assessment is conducted to determine CBE's GEIT practices implementation by using GEIT maturity assessment list and strategic alignment maturity by using LAMM assessment tool at CBE as follows:

1) Determine GEIT practice implementation in terms of relational mechanisms, processes and structures, using a 6-point maturity level from 0 to 5;

2) Measure strategic business-IT alignment using LAMM and calculating overall CBE alignment score, each question rated on a scale from 0 to 5 level of agreements;

3) Analyse the relationship between strategic business-IT alignment and GEIT practices implementation, using correlation analysis and regression analysis was also made for the relationship how GEIT practices implementation impacted strategic business-IT alignment in the case of CBE. Correlations between each predictor (independent) namely GEIT practices variable with a predicted (dependent) namely strategic business-IT alignment are presented. It also includes empirically tested relationship between GEIT and strategic business-IT alignment using the survey method employing regression analysis.

4) Analyse the gaps and provide the methods how CBE implement GEIT practices processes to achieve strong strategic business-IT alignment using COBIT 5 BSC.

3.2.2.2 Qualitative data analysis

Secondly, in the qualitative data analysis phase, the researcher integrated the results to bring together the quantitative and qualitative methods. Based on the quantitative result, the qualitative data were obtained through document analysis, formal and informal focus group discussion with selected managements, observation and participation and gap assessment using COBIT 5 in the case of CBE.

1) Document analysis

In terms of the qualitative data analysis, the researcher analysed GEIT practices and strategic business-IT alignment by integrating the quantitative results in CBE. Documents such as the five-year CBE strategy, quarter and annual reports, IT audit findings, IS policy and procedures, implementation

status of IS projects, IS/IT performance management system collected and analysed. Other related documents from public CBE memos, CBE website and CBE portal/Library were collected and analysed. Moreover, eight years performance (scorecards) annual reports from 2011 to 2019, IT audit rectification follow-up, GEIT structure, ATM performance and T24 Core Banking application production monitoring reports were collected and analysed from various CBE memos, CBE portal and CBE website.

2) Discussion

The research collected and analysed data based on the quantitative result, the qualitative data from 15 IT support district managers and analysed IT support requests, standard change handling mechanisms and standard procedure. It also analysed IS project status and CBE financial and non-financial facts and figures; data collected by formal and informal discussion from IS/IT managers, IS project managers and manager of monitoring and evaluation work unit under the strategic management office in CBE.

3) Observation and Participation

The researcher analysed IS overall IS performances based on GEIT practices, as well as strategic business-IT alignment maturity. The data gathered through observation and participation in various workshops such as, IT projects including ITIL processes deign, IBM Design Thinking for Resiliency, IS competency and job description revision and CBE five years corporate strategy. It also participated in performance measurement review, IS quarter and annual report preparation, IS budget preparation and attended weekly CAB meetings.

4) Gap assessment using COBIT 5

Identify the gap between the current GEIT processes and the desired level (level 4- managed and measurable) by assessing and measuring GEIT processes capability level using COBIT 5. Evaluate CBE IS activity in terms of Strengths, Weaknesses Threats and Opportunities (SWOT) analysis. Identified and analysed CBE internal and external stakeholders' needs. The current and desired state of GEIT practices processes mapping COBIT 5 processes and other related frameworks and standards. Illustrative IT-related goals cascade by taking one of the key goals of strategic business-IT alignment (ITG01). COBIT 5 mapping IT-related goal 1 to COBIT 5 processes. Finally, the researcher mixed quantitative and then qualitative results and analysed based on quantitative results. The next section deals with the research strategy.

3.3 RESEARCH STRATEGY

Research strategy is the overall approach to answering the research questions (Oates 2006). There are six research strategies in IS and computing namely; survey, case study, experiment, action research, design, creation and ethnography (Oates 2006). Mixed methods case study strategy is made through in-depth use of multiple sources of data collection methods that integrate both quantitative and qualitative sequentially. There are three types of case studies; explanatory, descriptive and exploratory (Oates 2006).

The researcher selected explanatory sequential mixed methods case study strategy to analyse the relationship between GEIT practices implementation related to strategic business-IT alignment using COBIT 5 in the CBE. In this regard, the researcher could help to obtain richer insight into reality, unique opportunity and convenience (Oates 2006). The research paradigm for the case study is a combination of specific positivistic elements of quantitative

research methods with specific constructivist elements of qualitative research methods precision (Kitchenham 2012). The research framework explains that the interaction of three components namely; philosophy, research designs and methods (Creswell 2014).

3.4 RELIABILITY AND VALIDITY

According to Field (2009), to be valid the instrument must first be reliable. Validity refers to whether an instrument measures what it was designed to measure (Field 2009). Conversely, reliability is the ability of the measure to produce the same results under the same conditions (Field 2009). Reliability and validity in mixed methods can be carried out by using a convergent approach, (i.e. a strategy from the quantitative method), for example content validity and another from the qualitative method (Creswell 2014). Verification ensures internal validity. To ensure this, integration of data strategy has been used, data gathered through multiple sources to include questionnaires, focus group discussions, document analysis, observation and participation and gap assessment using COBIT 5.

3.4.1 Reliability

In order to keep reliability in the study, the researcher managed the same type of questionnaires to all the subjects, that is, CBE top management and IT management of the CBE who participated in this study were given the same type of questions to all respondents. The reliability of the instruments can be used internal consistency reliability (across items) and the standardisation procedure through the employment of Cronbach's α. Cronbach's α is the most commonly used measure to investigate a scale's reliability (internal consistency) (Barry et al. 2011). Therefore, Cronbach's α indicates the overall reliability of a questionnaire and values.

3.4.2 Validity

According to Davis (2010), validity is defined as the extent to which a concept is accurately measured in a quantitative study while reliability is a central aspect of measurement (construct) validity. The sample was selected using the purposive sampling method from top management (board of directors, president, vice-president and directors) and IT managements of CBE as the target group of this study. GEIT is a high-level concept and the responsibility of top management and IT management around the world. There are three aspects of validity, namely; construct, internal and external validity.

Construct validity is keenly focused upon quantitative methodologies (Mills, Durepos, & Wiebe 2010; Creswell 2014). It measures the reliability of the survey instrument (Yue 2010).

Internal validity is achieved by making sure that survey questions did not contain any internal contradictions. The questionnaires were validated through discussion with senior IT staff in CBE and CBE editor edited the questionnaire.

External validity the ability to take the findings from one study and apply the same relationships and conclusions to other populations and contexts (Yue 2010). The researcher, therefore, integrated the results to bring together the quantitative and qualitative methods by using multiple sources such as focus group discussions, IS and business work units and document review and analysis such as quarter and annual IT reports, IS policy and procedures, IS plan and budget and memos, gap assessment using COBIT 5.

Content validity is the degree to which elements of an assessment instrument are appropriate for assessment purposes (Haynes 1995). Hence, the content validity of the questionnaire was discussed with senior IT staff in CBE and the

CBE editor edited the content of the questionnaire to avoid leading and misleading questions.

Internal consistency – reliability and validity of the survey instrument were tested using Cronbach's α for quantitative data analysis, both GEIT and business-IT strategic alignment. Factor analysis is not applicable for this study owing to sample size. The recommended sample size was five times the number of items. In this case, 33 items multiplied by 5, which equals to 165. Therefore, more than 165 sample sizes were needed to employ factor analysis (Field 2009). Besides, using statistical tests of normality of data to check whether data were normally distributed, Kolmogorov-Smirnov Normality Test (K-S Test) or Shapiro-Wilk in SPSS Q-Q plots and histogram for GEIT practices implementation maturity and strategic business-IT alignment were conducted (Field 2009; Pallant 2011). It also includes a test of normality uses hypotheses testing to test the sample data are normal or not. Moreover, the recommended sample size was needed to employ multiple regression, the required sample size $n > 50 + 8m$ (where m = number of independent variables). The number of independent variable is one in this study; more than 58 sample sizes required for multiple regression (Pallant 2011). Therefore, in this study, the sample size was 68 to generalise with other samples. The conclusion of this chapter is discussed in the next section.

3.5 CONCLUSION

This chapter focused on research design that includes research strategy, mixed methods data collection and analysis including target population and sampling. The methodology is discussed based on research strategy and design. Mixed methods explanatory sequential data collection techniques and analysis procedures are discussed. It also included the sampling method and target groups of this study. The research strategy of three components namely; philosophy, research designs and methods were discussed. The reliability and

validity of the survey instrument, using Cronbach's α and internal consistency reliability (across items) that have been used in the study are discussed. In the next chapter, mixed methods data collection, analysis and findings in this study are discussed.

CHAPTER 4: DATA COLLECTION AND ANALYSIS

4.1 INTRODUCTION

The researcher used explanatory sequential mixed methods designs, integrating or mixing quantitative and qualitative data generation methods. The next section provides an explanatory sequential by mixing (both quantitative and qualitative) data collection. In the quantitative data collection, data were collected using the GEIT practices implementation assessment tool and LAMM assessment tool. In the qualitative phase of the study, evidence was collected and examined from observation and participation, document review, focus group, formal and informal discussions with selected managements of CBE and gap assessment using COBIT 5. The third section provides data analysis using an explanatory sequential mixed methods that is integrating quantitative (questionnaires) and qualitative (document review and analysis, discussion, observation and participation and gap assessment using COBIT 5) data analysis. The preliminary analysis is also conducted to test the validity and reliability of the survey instruments using Cronbach's α followed by the test of normality test using Kolmogorov-Smirnov (KMO) or Shapiro-Wilk in SPSS Q-Q plots for both GEIT and strategic business-IT alignment. The fourth section provides interpretation of findings; it also includes preliminary analysis and GEIT practices implementation related to strategic business-IT alignment, using COBIT 5 in the case of CBE. Furthermore, the deliverable of the study provides the way for how to effectively implement GEIT practices to reach strong strategic alignment using COBIT 5 BSC goals cascade. The conclusion of the chapter provides in the last section. The sampling method is discussed in the next section.

4.2 SAMPLING METHOD

The sample was selected using the purposive sampling method (non-probability sample) from top management (board of directors, president, vice-president and directors) and IT managements of CBE as the target group of this study. GEIT has one of the top concerns and the responsibility of top managements and IT management around the world. CBE top management and IT management completed the questionnaires. Out of the total 100 participants in the study from CBE, 55 belonged to top management (14 process council committee executive management), nine members of Board of Directors and 32 business and IT directors) and 45 members were from IT management. The response rate (RR) was 68% (68 out of 100) and 68 questionnaires were completed. Three questionnaires were incomplete and these were disregarded.

4.3 MIXED METHODS DATA COLLECTION

This study used an explanatory sequential mixed methods data collection by integrating quantitative and qualitative data collection methods. The researcher integrated the results to combine the quantitative and qualitative methods in sequence; in the qualitative phase of the study, data were collected using questionnaires. In the qualitative phase of the study, evidence was collected using focus group discussion, document review and analysis, observation and participation and gap assessment using COBIT 5. Finally, the gap on GEIT processes using COBIT 5 identifies the method to fill the gap.

4.3.1 Quantitative data collection

The questionnaires were adopted and customised to the CBE context from the LAMM and GEIT practices. The response rate (RR) was 68% (68 out of 100)

and 68 questionnaires were completed. The next section discussed quantitative data collection used two questionnaires.

4.3.1.1 GEIT practices implementation

The first questionnaire used the GEIT practices implementation assessment tool to determine the maturity level of GEIT practices implementation in CBE, as presented in Table 4-1.

Table 4-1: Presentation of quantitative data assessment tools of GEIT practices

Source of questionnaires	Criteria/Domain	Items
Governance of enterprise IT (GEIT) practices implementation assessment tool, which is 6-point maturity level from 0 to 5 0=Non-existent –Level 0 1=Initial or ad hoc –Level 1 2=Repeatable but intuitive-Level 2 3 =Defined –Level 3 4=Managed and measurable-Level 4 5 =Optimised – Level 5	GEIT practices structures (S1 to S12)	12
	GEIT practices processes (P1 to P11)	11
	GEIT practices relational mechanisms (R1 to R10)	10
Total items		**33**

GEIT practices implementation assessment tool composed of 33 items in three domains: relational mechanisms, processes and structures based on a 6-point maturity level from 0 to 5.

4.3.1.2 Strategic business-IT alignment maturity

The second questionnaire used the LAMM assessment tool for evaluating strategic business-IT alignment maturity in CBE, as presented in Table 4-2.

Table 4-2: Presentation of quantitative data assessment tools of LAMM

Source of questionnaires	Criteria/Domain	Items
Strategic business-IT alignment maturity using Luftman Strategic Alignment Maturity Model (LAMM), 5-point agreements levels from one to five: 1=Strongly disagree(SD) 2= Disagree(D) 3=Neither agree nor disagree (N) (neither agree nor disagree) 4= Agree (A) 5=Strongly agree (SA)	Effectiveness of IT and business communication (EC1–EC6)	6
	Measurement of competency and IT value (CV1–CV7)	7
	Measurement of GEIT (ITG1–ITG8)	8
	Partnerships between IT and business functions (PA1–PA6)	6
	Scope and architecture (SA1–SA4)	4
	Human resources/skills(SM1–SM7)	7
Total items		**38**

LAMM assessment tool comprised 38 items in six criteria namely; communication, competency, partnership, governance, skills, scope and architecture based on five agreement levels from 1 to 5 (*strongly disagree* to *strongly agree*).

4.3.2 Qualitative data collection

The next section deals with the qualitative data collection: document review, observation and participation, focus group discussion with selected managements, observation and participation and gap assessment using COBIT 5 in the case of CBE.

4.3.2.1 Document review

Documents are collected and reviewed. These documents include CBE's five years corporate strategy, quarter and annual reports, IT audit findings, IS policy and procedures, implementation status of IT projects, IT performance management and GEIT structure.

1) CBE GEIT principles, policies and frameworks

CBE has expanded and used banking technology to ensure growth amidst a new digital era; streamlining customer-facing and support areas via technology infrastructure and improve customer experience through alternative channels at least cost and utmost convenience. IS policy was prepared and approved by CBE president and board of directors. The CBE IS policy complies with relevant parts of information systems-related laws, regulations and standards that integrating ISO 27001/2, Payment Card Industry Data Security Standard (PCI-DSS) and other related laws and regulations. Moreover, IS procedures such as network management, access management, physical security and IS change management procedures were approved. GEIT practices processes; principles, policies and frameworks are not defined and documented based on internationally accepted good practices and standards.

2) CBE GEIT practices processes

Key GEIT practices processes related to strategic business-IT alignment are discussed.

- **IS strategy management process:** IS strategy management process is not defined and implemented based on best practices and standards in the CBE. There is no responsible team to manage, evaluate, assess and

improve the process. IT controls framework within the enterprise, aligning IT strategy with enterprise goals.

- **IS project management process:** CBE PMO is responsible for all major IT projects for the bank and the IT steering committee and process council are responsible for follow up on the IT projects and IT operational tasks that are undergoing in the bank. CBE has drawn a number of IT initiatives to reach its vision. IT project implementation successfully and under implementation status are presented as in Table 4-3.

- **CBE performance management process**: The researcher collected IS performance, report, project status and other relevant information. The qualitative data assessed CBE performance report from June 30, 2011 to June 30, 2019. It also includes ATM performance and T24 (core banking application) production monitoring reports, as shown in Table 4-4.

Table 4-3: IT project status

projects implemented successfully:	ojects under implementation:
▪ T24 Core Banking application ▪ Enterprise Resource Planning (ERP) ▪ Mobile Money Solution (CBE Birr) ▪ CBE Mail and Portal ▪ Graphical Intelligence Electronic Operational Management (GIEOM) ▪ Information Security Management System (Integrated Cyber Security Solution).	▪ ITIL process design and implementation; ▪ Data Warehouse and Business Intelligence (BI); ▪ Customer Relationship Management (CRM); ▪ Enterprise Monitoring Tool (EMT); ▪ Electronic Document and Record Management System (EDRMS); ▪ Upgrade T24 core application; ▪ ATM Switch Replacement; ▪ NG|Screener upgrade project; ▪ T24 Upgrade from R10 to R17 including subsidiaries banking; ▪ Anti-money laundering (AML); ▪ Virtual desktop infrastructure (VDI) expansion; ▪ Data centre 3rd module expansion; ▪ IT capacity building project; ▪ Oracle Enterprise Performance Management (Hyperion planning).

Table 4-4: CBE facts and figures for financial and non-financial

Financial Highlights						
Particulars	2011 June 30 (billions Birr)	2012 June 30 (billions Birr)	2016 June 30 (billions Birr)	2017 June 30 (billions Birr)	2018 June 30 (billions Birr)	2019 June 30 (billions Birr)
Deposit Position	89	120.1	288.6	364.9	451.80	551.8
Loan and Bond Disbursement			91.9	94.5	100.68	125
Total Asset	114.2	158.1	384.6	485.7	565.50	712
Total Liability	108	150.4	368.59	445.7		
Total Capital	6.26	7.62	16.10	40.0		
Total Income	6.99	11.8	27.2	31.9	37.24	53.59
Total Expense	2.75	3.64	13.4	17.3	26.32	35.74
Gross Profit	4.23	7.93	13.7	14.6	10.32	17.9
NPL (%)			2.5	2.8	3.4	1.8

Non-Financial Highlights						
Particulars	2011 June 30	2012 June 30	2016 June 30	2017 June 30	2018 June 30	2019 June 30
Number of Customers (millions)	2.8	3.9	13.3	15.9	18.8	22
Number of Employees	10.753	12,782	28,467	33,706	34,879	37,894
Mobile Banking Users (millions)	NA	NA	1.1	1.4	1.7	2.4
Number of ATMs	42	92	889	1,501	1,708	2,513
Number of Branches	380	547	1,137	1,230	1,280	1,444
Three Overseas branches	NA	NA			3	3
Internet Banking Users	NA	NA	26,500	25,683	36,768	47,489
Number of POS	NA	NA	6,269	6,811	11,796	9,384
CBE Birr Customers	NA	NA	NA	NA	519,071	
CBE Birr Merchants	NA	NA	NA	NA	1,784	
CBE Birr Agents	NA	NA	NA	NA	3,211	
CBE ATM/VISA Card Holders (millions)	2.8	2.8	2.8	3.7	4.4	
Partners	SWIFT bilateral key arrangement, more than 700 banks across the world, 50 foreign banks and 20 transfer agents.					

Others	2019 June 30
Agents	20 money transfer agents like Bole Atlantic International, Money Gram, Xpress Money.
Correspondent relationship with foreign banks	More than 50 renowned foreign banks like Commerz Bank A.G., Royal Bank of Canada, City Bank, HSBC Bank, etc.
Transaction volume per-day	Per day: More than 1.3 million transactions Holiday week: More than 2 million transaction volume
Close of Business (COB)	COB 07 hours and 54 minutes and 1 hour and 42 minutes as of 24 December 2018.
COB 31/12/ 2018	End of month COB 10 hours and 24 minutes and IC.COB is 03 hours and 17 minutes
Corporate reputation	Corporate reputation of the bank stood at 77.1%.
Employee satisfaction	78.2% satisfaction score.

Average ATM performance from 10/04/2017 to 16/01/19 using Aptra vision monitoring tool							
ATM performance	Total up time (%)	Total down time (%)	Hardware fault	Cash out	Communications	Host down	Daily Balancing
Average	72.86	26.03	6.71	3.55	13.67	1.07	1.05
Maximum	88.08	11.92	2.44	0.79	6.69	0.46	1.55
Minimum	60.66	39.34	5.11	3.19	29.33	0.40	1.31

The largest and the leading banks in Ethiopia with Birr 712 billion worth of assets, Birr 17.9 billion annual profit, Birr 551.8 billion deposit, 1,444 branches

under 15 districts and over 37,894 employees. It includes more than 22 million account holders, 2.4 million mobile bank users and 47,489 internet bank users; more than 4.4 million active VISA card-holders, 2,513 Automated Teller Machines (ATMs) and 9,384 Point of Sale (POS) machines. Moreover, the bank has three subsidiary banks in other African countries (i.e.) two branches in South Sudan and one in Djibouti (CBE 2019). CBE has partners with more than 720 correspondent banks across the world, of which 20 were transfer agents and 50 foreign banks. Over 50 correspondent banks with which it has accounts, like Royal Bank of Canada, Commerz Bank A.G., City Bank and HSBC Bank among others (CBE 2019). It also has shown those there three overseas branches two in South Sudan and one in Djibouti.

From table 4.4 assessment results, we observed the comparison between 2011 assessment vs. 2019 assessment results in CBE. There is dramatic change in terms of infrastructure expansion, customer number, employment number, asset, technology agility and branch expansion (CBE 2012, 2014, 2015, 2016, 2018, 2019).

4.3.2.2 Focus group discussion

The researcher conducted focus group discussion with 15 districts IT support managers, managers under strategic management office (monitoring and evaluation work unit) and collected IS performance reports, budget and other related information. IT support requests at district levels have not tracked and monitored except in South Addis district, which tracked IT support requests using an excel sheet. Moreover, there is no Service Level Agreement (SLA) between branch or head-office organs and the IS department. Major IS change requests and incident management processes have been tracked and monitored. Additionally, the CBE performance report includes the ATM performance report. Unlike business processes BSC, IS performance measurement (BSC) reports a lack of IS competency/value metrics such as

technology/functionality, service and process, and percentage of accomplishment (plan vs. actual).

4.3.2.3 Participation and observation

The researcher participated in weekly CAB meetings, IS policy and procedures preparation, IS performance management preparation and review, IS competence revision, annual IS plan preparation, IT audit rectification follow-up, quarter and annual reports preparation and observed and understand overall IS activities. Furthermore, the researcher participated in ITIL processes, including incident and change management processes design workshops. IS change should be transparent across the enterprise and currently IS change management culture started in CBE. The CAB members are composed of IS managements, business representatives and subject matter expertise that are responsible for assessing business impact and change approval of weekly based request, to ensure changes that are made with minimum disruption to the services. The researcher observed that most IS assignments are urgency based instead of a planned approach and there is no continual improvement plan, assignments started from scratch instead of continual improvement.

1) CBE GEIT structures

CBE GEIT structures in the case of CBE headed by the Board of Directors and President after 2008/2009 Business Process Reengineering (BPR) implementation. Again, the IT structure has restructured following core banking application (T24) project implementation (that is during 2013). The GEIT structure in CBE is presented in Appendix G. The Vice-President of Information Systems (IS), Director of E-Payments and PMO and Chief Risk and Compliance directly report to the President of the bank. CBE has a Board of Directors with nine members; the Process Council Committee (executive

management) consists of 14 members chaired by the President of the bank and the Vice President (VP) of Information Systems (IS), a full member of the process council committees. The CBE Process Council Committees or IT Steering Committees are responsible for prioritising IT investments. There are also committees such as Information Security Steering, CAB and IT steering committees. The IS department is headed by the VP under the president of CBE and responsible for all IT operations of the bank. Under IS, it has got four divisions namely: Application Management, Infrastructure Management, Management Information Services (MIS) and Service Desk/Help desk and IT support managers at the district level. The E-Payment department is under the President of CBE and responsible for ensuring 24/7 service availability of ATM, Internet banking, Mobile Banking and Point of Sale (POS).

The Information System Security (ISS) department is under Chief Risk and Compliance, responsible for ensuring the confidentiality, integrity and availability (CIA) of data/information systems and infrastructure of the bank. The ISS department is expected to avail security awareness training, investigate security branches, regularly carryout information security risk assessments as well as analyse and propose appropriate mitigation strategies. The department is also responsible for planning, maintaining and managing disaster recovery plans of the bank in general. The *CBE Security Newsletter* is released on quarterly bases and information security awareness training is conducted to selected IT district support.

IT audit department had been established in 2005, but it was merged with internal audit during Business Process Reform in 2009 and re-established in 2012. CBE IT audit structurally under internal audit and direct reporting to the Board of Directors regarding IT audit findings to oversee IT assurance activities independently.

The new CBE organisational structure has been implemented. The new structure of GEIT of CBE missed the CIO position. However, it is under revision

from May 2018. Inappropriate organisational structures may have a negative adverse impact on strategic business-IT alignment, decision-making and IS performance and goal cascading.

2) CBE culture, ethics and behaviour

CBE has culture, ethics and behaviour, knowledge sharing, risk awareness and learning organisation cultures. CBE has established a culture that nurtures individual and group learning and disseminates tacit knowledge across the bank.

3) CBE information

CBE Management Information Services (MIS) department is one of the communication channels and mainly responsible for reporting requirements of the bank. MIS business analysis team is responsible for identifying the report requirements of top management (board of directors' members, process council and business managers) as well as the bank's stakeholders. The MIS technical team is responsible for the technical aspects of the MIS related tasks including development of scalable solution architecture, managing the MIS database and performs Extract Transform Load (ETL) activities; development and customisation report and manage the Enterprise Data Warehouse (EDW) of the bank. The team also promotes data standards, data quality; it manages Business Intelligence (BI) and establishes a comprehensive data warehouse metadata.

4) CBE IS services, infrastructure and applications

CBE has various applications, infrastructure and services that provide information technology processing and services.

- **Electronic-payment service:** The E-payment department is responsible for ensuring 24/7 service availability of the following services more than 22 million account holders, 2.4 million and 47,489 mobile and internet banking users, respectively; 4.4 million active VISA cardholders; 2,513 ATMs and 9,384 POS machines, as of June 30, 2019. CBE birr (mobile money) has 519,701 customers, 1,784 merchants and 3,211 agents as of June 30, 2018.

- **IS infrastructure management:** The CBE IS infrastructure management wing is responsible for managing all network, server and Web Infrastructure of the Bank. It is composed of the three units: Network and Server Administration, Database and Intranet Administration and Data Center Management. The Network and Server Administration team is responsible for managing the high-end Unix/Linux servers of the bank.

- **Application management:** The application management work unit is responsible for managing T24 core Banking and other in-house developed or support systems. The daily management of the application ensures the smooth running of the daily operation and high availability of the online T24 core banking and other applications. The bank has deployed and managed applications such as T24 core banking, mobile banking, internet banking, GX-reporter and Society for Worldwide Inter-bank Financial Telecommunication (SWIFT). Enterprise Monitoring Tool (EMT) is under implementation; monitoring applications are helpful for register, online track and monitor and follow-up for right decision-making. CBE deployed the T24 core banking application for more than 1,444

online branches as of June 30, 2019. Moreover, the application management work unit is responsible for local development and customisation, performance tuning, BCON follow-up, testing, quality assurance, release and registration, documentation and version management, security management, system management, data migration, Close of Business (COB) management among others.

- **Interface management:** The interface management team is responsible for interfacing with the T24 core banking application and managing interfaces. There are various internal and external interfaces, which work in life. Internal interfaces include ATM, Mobile Money Solution (CBE Birr) and ERP and external interfaces: Ethiopian Automated Transfer System (EATS), SWIFT, Ethiopia Commodity Exchange (ECX), tax or utility payment interface, pay at bank, flow cash and industrial park in Ethiopia etc. The interface management team customises various interfaces or avails automated payment service for external enterprises that need electronic payment through integration with T24 core banking system interfaces with internal and external systems by interfacing new interface or additional modification or enhancements to the interfaces.

5) CBE GEIT people, skills and competencies

CBE value disciplines strategic focus benefit statement of the bank to committed to realise stakeholders' values through enhanced financial intermediation using the best professionals and technology. It consists of three generic value disciplines: customer intimacy, operational excellence and product leadership. The three strategic themes/pillars (focus areas) are business growth, business excellence and digitalisation.

The corporate core values that govern CBE's practices and organisational culture include the following eight core values:

1. **Integrity**: CBE employees are committed to the highest ideals of honour and integrity.
2. **Service excellence**: CBE employees are committed to maintain the highest operating standards and build long-lasting relationships with customers and promote efficient and effective services and ensure maximum value for money.
3. **Professionalism**: CBE employees take ownership and personal responsibility; professional in conduct and treat customers with the utmost respect; maintain confidentiality and privacy of all customers; and continually develop to maintain leading-edge capabilities and apply knowledge and competence to competitive advantage.
4. **Empowerment**: CBE employees are distinguished employees as valuable organisational resources and promote delegation of duties and responsibilities;
5. **Learning organisation**: CBE employees anticipate and respond to internal and external changes through constant improvement. They also establish a culture that nurtures individual and group learning and disseminates tacit knowledge across the bank.
6. **Teamwork**: CBE employees are collaborating and support one another to ensure process integration and minimise external business challenges.
7. **Respect for diversity**: CBE employees are sensitive to cultural, ethical, religious, or other values of employee and customers; value diversity of ideas and viewpoints of employees;
8. **Corporate citizenship**: CBE employees care about society's welfare and the environment and build public confidence.

HR development strategy implementation has been engaged in employee learning and development as one of its Human Resource Development (HRD)

strategy. To accomplish this, a bank-wide competency gap assessment was made and different training programmes were designed to enhance employees' competency and achieve the bank's strategic objectives. CBE has developed career management system designed with the objectives of providing progressive a career development opportunities and experiences for employees, enhancing employee competency development and ensuring a ready supply of highly competent internal talent for the bank's current and projected talent requirements. CBE IS skill assessment through integrated training needs assessment by Tech-Mahindra IT consultants, who are baselining the skill requirement, utilising Skills Framework for the Information Age (SFIA[3]), Frankfurt School of Finance and Management (FSFM) consultants and HRD staff were made to identify the most critical training needs.

Accordingly, CBE has selected benchmark banks from emerging economies (ICBC, Bank of China, Bancos do Brazil SA, Woori Financial Holdings (Korea), State Bank of India, ICICI Bank and Vietnam Bank for Agricultural and Rural Development) for strategic benchmarking. These include aggressive working on branch expansion, continuous expansion of products and services, utilisation of modern banking technology and simple access points to reach rural and small towns, service quality and customer compliant handling and continuous training and upgrading of skills of employees.

4.3.2.4 Gap assessment using COBIT 5

The researcher mapped GEIT practices processes with COBIT 5 processes, assessed and identified gaps on current and desirable level GEIT practices processes capability level. Most of GEIT practices processes are mapped to

[3]SFIA is one of the globally accepted common languages for the skills and competencies required in the digital world.

COBIT 5 APO domain and EDM processes. GEIT practices process assessment capability levels by using COBIT 5, the rating scale involves six capability levels is N = (0-14%), P= (15%-49%), L= (50%-84%) and F= (85%-100%). The mixed methods data analysis is discussed in the next section.

4.4 MIXED METHODS DATA ANALYSIS

The researcher used explanatory sequential mixed methods that is integrating quantitative (questionnaires) and qualitative (document review and analysis, discussion, observation and participation and gap assessment using COBIT 5) data analysis. The preliminary analysis is discussed in the next section.

4.4.1 Preliminary analysis

The preliminary analysis was tested using Cronbach's α for reliability and validity of the survey instrument followed by a normality test using KMO or Shapiro-Wilk in SPSS Q-Q plots for both GEIT and strategic business-IT alignment quantitative data. The preliminary analysis covered the demographic distribution of respondents also analysed: gender, level of education, working experience, and current position in the bank.

4.4.1.1 Validity and reliability of the survey instrument

The validity and reliability of the instruments are used through internal consistency reliability (across items) and the standardisation procedure using Cronbach's α. The questionnaires were adopted from GEIT practices and strategic business-IT alignment literature, the instruments LAMM and GEIT practices implementation maturity assessment tools were used. Hence, they were customised to CBE context and measured in terms of validity and reliability of the instrument using internal consistency. The instruments with 33 of GEIT practices items and 38 strategic business-IT alignment items were

categorised in three and six criteria respectively. In addition to this, the qualitative data were collected and analysed from focus group discussion, participation and observation, document analysis and gap assessment using COBIT 5 and related works in GEIT and strategic business-IT alignment in CBE.

Cronbach's α is the most commonly used measure the overall reliability of a questionnaire and values (internal consistency) (Barry et al. 2011). The Cronbach's α "*comfort ranges*" for scales: very good = .80 to .90; respectable = .70 to .80; minimally acceptable = .65 to .70; undesirable = .60 to .65 and unacceptable = .60 or below (Barry et al. 2011). When Cronbach's $\alpha < .05$ recommends additional inter-item correlation test and the p-value ranges from 0.2 and 0.4, this is unacceptable (Field 2009).

The statistical tests of normality of data are used to check whether data are normally distributed, Kolmogorov-Smirnov Normality Test (K-S Test) in SPSS Q-Q plots and box plot (Field 2009). The KS-test for all uses and the p-value > 0.05, the null hypothesis could be accepted or retained and it is that the sampling distribution was normal. If p-value < 0.05, the null hypothesis could be rejected and it was concluded that the sampling distribution was not normal (Field 2009; Pallant 2011).

The data-set contained some missing values where participants did not answer some items on the questionnaire or did not complete when entering data initially and leaving any missing values as blank cells. For this study, no missing values were selected and used. To manipulate missing date, SPSS allows or either excludes cases list wise or cases pairwise. Therefore, the exclude cases pairwise was used to estimate the missing value and it is the safest option to exclude cases list wise, unless this results in a massive loss of data (Field 2009).

1) Internal consistency reliability

For internal consistency reliability (across items), Cronbach's α was used. The study looked at one important component of a good assessment of reliability. To test the reliability of the survey instrument, Cronbach's α tested a sample size of 68 respondents. The Cronbach's α tested for GEIT practices result is tabulated in Table 4-5.

Table 4-5: Reliability statistics for GEIT practices

Cronbach's α	Cronbach's α based on standardised items	No. of items
.845	.847	33

The Cronbach's α value of reliability for GEIT practices Cronbach's α based on standardised items is .847 (it is greater than Cronbach's α .845 by 0.002). Cronbach's α for GEIT practices indicates that the overall reliability of a questionnaire and values is greater than 0.8 and very good. However, factor analysis is not applicable for this study owing to the sample size (which is 100). The recommended sample size was five times the number of items. Therefore, more than 165 sample sizes were needed to employ factor analysis. It is useful to calculate mean inter-item correlations because the overall α is affected by the number of items being analysed whether the items seem to interrelate well (Field 2009). The mean inter-item correlation value is shown in the summary item statistics table (Pallant 2011). The mean inter-item correlation is as shown in Table 4-6.

Table 4-6: Inter-item correlations test for GEIT practices

	Mean	Minimum	Maximum	Range	Maximum/ Minimum	Variance	Number of Items
Inter-Item Correlations	.648	.605	.713	.108	1.179	.003	33

In this case, the mean inter-item correlation is .648, with values reflecting greater than 0.4. This suggests a relationship among the items. The Cronbach's α value of reliability GEIT practices is as shown in Table 4-7.

Table 4-7: Cronbach's α tested for GEIT practices per domain

No.	Domains	Cronbach's α	Cronbach's α based on standardised items	No. items per domain	Remark
1.	Rx	.867	.870	10	Very good for all 10 items
2.	Sx	.898	.901	12	Very good for all 12 items
3.	Px	.914	.914	11	Very good for all 11 items

The Cronbach's α value of reliability GEIT practices for a relational mechanism Cronbach's α based on standardised items .870 and Cronbach's α .867. Cronbach's α is based on standardised items, which is greater by 0.003. GEIT practices for structures Cronbach's α based on standardised items .901 and Cronbach's α .898. Cronbach's α is based on standardised items, which is greater by 0.003. GEIT practices for processes Cronbach's α based on

standardised items .914 and Cronbach's α .914, which are equal. Each independent sub-group on the instrument had Cronbach's α values greater than .8 (very good). Therefore, the individual question on a test or questionnaire gave consistent and appropriate results. The Cronbach's α tested for strategic business-IT alignment result is tabulated in Table 4-8. The inter-item correlation for strategic business-IT alignment result is tabulated in Table 4-9.

Table 4-8: Reliability analysis for strategic business-IT alignment

Cronbach's α	Cronbach's α based on standardised items	Number of items
.843	.848	38

Table 4-9: Inter-item correlation for strategic business-IT alignment

	Mean	Minimum	Maximum	Range	Maximum/ Minimum	Variance	Number of items
Inter-Item correlations	.482	.271	.637	.366	2.352	.009	38

The Cronbach's α for strategic business-IT alignment of reliability values is greater than 0.8, very good and the Cronbach's α based on standardised items is .848 greater than Cronbach's α .843 by 0.005. Therefore, the individual question on a test or questionnaire gives consistent and appropriate results. Moreover, the mean inter-item correlation is .482, with values greater than 0.4. This suggests that there is a relationship among the items. The Cronbach's α tested for strategic business-IT alignment per alignment criteria result is tabulated in Table 4-10.

Table 4-10: Cronbach's α for strategic business-IT alignment per alignment criteria

No.	Name of criteria	Cronbach's α for the criteria	Cronbach's α based on standardised items	Number of items per criteria	Remark
1.	EC	.762	.756	6	Accept all six items
2.	CV	.703	.719	7	Accept all seven items
3.	ITG	.664	.671	8	Minimally acceptable for all eight items
4.	PA	.741	.739	6	Accept all six items
5.	SA	.788	.796	4	Accept all four items
6.	SM	.816	.803	7	Accept all seven items

Each independent sub-group on the instrument had Cronbach's α value greater than .7, acceptable for five criteria. The governance Cronbach's α value is .671, minimally acceptable for all eight items. The standardised procedures were used for the validity and reliability of the instruments to be used in the study. The standardisation procedure was used through Cronbach's α to measure the internal consistency reliability (across items) and content validity. For this study, the instrument used 33 GEIT practices items and 38 strategic business-IT alignment items that were categorised in three and six criteria, respectively, in the sample size of 68. The Cronbach's α result for GEIT practices is greater than .8, very good and strategic business-IT

alignment greater than .7, good. Therefore, the instrument is estimated to be reliable. Mean inter-item correlations for GEIT and strategic business-IT alignment are .648 and .482 respectively, greater than 0.4, acceptable. The next section presented a test of normality of data.

2) Normality test of data

Tests for normality calculate the probability that the sample data was believed to be normal (Field 2009).

Hypotheses

H1: P < 0.05, which indicates the sample data are not normal.

Ho: P > 0.05, which indicates the sample data are normal.

As the data were collected from 68 respondents, the distribution of the data was believed to be normal. However, for the sake of completeness, statistical tests of normality of data were checked. To check whether data were normally distributed, K-S Test in SPSS Q-Q plots and box plot were conducted and test results presented in a table with the K-S test or Shapiro-Wilk.

2.1 Test normality of GEIT practices

K-S test in SPSS Q-Q plots and box plot were conducted for GEIT practices data and the test results presented in a table with K-S test or Shapiro-Wilk. These tests suggested normality conclusions: Test of normality for GEIT practices with the K-S test or Shapiro-Wilk as shown in Table 4-11.

Table 4-11: Tests of normality for GEIT practices

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Rx	.126	68	.010	.941	68	.003
Sx	.080	68	.200*	.989	68	.789
Px	.087	67	.200*	.962	67	.040

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

In the KS-test for all uses, the p-values are produced in comparison with the alpha level of 0.05. As the p-value for the study was greater than 0.05, the null hypothesis could be accepted/retained and GEIT structures and processes are likely that the sampling distributions are normal. Since the p-value for relational mechanisms was less than 0.05, the null hypothesis was rejected. Shapiro-Wilk test also indicated the p-value to be less than 0.05 for relational mechanisms. The SPSS Q-Q plots and graphs were conducted further to test for GEIT practices. The test of normality for GEIT practices relational mechanisms graph is shown in Figure 4-1.

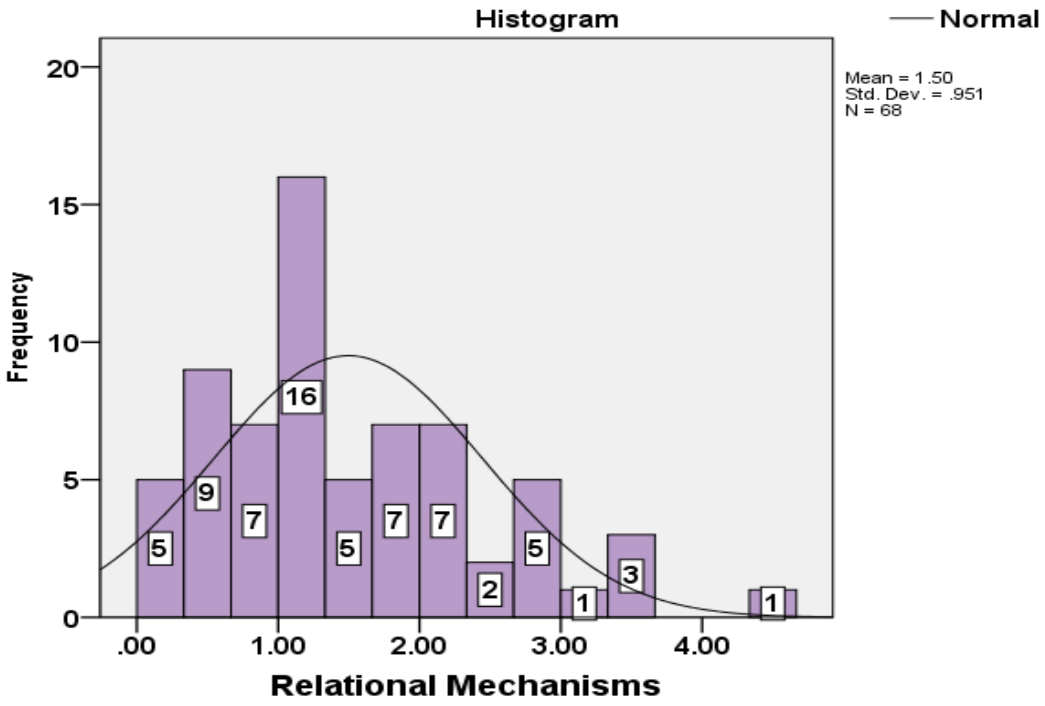

Figure 4-1: GEIT relational mechanisms

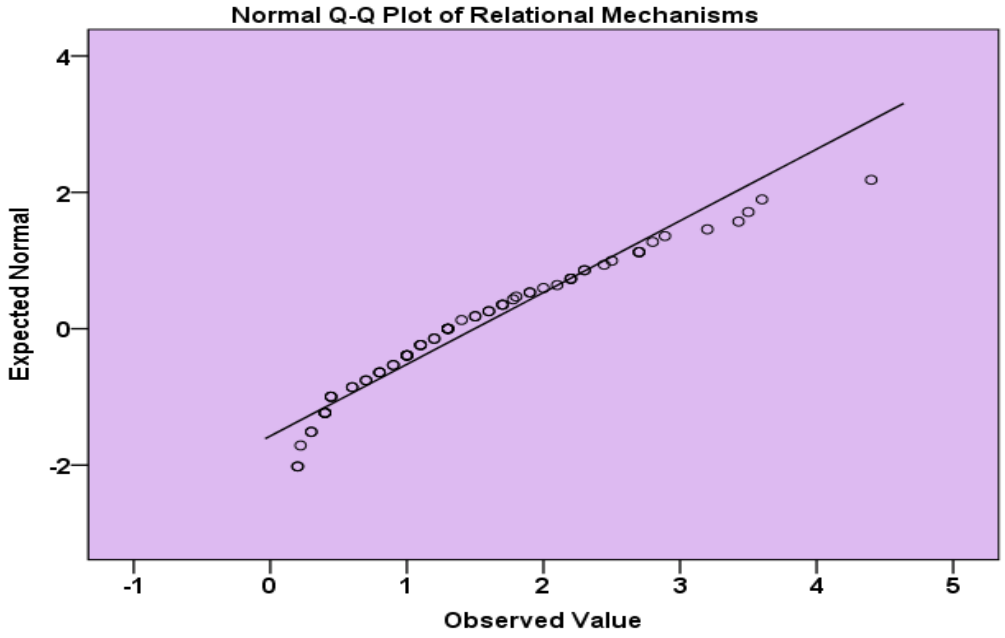

Figure 4-2: Normal Q-Q plot of relational mechanisms

The graphs for GEIT relational mechanisms are likely normal distribution.

3) Non-parametric tests for GEIT practices

Tests of normality for GEIT practices using non-parametric tests is shown in Table 4-12.

Table 4-12: Non parametric tests for GEIT practices

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Rx is normal with mean 1.50 and standard deviation 0.95.	One-Sample Kolmogorov-Smirnov Test	.234	Retain the null hypothesis.
2	The distribution of Sx is normal with mean 2.40 and standard deviation 1.11.	One-Sample Kolmogorov-Smirnov Test	.778	Retain the null hypothesis.
3	The distribution of Px is normal with mean 1.91 and standard deviation 1.16.	One-Sample Kolmogorov-Smirnov Test	.697	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

GEIT practices are retaining/accepting the null hypothesis and conclude that GEIT practices are normal.

Test normality of strategic business-IT alignment using K-S test in SPSS Q-Q plots and box plot were conducted for strategic business-IT alignment and the test results presented in a table with K-S test or Shapiro-Wilk. The K-S tests suggested normality and the Shapiro-Wilk test suggested normality for strategic business-IT alignment. A test of normality for strategic business-IT alignment is as shown in Table 4-13.

Table 4-13: Tests of normality for strategic business-IT alignment

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
EC	.078	68	.200*	.977	68	.242
CV	.134	68	.004	.982	68	.418
ITG	.094	68	.200*	.985	68	.593
PA	.107	68	.053	.975	68	.191
SM	.093	68	.200*	.986	68	.636
SA	.167	68	.000	.947	68	.006
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

The p-value > 0.05 accepted/retained the null hypothesis and conclude that the sampling distribution is normal for five strategic business-IT alignment criteria, except scope and architecture. The Shapiro-Wilk test indicated that the p-values were greater than 0.05, which indicates acceptability for the five criteria that follow normal distribution. Further, SPSS Q-Q plots and graphical presentations were conducted for GEIT practices and strategic business-IT alignment. Another method of testing the normality of data is graph and Q-Q plot. The histogram for strategic business-IT alignment in scope and architecture area is shown in Figure 4-3.

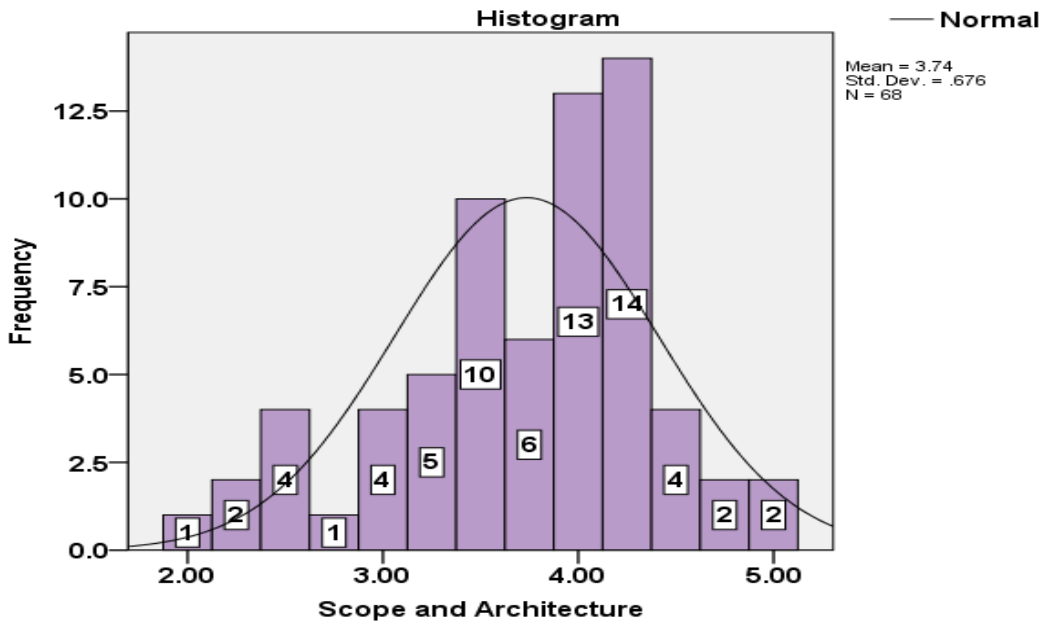

Figure 4-3: Scope and architecture alignment

A Q-Q plot of strategic alignment in the area of scope and architecture is shown in Figure 4-4.

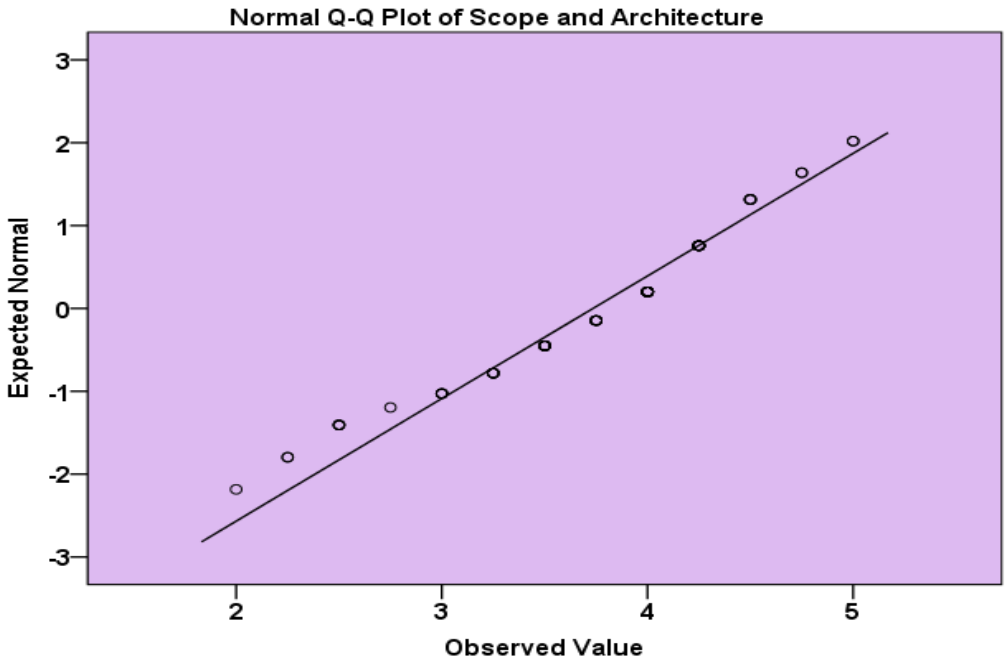

Figure 4-4: Normal Q-Q plot of scope and architecture alignment

The graphs are likely normal distribution for scope and architecture areas. The non-parametric test for strategic business-IT alignment is shown in the next section.

4) Non-parametric tests for strategic business-IT alignment

Test of normality of five criteria of strategic business-IT alignment is shown in Table 4-14. The five criteria of strategic business-IT alignment have retained/accepted the null hypothesis, except scope and architecture.

Table 4-14: Non-parametric tests for strategic business-IT alignment

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of EC is normal with mean 3.17 and standard deviation 0.63.	One-Sample Kolmogorov-Smirnov Test	.808	Retain the null hypothesis.
2	The distribution of CV is normal with mean 3.28 and standard deviation 0.57.	One-Sample Kolmogorov-Smirnov Test	.175	Retain the null hypothesis.
3	The distribution of ITG is normal with mean 3.66 and standard deviation 0.48.	One-Sample Kolmogorov-Smirnov Test	.584	Retain the null hypothesis.
4	The distribution of PA is normal with mean 3.52 and standard deviation 0.55.	One-Sample Kolmogorov-Smirnov Test	.422	Retain the null hypothesis.
5	The distribution of SM is normal with mean 3.11 and standard deviation 0.64.	One-Sample Kolmogorov-Smirnov Test	.599	Retain the null hypothesis.
6	The distribution of SA is normal with mean 3.74 and standard deviation 0.68.	One-Sample Kolmogorov-Smirnov Test	.045	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Since the p-value for scope and architecture is approximately 0.05, we conclude that scope and architecture criteria are likely normal distribution. Hence, it is safe to conclude that strategic business-IT alignment is normal distribution. Therefore, the individual questions on a test or questionnaire give

consistent, appropriate results and normal distribution. The next section presents the demographic distributions of respondents in the case of CBE.

4.4.1.2 Demographic data of respondents analysis

This section provided demographic data analysis in terms of the respondents' gender, level of education, working experience, and position in CBE. The demographic distribution of respondents: gender, working experience, level of education and current position in the bank is summarised in Table 4-15.

The summary indicates that the majority of respondents were male (76.8%) and 23.2% female. The female respondent rate is higher, 80% (16 out of 20) than the male respondent rate is 63% (50 out of 80). 58.8% of the majority of respondents had postgraduate degrees, 39.4% degree and 1.5% other levels of education. Majority of the respondents 67.6% had more than 10 years of working experience (experienced participants indicated this as good sample representative), 22.1% between 6 and 10 years and 10.3% between 1 and 5 years of working experience. About 1.5% board of directors, 33.8% of the majority respondents were business managers, 22.1% IT managers, 8.8% directors, 5.9% process council members (including the president and vice presidents), 5.9 business executives and 5.9% IT auditors in the bank. Out of the 68 management members, 15 assigned experts to fill the questionnaires and 11.8% IT and 10.3% business experts.

Table 4-15: Demographic distributions of respondents

Gender		Frequency	Percent	Valid percent	Cumulative percent
Valid	Male	52	66.7	76.5	76.5
	Female	16	20.5	23.5	100.0
	Total	68	87.2	100.0	
Highest level of education		Frequency	Percent	Valid percent	Cumulative percent
Valid	Degree	27	34.6	39.7	39.7
	Postgraduate degree	40	51.3	58.8	98.5
	Other	1	1.3	1.5	100.0
	Total	68	87.2	100.0	
Working experience		Frequency	Percent	Valid percent	Cumulative percent
Valid	1 - 5 years	7	9.0	10.3	10.3
	Between 6 and 10 years	15	19.2	22.1	32.4
	More than 10 years	46	59.0	67.6	100.0
	Total	68	87.2	100.0	
Position in the bank		Frequency	Percent	Valid percent	Cumulative percent
Valid	Board member	1	1.3	1.5	1.5
	Process Council member	4	5.1	5.9	7.4
	IT executive	2	2.6	2.9	10.3
	Business executive	4	5.1	5.9	16.2
	IT manager	15	19.2	22.1	38.2
	Business manager	23	29.5	33.8	72.1
	IT Audit	4	5.1	5.9	77.9
	Business expert	7	9.0	10.3	88.2
	IT expert	8	10.3	11.8	100.0
	Total	68	87.2	100.0	
	Missing value	10	12.8		
Total		78	100.0		

The number of the respondents from business and IT in the case of CBE is as presented in Table 4-16.

Table 4-16: Number of the respondents business and IT in the bank

No. of respondents in bank	N	Mean	Std. Deviation
Board member	1	3.50	.00
Process council member	4	3.87	1.03
Business executive	4	3.25	1.19
Business manager	23	3.17	.49
Business expert	7	3.07	.84
Total	**39**	**3.37**	**0.88**
IT executive	2	3.50	.00
IT manager	15	3.40	.43
IT Audit	4	3.62	.75
IT expert	8	3.37	.52
Total	**29**	**3.47**	**0.56**
Grand Total	**68**	**3.32**	**.62**

The response rates seem good representation of the target group by position in CBE and business representatives: 39 (56.5%) more respondents than IT representatives, 29 (43.5%). The Strategic business-IT alignment score of the respondents business and IT in the bank is as shown in Table 4-17.

Table 4-17: Strategic business-IT alignment score

Position in the bank	Statistic		Std. Error
	Mean	Std. Deviation	
Process council member	3.80	.624	.312
IT executive	3.69	.192	.136
Business executive	3.58	.386	.193
IT manager	3.33	.492	.127
Business manager	3.36	.469	.098
IT Audit	3.52	.220	.110
Business expert	3.23	.479	.181
IT expert	3.40	.247	.087

Strategic business-IT alignment and position in the bank is as shown in Figure 4-5. The highest average score for strategic business-IT alignment by position in the bank is 3.80 process council members and the lower score is business experts is 3.23. Strategic business-IT alignment score is constant when position in the bank for board member, it has been omitted.

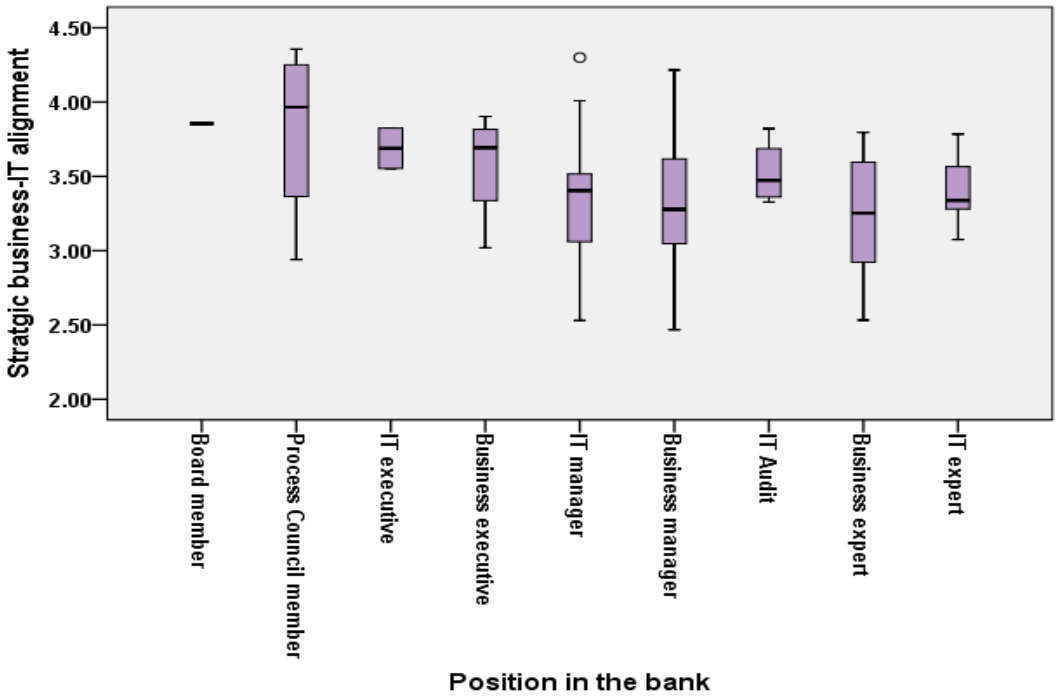

Figure 4-5: Strategic business-IT alignment vs. position in the bank

The GEIT practices score of the respondents business and IT in the bank is as shown in Table 4-18.

Table 4-18: GEIT practices score

Position in the bank	Statistic		Std. Error
	Mean	Std. Deviation	
Process council member	2.81	1.23	.613
IT executive	2.27	.42	.293
Business executive	2.55	1.07	.536
IT manager	1.66	.91	.234
Business manager	1.80	.18	.852
IT Auditor	1.65	.96	.435
Business expert	1.91	1.15	.408
IT expert	2.07	.68	.242

GEIT practices score is constant when position in the bank board member, it has been omitted. GEIT practices score and GEIT practices vs. position in the bank as shown in Figure 4-6.

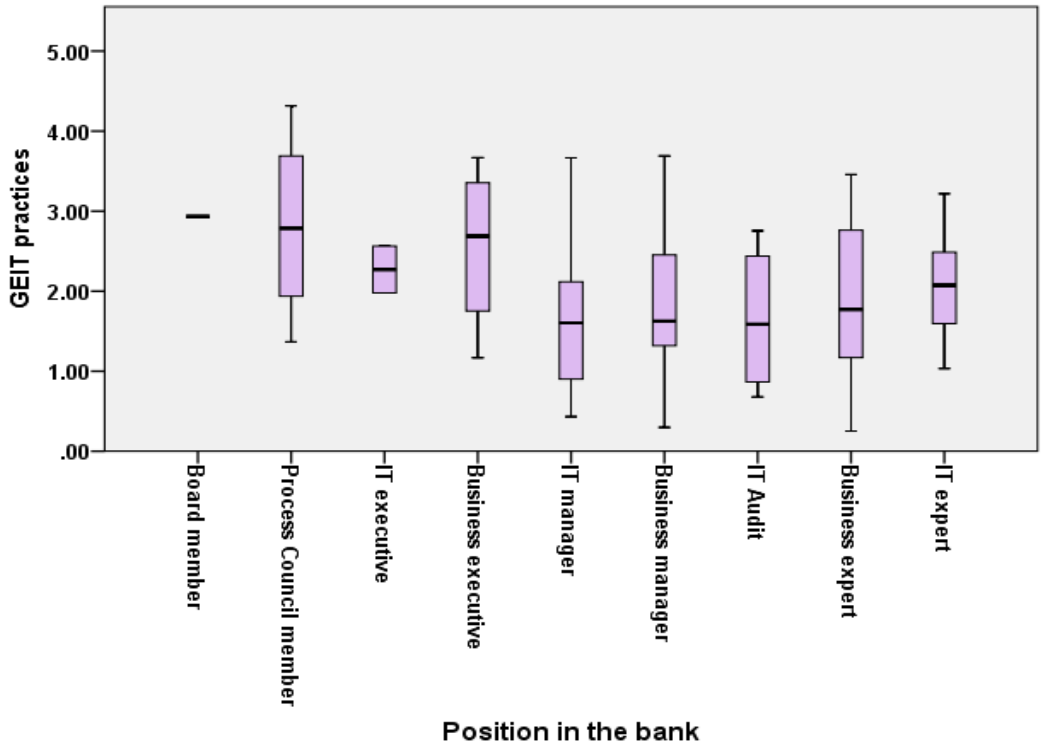

Figure 4-6: GEIT practices vs. position in the bank

The highest average score for GEIT practices by position in the bank is 2.81 (process council members) and the lower score is 1.65 (IT auditors). The next section presents mixed method data analysis (both quantitative and qualitative) for GEIT practices and strategic business-IT alignment using the Luftman assessment tool in the case of CBE.

This study analysed both quantitative and qualitative data to address research questions more fully and to obtain the answers. Therefore, the quantitative and the qualitative data were analysed according to explanatory sequential mixed methods study approach.

4.4.2 Quantitative data analysis

The researcher used an explanatory sequential method to integrate or mix quantitative and qualitative data analysis conducted based on GEIT practices and strategic business-IT alignment according to LAMM in the case of CBE. Firstly, a quantitative phase assessment was conducted to determine the current state of the GEIT practices implementation by using the GEIT maturity assessment list and strategic alignment maturity by using the LAMM assessment tool at CBE. In the quantitative data analysis phase, data were analysed using SPSS from questionnaires. The next section deals with quantitative data anaysis of GEIT practices namely; processes, structures and relational mechanisms.

4.4.2.1 GEIT practices implementation

The overall quantitative results of GEIT practices implementation level is at 1.77 maturity level, that is around level 2 (repeatable but intuitive). The three GEIT practices implementation maturity level: GEIT practice processes implementation level is at 1.69 maturity level (initial or ad hoc), GEIT practice structures implementation level is at 2.18 maturity level (repeatable but intuitive) and GEIT practice relational mechanisms implementation level is at 1.45 maturity level (initial or ad hoc). The overall GEIT practices implementation assessment result in the case of CBE is shown in Figure 4-7.

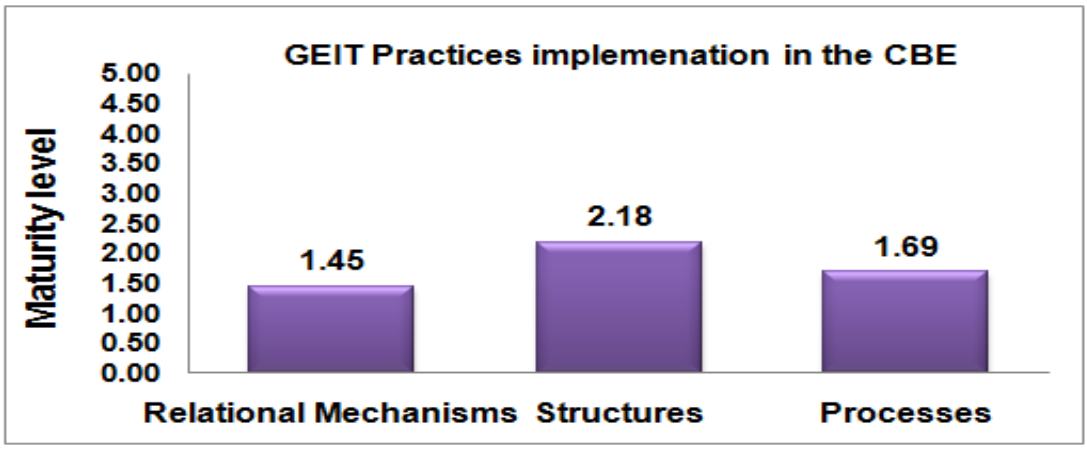

Figure 4-7: GEIT practices implementation maturity

Some processes are ad hoc and some of them are following a regular pattern. Figure 4-7 also shows that GEIT practice structures on average were more matured compared to GEIT practice processes, indicating that it is easy to implement GEIT practice structures compared to GEIT practice processes. This study also focused on GEIT practice processes implementation to achieve strong strategic business-IT alignment.

1) GEIT practices structures

The GEIT practices structures represented by Sx, where x starting from 1, 2, 3…12. The graph is shown that GEIT practice structures were the highest maturity level compared to GEIT practices processes and relational mechanisms. The overall GEIT practices structures maturity level is at 2.18 (repeatable but intuitive) meaning basic GEIT practices structures exist in the case of CBE. The average GEIT practices structures implementation level for 12 items are shown in Figure 4-8.

The maturity level of S4-Chief Information Officers (CIO)/Vice President (VP) of IS, a full member of the process council (executive management) committee is at 3.38 maturity level (level 3, defined), the highest of all. However, the

structure of architecture steering committee (S11) is at 1.37 maturity level (level 1, initial or ad hoc), the lowest maturity level. There is no dedicated enterprise architecture team and architecture steering committee providing architecture advice and guidelines on their applications and IT road map. There is a security/compliance/risk team under CBE IS security department and responsible for possible impact assessment of information security, is at 2.72 maturity level (level 2, repeatable but intuitive); S5- The maturity level of direct reporting relationship between CIO to CEO at 2.56 maturity level (level 2, repeatable but intuitive); S6- The maturity level of the IT steering committee at senior management level responsible for determining business prioritises IT investments is at 2.51 maturity level (level 2, repeatable but intuitive);

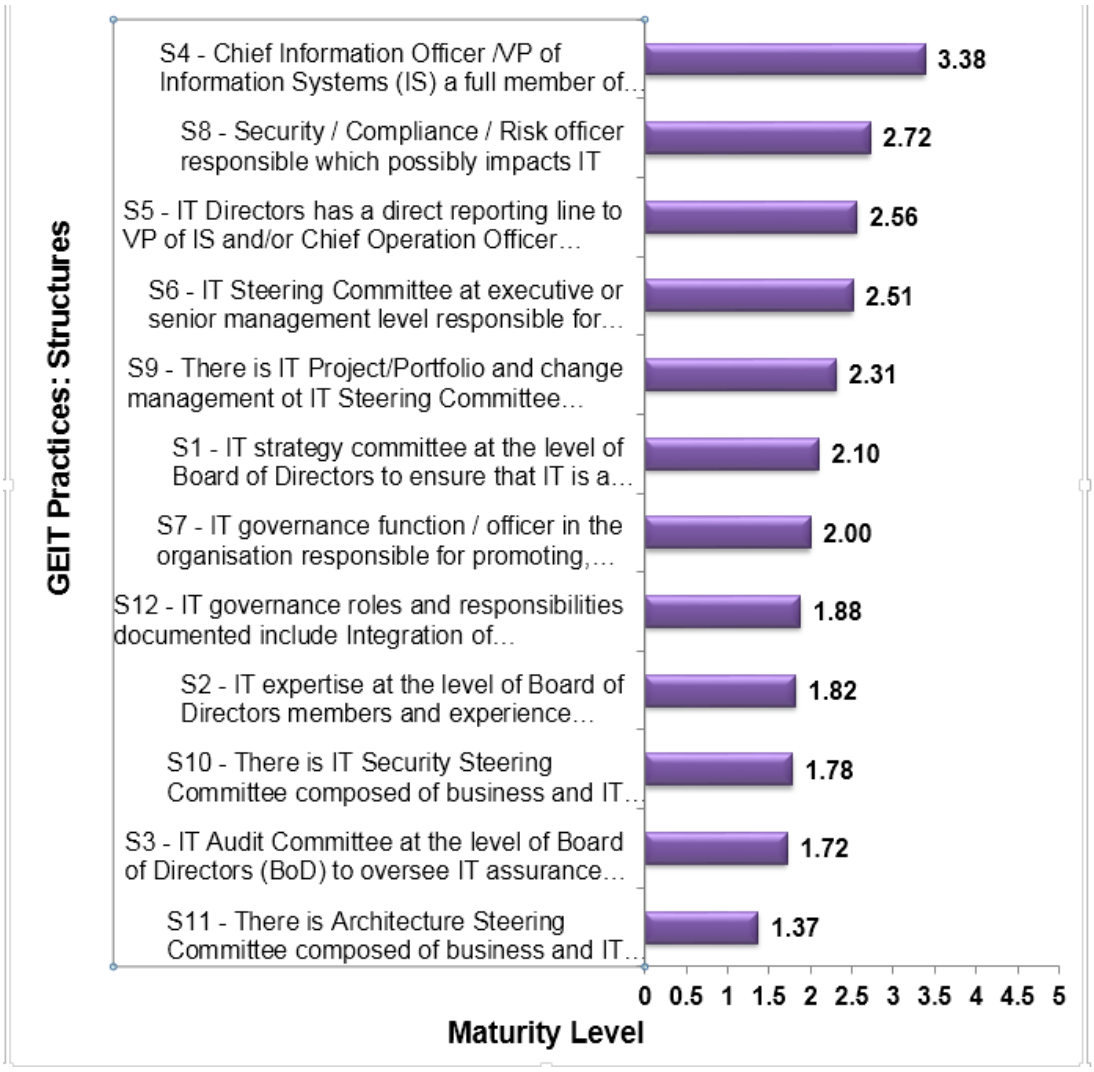

Figure 4-8: GEIT practice structures implementation maturity

S9 – There is IT project/portfolio and steering committee that composed of business and IT people focusing on prioritising and managing IT projects at 2.31 maturity level (level 2, repeatable but intuitive);

S1 – The maturity level of the IT strategy committee at the level of the board of directors is at 2.10 maturity level (level 2, repeatable but intuitive). The CBE process council members ensure that IT is a regular agenda item and reported about to the board of directors;

S7 – GEIT function/office is not established in CBE to direct, evaluate and monitor GEIT processes and the maturity level is at 2.00 maturity level (level

2, repeatable but intuitive). GEIT processes are not managed systematically. Besides, there is no continual improvement for GEIT processes; S12 – GEIT practices' roles and responsibilities are not documented; including the alignment for business and IT people is at 1.88 maturity level. That is around level 2 (repeatable but intuitive); S2 – The maturity level of IT expertise at the board member is at 1.82 maturity level. That is around level 2 (repeatable but intuitive). There is no dedicated IT expertise of board members that know the value and risk of IT; S10 – The maturity level of the IT security steering committee on IT-related risks and security issues is at 1.78 maturity level. That is around level 2 (repeatable but intuitive); S3 – The maturity level of the IT Audit Committee at the level of the Board of Directors to oversee IT assurance activities independently maturity level is at 1.72. That is around level 2 (repeatable but intuitive). The IT Audit was re-established in 2012, it is under the audit department and reports to the board of directors to oversee IT assurance activity.

2) GEIT practices processes

The GEIT practice processes are represented by 'Px', where x starting from 1, 2, 3…11. The overall GEIT practices processes maturity in the case of CBE is at 1.69 maturity level (initial or ad hoc) meaning basic GEIT practices processes are not formally defined, established, documented and under continual improvement. The average GEIT processes implementation level is shown in Figure 4-9.

The maturity level of IT performance measurement (P2) is at 2.32 maturity level (repeatable but intuitive) the highest of all. However, (P4) a methodology to chargeback IT costs to the business unit is at 1.12 maturity level (initial or ad hoc), the lowest maturity level.

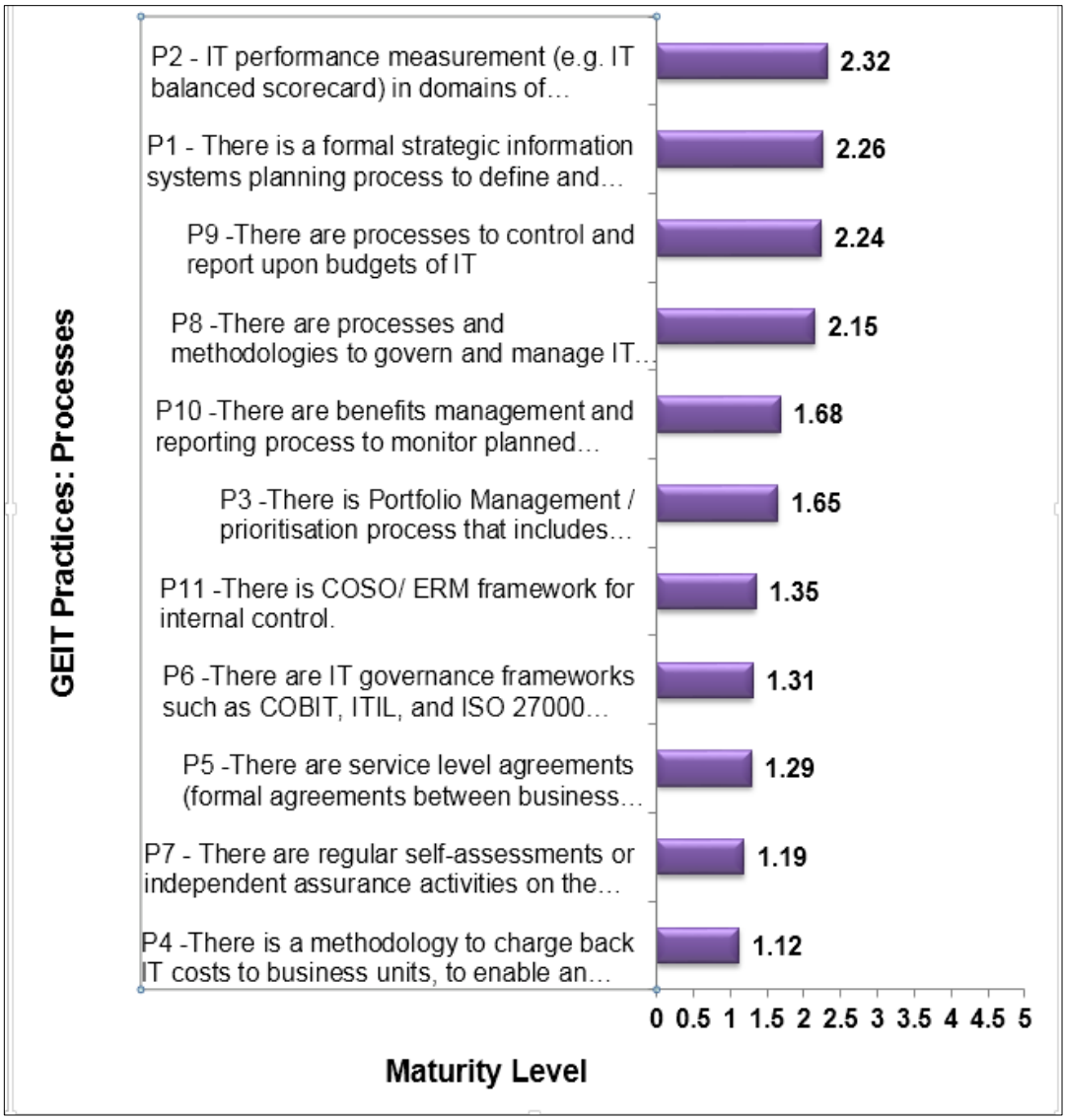

Figure 4-9: GEIT practice processes implementation maturity

P1-Strategic Information Systems Planning (SISP) process

The quantitative result indicated that the maturity level of the SISP process is at 2.26 (repeatable but intuitive). SISP process is not a defined and updated IT strategy, but there is an ad hoc team that prepares the IT budget/plan on yearly basis.

P2- IT performance measurement

The quantitative result indicated that the maturity level of the IT performance measurement system is at 2.32 (repeatable but intuitive). However, there is no tracking tool to monitor, evaluate and analyse IT process performance. Assessment is not integrated among all processes and performed at an individual IT process. Besides, it is difficult to measure customer satisfaction without defining Service Level Agreement (SLA). Therefore, IT performance management system should be transparent and drive the achievement of goals.

P3- IT portfolio management

The quantitative result indicated that the maturity level of the IT portfolio management process is at 1.65 (initial or ad hoc). The process standard is not defined and deployed.

P4- IT cost centre

The least maturity level is the methodology to chargeback IT costs to the business unit is at 1.12 (initial or ad hoc) and IT is still seen as a cost centre.

P5- Service level agreements

The maturity level of Service Level Management (SLM) in the case of CBE is at 1.29 (initial or ad hoc). SLM ensures that IT services and service levels meet current and future enterprise needs. This indicated that there are no formal agreements between business and IT, about IT operations or IT development projects.

P6- GEIT framework

The maturity level of GEIT frameworks in CBE is at 1.45 (initial or ad hoc), meaning that processes are at an ad hoc stage. CBE adopted COBIT during BPR (2008/9), but still, it is not effectively utilised. The CBE has started implementing GEIT frameworks and standards. The IS Policy is developed by using COBIT, ITIL and ISO 27001/2. Currently, 11 ITIL processes are defined and are under deployment. CBE should be used as a single-integrated GEIT framework. Moreover, CBE should identify and prioritise key initiatives to enable CBE and to achieve higher levels of operational efficiency, customer satisfaction and more importantly, drive innovation.

P7-GEIT assurance and self-assessment

The maturity level of independent assurance activities on governance and control over IT is at 1.19 (initial/ad hoc), meaning processes are at an emerging stage.

P8-project governance

The maturity levels of governing and managing IT projects is at 2.15 (repeatable but intuitive). There is limited stakeholder involvement in IT project management. It also includes IS project management policy and guidelines and is left to the carefulness of the individual project manager.

P9- IT budget control and reporting

The maturity level of the IT control process is at 2.24 (repeatable but intuitive). The analysis confirmed that the process is not defined based on the standard process. The CBE Finance department controls and reports IT budgets. IT

Finance reporting mechanism monitors business benefits during and after implementation of IT projects.

P10 – benefits management and reporting

The maturity level of the benefit management process is at 1.68 (initial or ad hoc). The analysis confirmed that there is no benefit management and reporting process to monitor during and after implementation of IT investments/projects and no standard measurements or assessment benefits delivery management process and monitoring.

P11- COSO/ERM

The maturity level of the internal control framework is at 1.35 (initial or ad hoc). There is COSO/ERM framework for internal control at the initial level. The result indicated that the bank has started implementing an internal control framework and assessment.

3) GEIT practice relational mechanisms

The GEIT practice relational mechanisms (Rx) represented by Rx, where x starting from 1, 2, 3…10. The overall GEIT practices relational mechanisms maturity in the case of CBE is at level 1.45 (initial or adhoc); meaning basic GEIT practices relational mechanisms do not formally exist. The average GEIT practices relational mechanisms implementation level is shown in Figure 4-10. The maturity level of R1 (there is no practice of job-rotation between IT staff working in business units and vice versa) in CBE is at 0.47 maturity level (non-existent), the lowest maturity level.

R8 – IT leaders' ability to articulate a vision for IT role in the company is at 1.91 around level 2 maturity level (repeatable but intuitive), the highest of all;

R6 – Senior business and IT management acting as “partners” and setting good examples’ the maturity level was at 1.81 around level 2 (repeatable but intuitive);

R9 – CBE has a regular internal corporate communication, which addresses general IT issues, the maturity level is at 1.76 around level 2 (repeatable but intuitive);

R7 – There is the practice of informal meetings between business and IT executives/senior management, maturity level is at 1.72 around level 2 (repeatable but intuitive);

R2 – The co-location of business and IT close to each other physically, the practice in CBE is at 1.57maturity level (initial or ad hoc);

R4 – The practice of knowledge sharing about GEIT framework, responsibilities and tasks is at 1.5 maturity level (initial or ad hoc);

R3 – The practice of cross-training business IT about business and/or training business people about IT is at 1.43 maturity level (initial or ad hoc);

Figure 4-10: GEIT practice relational mechanisms implementation maturity

R10 – GEIT practices awareness campaigns in the CBE is at 1.21 maturity level (initial or ad hoc). There are no GEIT practices awareness campaigns in the CBE that explain to business and IT people, the need for GEIT;

R5 – There is a dedicated business/IT account manager to bridge the gap between business and IT at 1.15 maturity level (initial or ad hoc). This indicates that there is no dedicated business relationship manager who acts as in-between;
R1 – Job-rotation between IT staff working in business units and vice versa practices in the CBE is at 0.47 maturity level (non-existent).

The next section deals with data analysis quantitative of strategic business-IT alignment in the case of CBE.

4.4.2.2 Strategic business-IT alignment maturity

The business-IT strategic alignment assessment was conducted in CBE using LAMM. The assessment undertaken by considering strategic business-IT alignment has been maturity level 3, which means there are established and focused processes in the CBE. Based on the alignment criteria, the level of maturity of the bank can be taken as ‘good’ and the LAMM questionnaire format was adopted accordingly. The LAMM assessment tool covered 38 questions in six criteria. The result is shown in Figure 4-11.

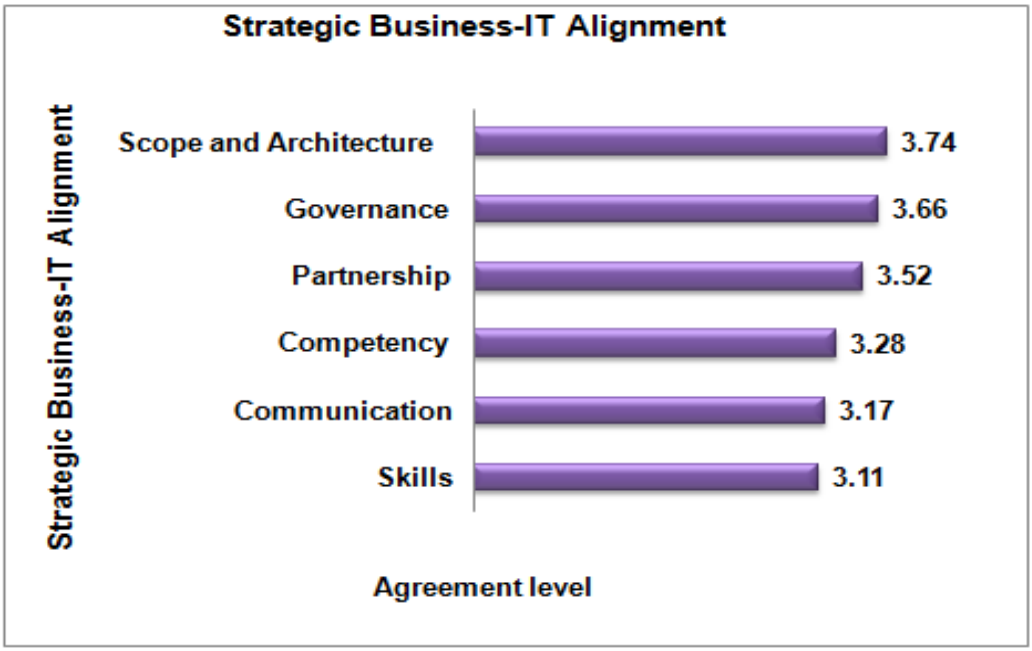

Figure 4-11: The overall CBE strategic business-IT alignment maturity

The overall average strategic business-IT alignment agreement level is at 3.41, the average alignment agreement level of scope and architecture is at 3.74 (the highest of all), governance at 3.66, partnership at 3.52 and competency at 3.28 agreement level. Moreover, communication alignment is at 3.17 and skills alignment criteria at 3.11 (the lowest) agreement level. The percentage strategic business-IT alignment maturity agreement level is shown in Figure 4-12.

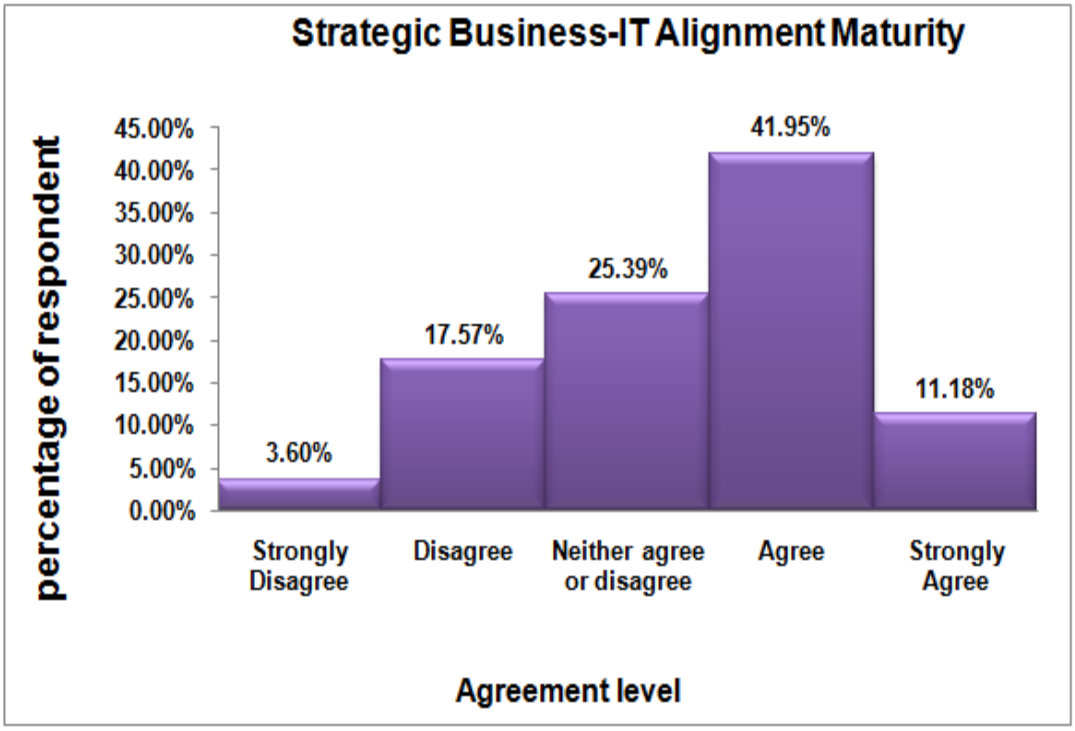

Figure 4-12: Percentage of the overall CBE strategic business-IT alignment maturity

The overall average strategic business-IT alignment agreement level was at 3.41 (53.13%) agreed, which means half of the respondents agreed that strategic alignment business-IT was good (level 3-established, focused strategic alignment maturity are documented and communicated) in the case of CBE. The average agreement level of scope and architecture alignment criteria was at 3.74 (69.49%) agreement level (the highest of all), governance at 3.66 (62.13%) agreement level, partnership at 3.52 (57.84%), competency at 3.28 (47.69), communication at 3.17 (45.34%) and skills alignment criteria at 3.11 (41.61%) agreement level, the lowest of all. All six strategic business-IT alignment criteria are above 3 agreement level. The banking industry nowadays is spending more on IT and banks are becoming essentially technology-supported institutions. IT investment should be aligned with the strategic objective of a company. Therefore, strong business-IT strategic

alignment and integration will increase the competitive advantage of enterprises.

1) Communication alignment maturity

Communication contains how IT and business executives understand each other. Therefore, mutual understanding between business by IT and IT by business is essential to the exchange of information between IT and business enterprises to achieve them and influence stakeholders using the right language. The overall agreement score in this study places communication in fifth place, among the strategic alignment areas was at 3.17 (45.34%) agreed that level 3 maturity level (established, focused processes), 31.37% disagreed and 22.79% neither agreed nor disagreed. The communication alignment criteria agreement level is shown in Figure 4-13.

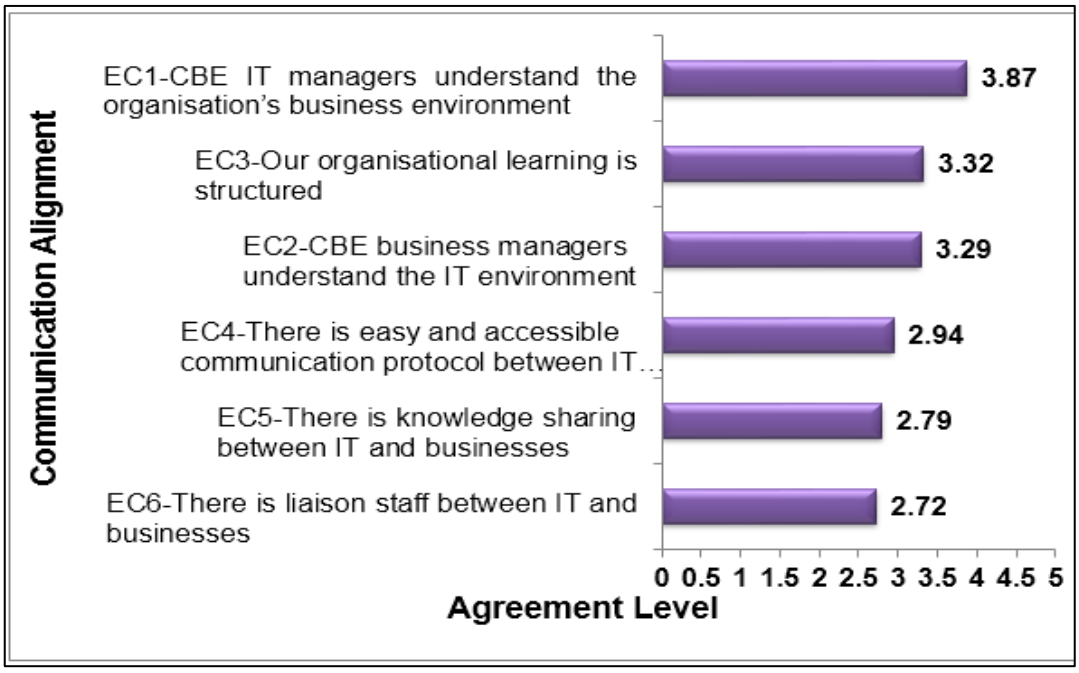

Figure 4-13: Communication alignment maturity

CBE IT managers understand the banking business environment; the average agreement level is at 3.87 (77.94%) level 3-established, focused processes, the highest of all. CBE has good organisational learning structured average agreement level 3.37 (50%) at level 3-established, focused processes. The business managers understand the IT environment and place it in third place among the six criteria and at a Level 3.29 (50%) agreement level (established, focused processes). Half of the respondents agree that business executives and managers understand the IT environment.

Easy and accessible communication protocol rigidity between IT and businesses (which means difficulty in accessing stakeholders) placed in fourth place and the average agreement level is 2.94 (39.71%) around level 3-established, focused processes. The knowledge sharing between IT and businesses average agreement level is 2.79 (30.88%) agreed that are committed to begin the process for strategic alignment maturity. The average agreement level of liaison staff between IT and businesses is at 2.76 (23.53%) agreed that are committed to begin the process for strategic alignment maturity and the lowest of all, which means one-way communication business to IT. The percentages of strategic business-IT alignment communication criteria maturity agreement level is shown in Figure 4-14.

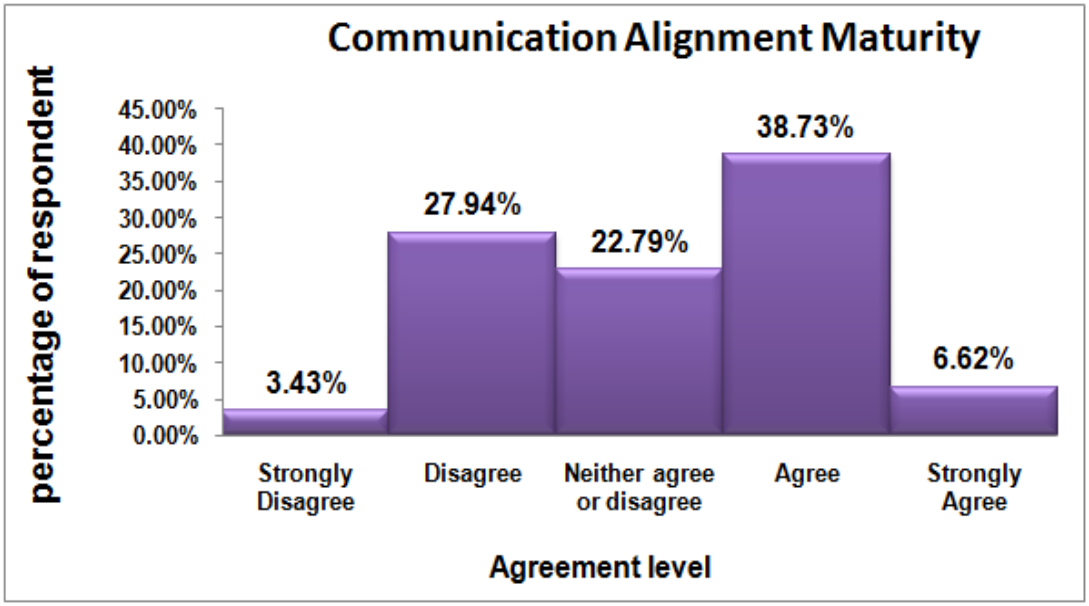

Figure 4-14: Percentage of communication alignment maturity

Communication alignment maturity measures the effectiveness of the exchange of knowledge, ideas and information between IT and business enterprises. Of the total respondents, 45.34% of the respondents agreed that the maturity level is at level 3 (established, focused processes).

2) Competency/Value alignment maturity

Competency/value of IT alignment maturity measures balanced metrics in terms of both the business and IT. The overall average competency agreement level is 3.28 and this implies that IT value is measured in functional cost efficiency in CBE. Strategic alignment in the area of competency/value of IT alignment maturity average agreement level in CBE is shown in Figure 4-15.

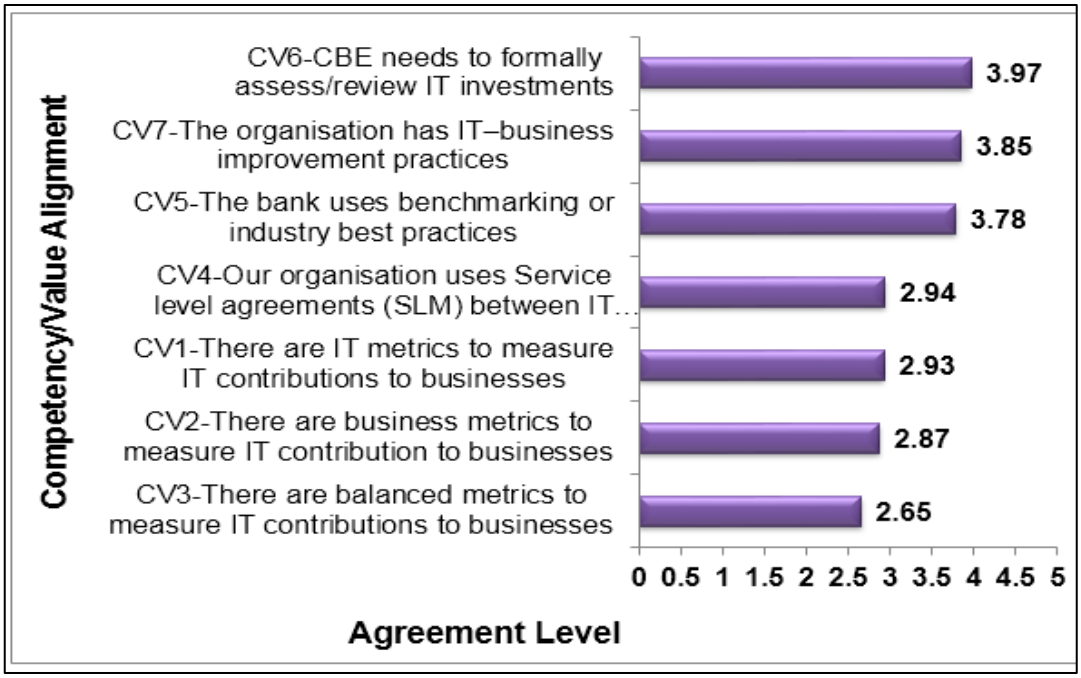

Figure 4-15: Competency/Value alignment maturity

CV3 – The average agreement level of balanced metrics to measure business contribution to IT is at 3.97 agreement level (level 3, established a focused strategic alignment), the highest score;

CV1 – The existence of IT metrics is at 2.65 agreement level (level 2, committed to begin the process for strategic alignment maturity), the lowest. CBE has implemented BSC for performance measurement of the staff for business-IT improvement practices since 2010. Currently, the CBE performance management system is linked to the ERP performance management system. The objectives and targets are set by the respective work unit supervisor;

CV2 – There were business metrics to measure IT contribution to businesses. The agreement level for this is at 3.85. At the branch level, the BSC is cascaded at an individual level and there is a reward system. There are tracking report inputs such as ATM performance monitoring report, deposit mobilisation target for district managers;

CV4 – CBE uses SLA between IT and business and is at 3.78 agreement level. It lacks uniformity and consistency;

CV5 – The bank uses benchmarking or industry's best practices and maturity is at 2.94 at the emerging stage;

CV7 – CBE has IT-business improvement practices maturity at 2.93 agreement level;

CV6 – CBE formally assesses/reviews IT investments and the average agreement level is at 2.87. CBE IT audit and risk and compliance regularly assess and review IT investments and report to CBE's board of directors, the President and the Office of Strategic Management (which assigns IT audit rectification follow up);

CV1 – The maturity level of IT metrics is at 2.65, the lowest of all. However, the CBE performance measurement system has been using BSC since 2010. IT processes lack metrics and integrated tracking tool. The only metrics are customer and employee satisfaction surveys. Currently, CBE BSC was linked to the ERP performance measurement system. The percentage of CBE competency/value in CBE is shown in Figure 4-16.

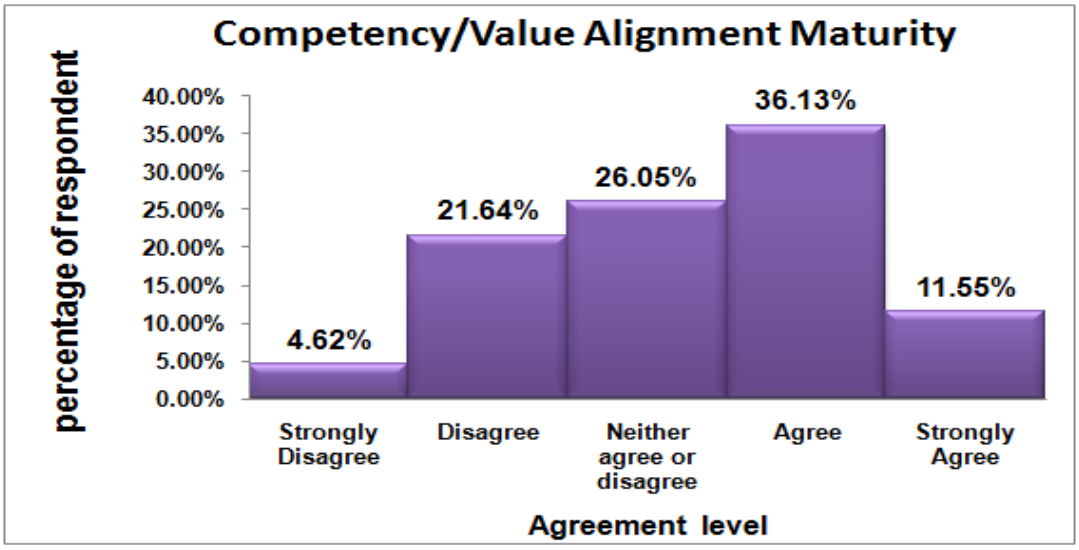

Figure 4-16: Percentage of competency/Value alignment maturity

The percentage of CBE competency/value measurement ranked fourth from the six components and a 3.28 agreement level overall, which means 47.69% agree (36.13% agree and 11.55% strongly agree), 26.05% neither agree nor disagree and 26.26% (21.64% disagree and 4.62% strongly disagree) from the total respondents. Therefore, almost half of the respondents agree that the maturity level of value was a good measurement level 3 (established a focused strategic alignment maturity) in the CBE.

3) Governance alignment maturity

Governance maturity increases efficient and effective IT and business processes, which is integrating priorities, planning and budgeting and describes the authority of level of decision-making of IT and business processes. Governance alignment maturity criteria received an overall maturity agreement level at 3.66 (62.13%) ranked second of the six areas and the respondents agreed that there is good governance alignment (maturity level 3 - established process) in CBE, as shown in the Figure 4-17.

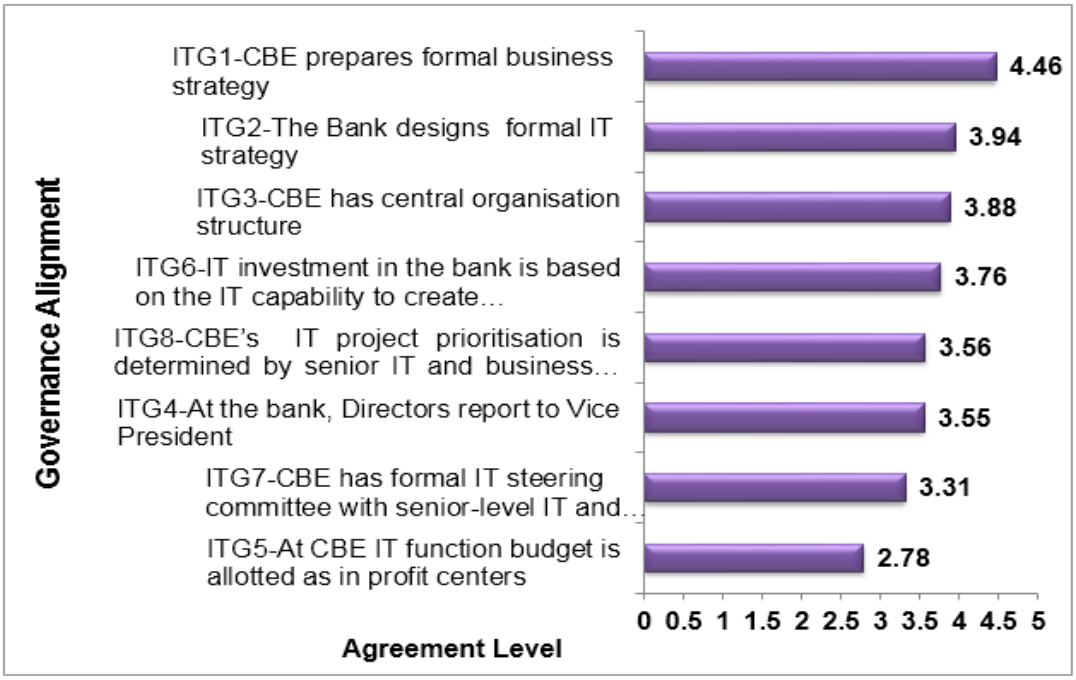

Figure 4-17: Governance alignment maturity

CBE prepares formal business strategy and this implies that across the enterprise, respondents agree that formal business strategy plan is prepared, the highest agreement level from governance maturity at 4.46. CBE IT function is as a profit centre, the lowest 2.78 (meaning cost centre). CBE has a central IT-organisational structure and the average agreement level was at 3.88 (55.22%) of the respondents who agreed that there was good governance maturity (level 3 - established process) in CBE and IT resources report to the IS department lead by a VP IS. The percentage of governance alignment maturity is shown in Figure 4-18.

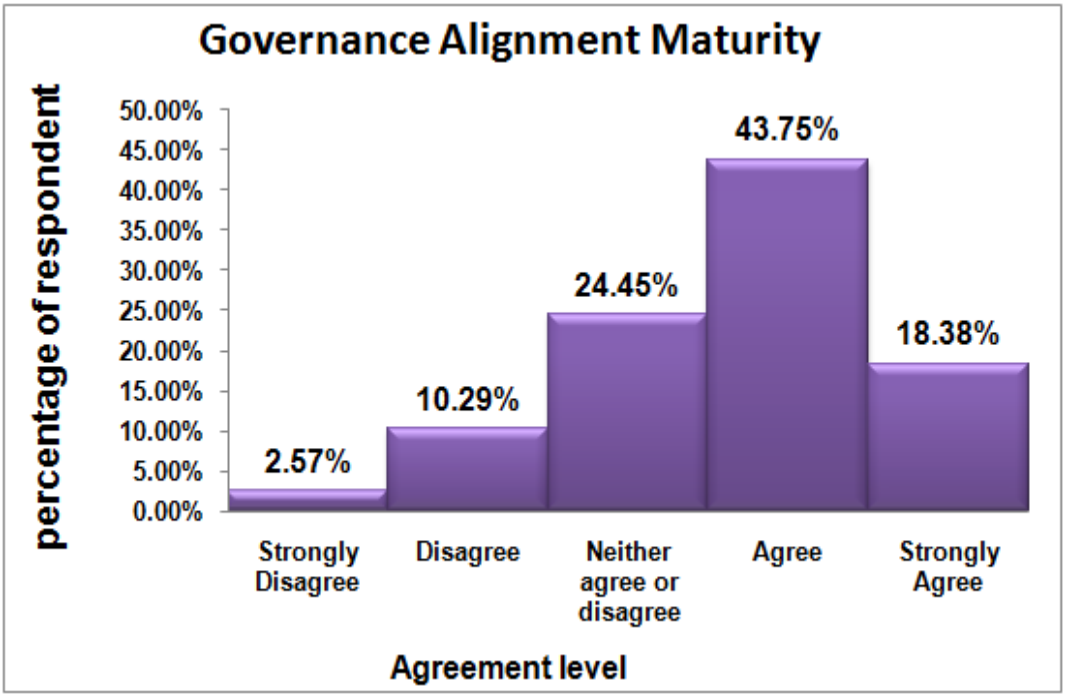

Figure 4-18: Percentage of governance alignment maturity

The percentage of governance maturity agreement level is 62.13% agree (43.75% agree and 18.38% strongly agree), 24.45% neither agree nor disagree and 12.87% (10.29% disagree and 2.57% strongly disagree) from the total respondents. Therefore, the majority of the respondents have agreed and

the maturity level in governance alignment area maturity level 3 - established process in CBE.

4) Partnerships alignment maturity

Partnership is the relationship between IT and business, mutual trust, sharing of risks and rewards are key attributes. It is shown in Figure 4-19.

Out of partnership alignment criteria, IT-based initiatives have the highest rate at 3.82 and the lowest agreement level is change adaptability at 3.32.

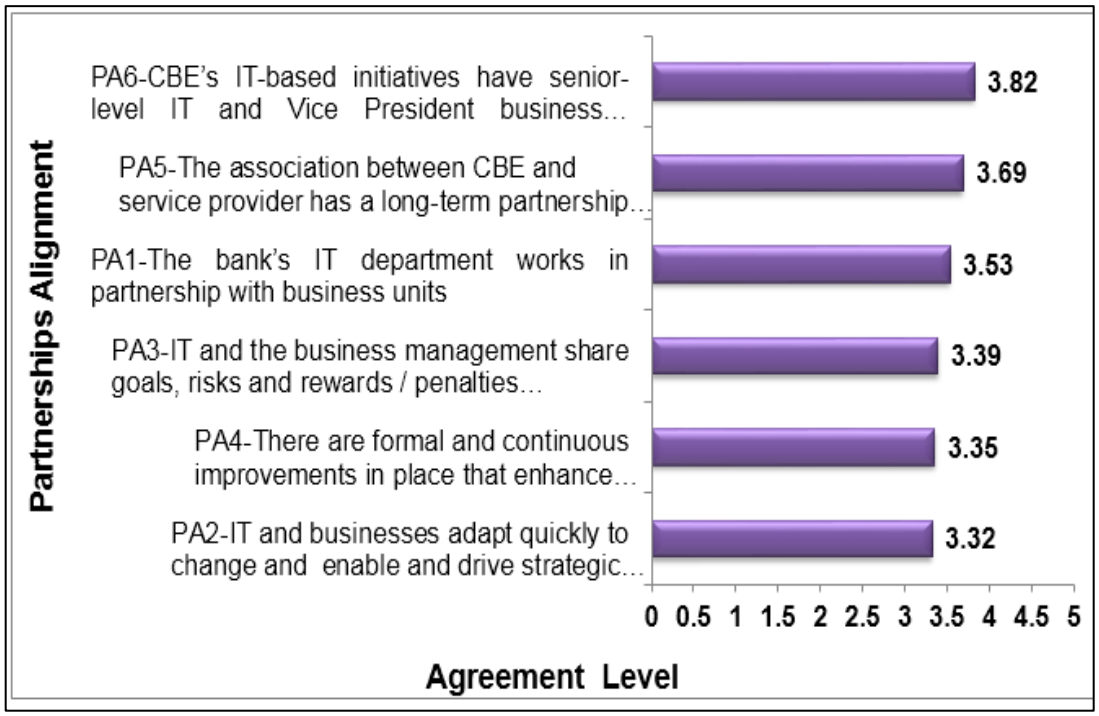

Figure 4-19: Partnership alignment maturity

PA6 –CBE's senior staff of IS and Vice President IS have a business sponsor or champion on IT-based initiatives is at 3.81 agreement level.

PA5 – The association between CBE and service provider has a long-term partnership and valued at 3.69 agreement level.

PA1 – The bank's IT department works in partnership with business units at 3.53 agreement level.

PA3 – IT and the business management share goals, risks and rewards/penalties associated with IT-based agreement level at 3.39.

PA4 – CBE has been making formal and continuous improvements in places that enhance partnership between IT and business at 3.35 agreement level.

PA2 – Change adaptability IT and businesses are enabling and driving strategic objectives at 3.32 agreement level.

The percentage strategic business-IT alignment partnership criteria maturity agreement level is shown in Figure 4-20.

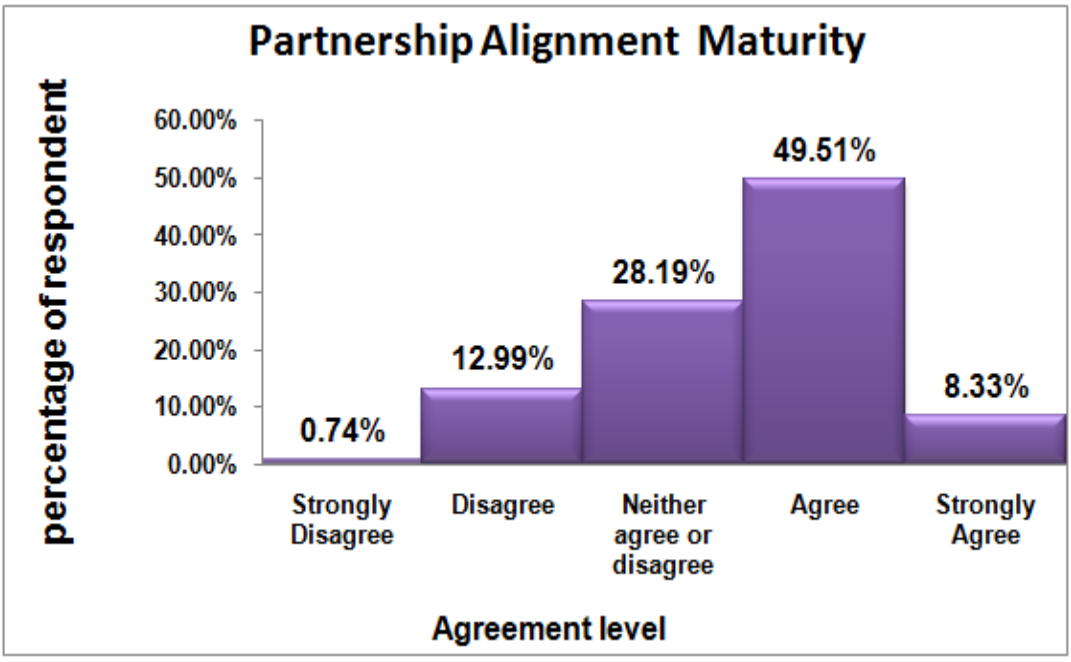

Figure 4-20: Percentage of partnership alignment maturity

More than half of the respondents agreed that partnership maturity at level 3-established process in the CBE. This indicates that IT plays a role in defining business strategies. The overall score of partnership between IT and business functions alignment maturity agreement level is at 3.52 (57.84%) agree (49.51% agree and 8.33% strongly agree), ranked third from the six areas and

28.19% neither agree nor disagree and 13.73% disagree (12.99% and 0.74% strongly disagree).

5) Scope and architecture alignment maturity

Scope and architecture maturity measures emerging technologies, promotes business process change, delivers value to the business, customers and partners. It also evaluates the flexibility of IT infrastructure and the only technical component in the model. It received the highest overall score of 3.74 among the six alignment areas, which indicates 69.49% of the respondents agree that scope and architecture maturity was good (level 3- established, focused processes) in the CBE. The scope and architecture alignment criteria average agreement level is shown in Figure 4-21.

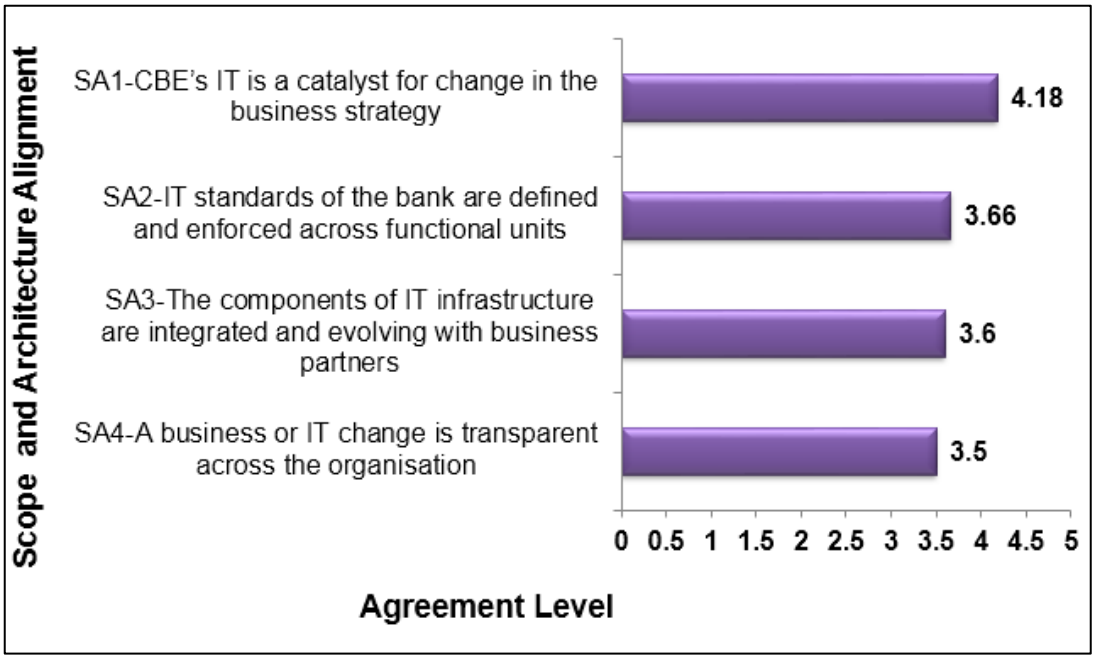

Figure 4-21: Scope and architecture alignment maturity

SA1 – CBE's IT is a catalyst for change in the business strategy. The agreement level is at 4.18, which is very good;

SA2 – IT standards of the bank are defined and enforced across functional units. The agreement level is at 3.66. IT standards and best practices such as ITIL for IT service management and ISO27001/2 implemented for information security standards under implementation in CBE;

SA3 – The agreement level components of IT infrastructure are integrated and evolving business partner is at 3.60;

SA4 – The business or IT change is transparent across the enterprise. The agreement level is at 3.50. The key to the change management approach is proactively balancing the rationality of the sponsor (CBE) and employees' concerns in the process. The overall assessment of the bank's strategic alignment maturity in scope and architecture is at a 3.74 agreement level. Therefore, this indicates that there is good IT architecture maturity integration across CBE. The flexible infrastructure integrated across the enterprise is good in CBE as shown in Figure 4-22.

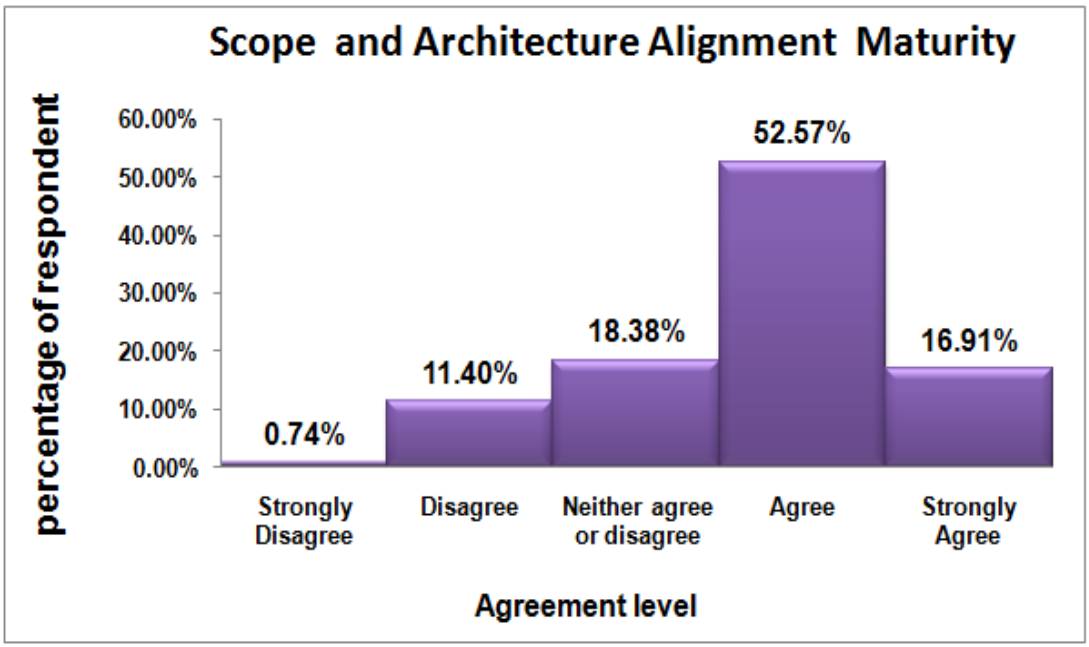

Figure 4-22: Percentage of scope and architecture alignment maturity

The percentage of scope and architecture alignment maturity agreement level is 69.49% agree (52.57% agree and 16.91% strongly agree), 18.38% neither agree nor disagree and 12.13% disagree (11.40% disagree and 0.74% strongly disagree) from the total respondents. Therefore, the majority of respondents have agreed and the maturity level in scope and architecture alignment area is good.

6) Human resources/skills alignment maturity

The Bank's Human Resource (HR) both at leadership and professional levels must uphold critical competencies that match world-class standards. This criterion covers all IT-HR practices, such as how to hire, retain and fire, train, educate, motivate, career opportunities, culture and developing skills of employees. Skills maturity measures the enterprise's HR's practices and capability for learning, readiness for change and ability to leverage new ideas. The overall assessment of the bank's strategic alignment maturity in human resources/skills maturity scored at 3.11 (41.60%) agreed that skill alignment maturity is an emerging value service provider. The human resources/skills alignment maturity average agreement level is shown in Figure 4-23.

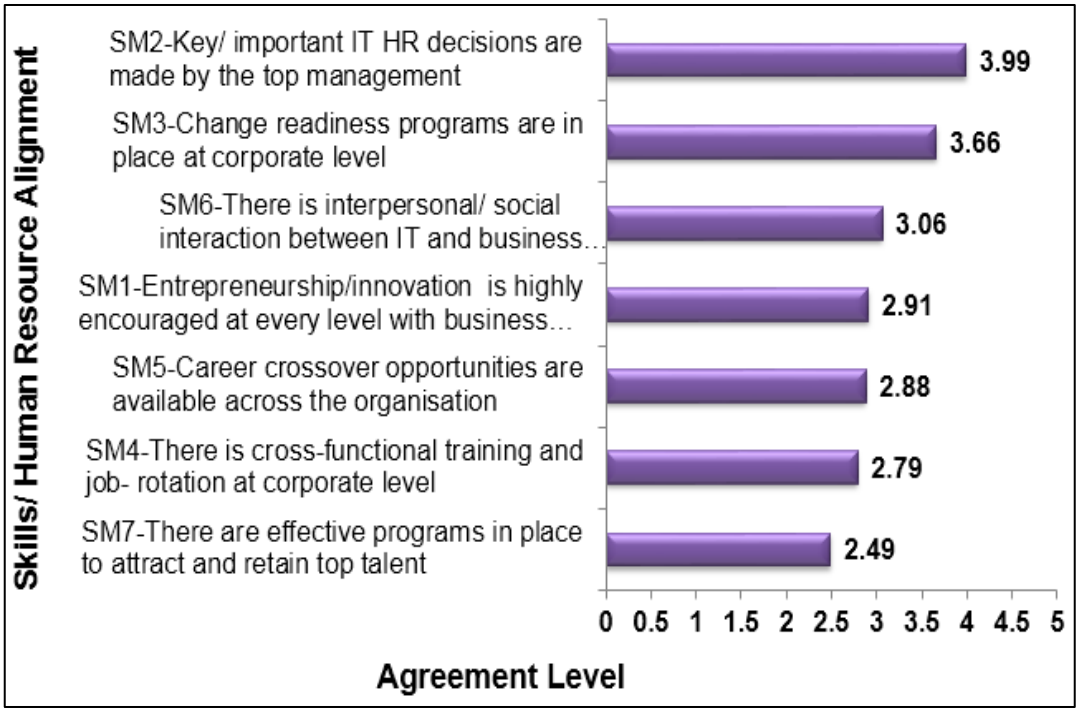

Figure 4-23: Human resources/Skills alignment maturity

SM2 – The top management make key IT-HR decisions. The agreement level for this is the highest agreement level at 3.99 and the figure indicates a very good alignment in this area;

SM3 – CBE change readiness programmes are in place at the corporate level. The agreement level for this is at 3.66 and the skill alignment maturity in the area is very good;

SM6 – There is interpersonal/social interaction between IT and business partner enterprises. The agreement level is at 3.06 and skill alignment maturity in the area is also good;

SM5 – Career crossover opportunities are available across the enterprise. The agreement level is at 2.88 and skill alignment maturity in the area is good;

SM1 – Entrepreneurship/innovation is highly encouraged at every level with business partners' agreement. The agreement level is at 2.87. This indicates that CBE focuses on learning and development, instead of innovation;

SM4 – There is cross-functional training and job rotation at the corporate level. The agreement level and maturity level is at 2.79 (level 2);
SM7 – There is an effective programme in place to attract and retain top talent. The agreement level is at 2.49 (level 2). The percentage of skills alignment maturity in CBE is shown in Figure 4-24. Below half of the respondents have agreed and the maturity level of skill alignment is good.

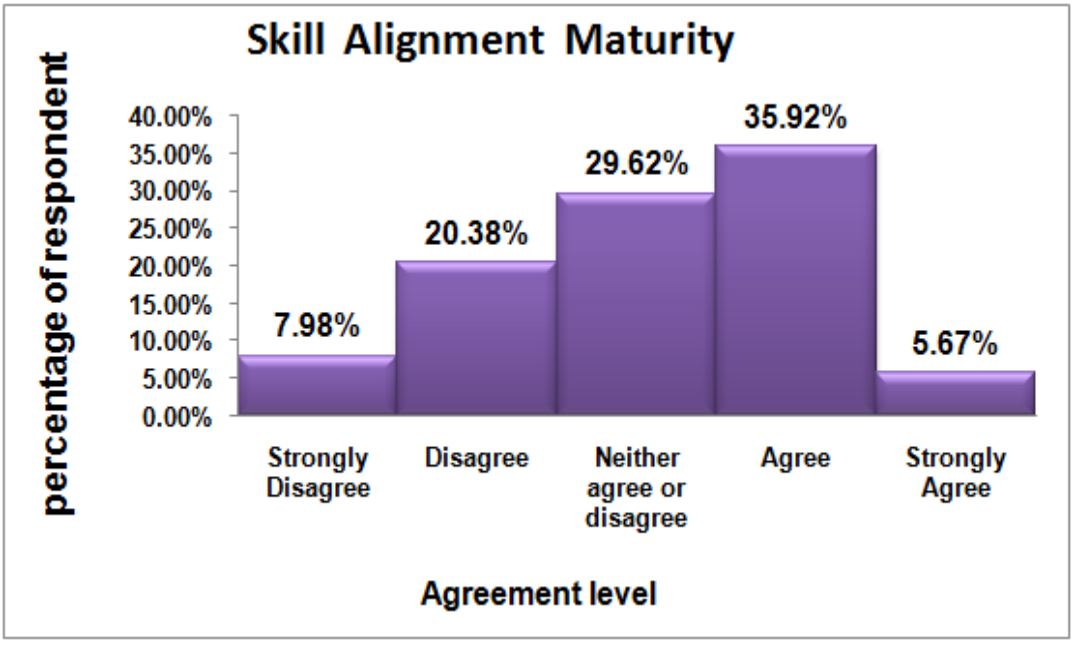

Figure 4-24: Percentage of Human resources/Skills alignment maturity

Skills established are at the lowest overall score 3.11 of the six areas, which shows that only 41.60% (35.92% agree and 5.67% strongly agree) of the respondents agree that human resources /skills maturity was good (established, focused processes) in the CBE. On the contrary, 29.62% neither agree nor disagree and 28.36% disagree (20.38% disagree and 7.98% strongly disagree) from the total respondents.

4.4.2.3 GEIT practices implementation related to strategic business-IT alignment maturity

Correlation analysis is used to describe the strength and direction of a linear relationship between two variables (Pallant 2011). It is used to measure the relationship between GEIT practices and strategic alignment in the case of CBE Pearson correlation coefficients (r) used in this study. Pearson correlation coefficients (r) can only take on values from –1 to +1. The positive correlation sign indicates as one variable increases, the other. The negative correlation indicates as one variable increases, the other decreases. Zero correlation meaning the variables are perfectly independent (Saunders et al. 2009).

The recommendation from the sample size was needed to employ multiple regression n > 50 + 8m (where m = number of independent variables). The number of independent variable is one in this study. More than 58 sample sizes are required to use multiple regression analysis. Therefore, in this study, the sample size was 68 generalise with other samples (Pallant 2011).

Regression analysis is a technique that shows relationships between one or more independent (predictor) variables, with a dependent (predicted) variable by calculating a regression equation $Yi= (b0 + b1Xi) + \varepsilon i$ (Field 2009; Saunders et al. 2009). In this study, to measure the correlation between GEIT practices and strategic business-IT alignment, the predicted variable (dependent variable) is strategic business-IT alignment and the predictor variable (independent variable) is GEIT practices.

Hypotheses

H1: $P < 0.001$ stated that strategic business-IT alignment is a useful predictor of GEIT practices (strategic business-IT alignment and GEIT practices are positively correlated);

Ho: P > 0.001 stated that strategic business-IT alignment is not a useful predictor of GEIT.

The next discussion assesses the regression analysis of GEIT practices implementation related to strategic business-IT alignment in CBE. Studies revealed that enterprises with higher mature GEIT practices are expected to reach a higher degree of strategic alignment maturity (De Haes & Van Grembergen 2009; 2008). The regression analysis of GEIT practices implementation related to strategic business-IT alignment in CBE, Table 4-19 portrays that the data supported the hypothesis at a 5% level of significance.

Table 4-19: Regression analysis of GEIT practices implementation related to strategic business-IT alignment

Coefficients[a]							
Model	Unstandardised coefficients		Standardised coefficients	t	Sig.	95.0% confidence interval for B	
	B	Std. Error	Beta			Lower bound	Upper bound
(Constant) 1	2.758	.091		30.417	.000	2.577	2.939
GEIT practices	.338	.042	.701	7.994	.000	.254	.422
a. Dependent variable: Strategic business-IT alignment							

The overall regression model: in this case, the Y-intercept for GEIT and strategic business-IT alignment data is 2.76, the SE of the Y-intercept 0.338 and significantly different from zero (t=30.417) at a significant level of greater than .001. The regression equation is:

Y= 0.338 x + 2.758

T = 7.643 and p-value = .000

ANOVA table for GEIT practice implementation and strategic business-IT alignment is as shown in Table 4-20.

Table 4-20: ANOVA table for GEIT and strategic business-IT alignment

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.560	1	6.560	63.908	.000[b]
	Residual	6.774	66	.103		
	Total	13.334	67			
a. Dependent variable: Strategic business-IT alignment						
b. Predictors: (Constant), GEIT practices						

The correlations between GEIT practices implementation and strategic business-IT alignment is as shown in Table 4-21.

Table 4-21: Correlations between GEIT and strategic business-IT alignment

		Strategic business-IT alignment	GEIT practices
Strategic business-IT alignment	Pearson correlation	1 A	.701** B
	Sig. (2-tailed)		.000
	N	68	68
GEIT practices	Pearson correlation	.701** C	1 D
	Sig. (2-tailed)	.000	
	N	68	68
** Correlation is significant at the 0.01 level (2-tailed).			

Missing values: exclude cases pair-wise

From the Pearson correlation coefficient for strategic business-IT alignment and GEIT practices areas we can see 0.701**, significant ($p < .001$ for a two-tailed test) based on 68 complete responses.

A Correlation of strategic business-IT alignment with itself (r=1) and the number of non-missing observations for strategic business-IT alignment (n=68).

B Correlation of strategic business-IT alignment and GEIT practices (r=0.701**) based on n=68 observations with pair-wise no missing values.

C Correlation of strategic business-IT alignment and GEIT practices (r=0.701**) based on n=68 observations with pair-wise non-missing values.

D Correlation of GEIT practices with itself (r=1) and the number of non-missing observations for GEIT practices (n=68).

The relationship between GEIT practices implementation and strategic business-IT alignment model summary as shown in Table 4-22.

Table 4-22: GEIT practices implementation related to strategic business-IT alignment model summary

Model	R	R^2	Adjusted R^2	Std. error of the estimate
1	.701[a]	.492	.484	.32038
a. Predictors: (Constant), GEIT practices				
b. Dependent variable: Strategic business-IT alignment				

Since p-value = 0.000 ≤ 0.001, the slope of the population regression line is not zero. We accept H1 and conclude that GEIT practices implementation related to strategic business-IT alignment have a positive direction (linear) relationship. Hence, we are 95% (at the α= 0.05 level of significance) confident strategic business-IT alignment is useful as a predictor (independent variable) of GEIT practices. The magnitude, or strength, of the association, is medium correlation | *r* |= 0.701. The graph in Figure 4-25 indicated that GEIT practices related to strategic business-IT alignment of CBE has a positive linear correlation.

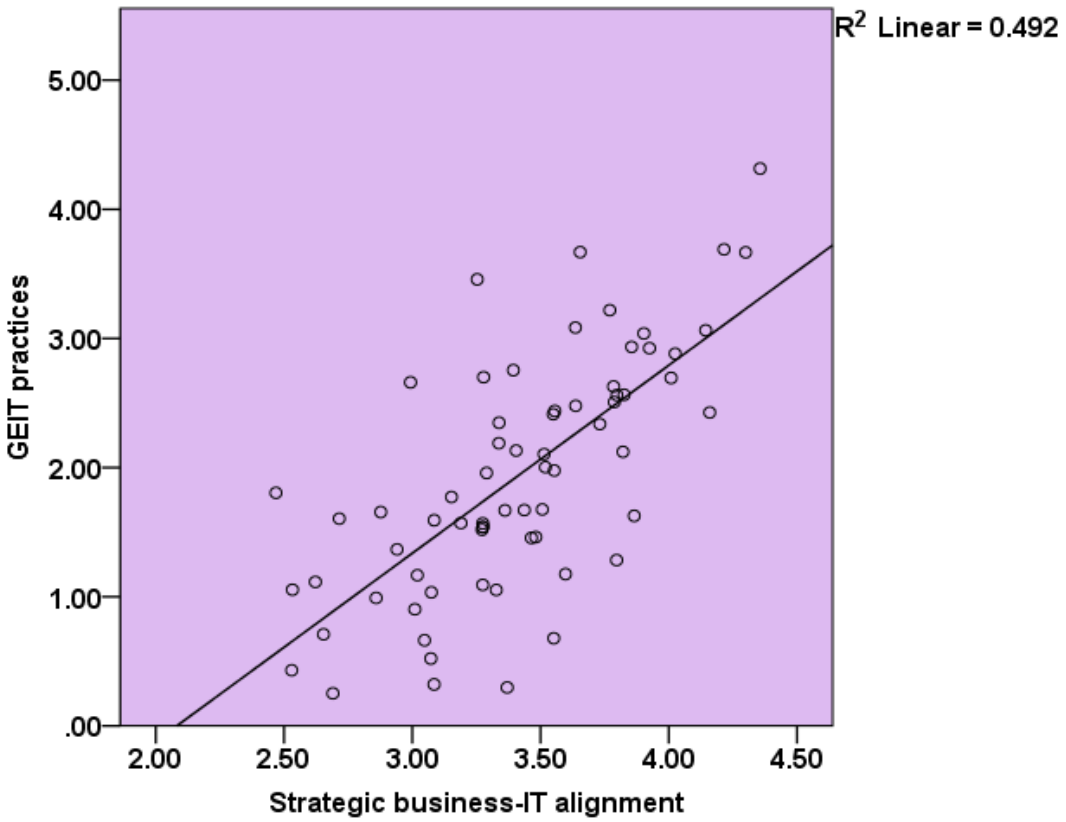

Figure 4-25: The relationship between GEIT practices and strategic business-IT alignment

The value of R^2 is .492, which tells us about 49.2% of the variation in the strategic business-IT alignment data is explained by GEIT practices implementation maturity. This means that 50.8% of the variation in strategic business-IT alignment data cannot be explained by GEIT practices. The quantitative data analysis has revealed that there is a direct relationship between GEIT practices implementation and strategic business-IT alignment. The next section presents qualitative data analysis.

4.4.3 Qualitative data analysis

In the qualitative data analysis phase, based on quantitative data results, qualitative data were analysed from observation and participation, documents and focus group discussion. Documents such as CBE GEIT structures, the five years CBE strategy, quarter and annual reports, IS policy and procedures, IS project implementation status and IT performance management system were analysed. GEIT practices processes gap assessment using COBIT 5 assessed and analysed. The researcher has integrated the results to bring together quantitative and qualitative methods and explain sequentially.

4.4.3.1 GEIT practices implementation

GEIT practices implementation in the case of CBE are not defined, deployed, documented, and communicated based on best practices. This section deals with qualitative data anaysis of GEIT practices namely; processes, structures and relational mechanisms.

1) GEIT practices structures

GEIT structures are the key decision-making entities in an enterprise. The quantitative result indicated that GEIT practices structures implementation maturity level is at 2.18 (repeatable but intuitive). The qualitative analysis also confirmed that basic GEIT structures exist in the CBE, except a dedicated IT strategy committee at the level of board of directors to ensure that IT is a regular agenda item, which reports about issues to the board of directors. There is an absence of IT expertise at the level of executive management or the board of directors regarding the value and risk of IT experience. There is no dedicated architecture steering committee (composed of business and IT people) providing architecture guidelines and advice on the IT road map.

Currently, the infrastructure management division is responsible for the architecture issue.

CBE GEIT processes are not designed; this indicated that the RACI chart, key performance indicator (KPI), performance measurement, procedures, guidelines and work instructions are not defined and documented. Therefore, it is safe to conclude that accountability and responsibility are not defined exhaustively for GEIT processes.

2) GEIT practice processes

The qualitative data analysis confirmed that strategic IS planning process, policy and procedure are not defined, as to when and how to perform IT strategic planning. Lack of IS integrated plan most of the time, unplanned task takes more time (firefighting) and needed basis. CBE IT performance measurement system has been implemented since 2010. However, there is also no tracking tool for monitoring IT performance. The analysis also indicated that there are no IT projects in the IT project portfolio that are directly traced back to the IT tactical plans. There is a lack of portfolio reports that include ROI, business cases, information economics, payback, IT investments and projects in which business and IT are involved and benefits have not been realised, owing to lack of benefit monitoring system. There are no project methodologies and performance measurements to govern and manage IT projects.

GEIT practice processes are not defined based on standard processes and measurements. The benefits of define process are to:

1) define a formal pattern and rules that govern the process activities of the bank;
2) define roles and responsibilities across the bank concerning the GEIT processes;

3) set up effective and efficient communication across the bank concerning GEIT; and
4) manage and implement GEIT processes to make sure that IT is aligned with business needs and continual service improvement.

Therefore, GEIT processes should be defined, deployed and measured based on best practices. Business Relationship Management (BRM) process is a newly added COBIT 5 process for business-IT integration.

3) GEIT practices relational mechanisms

The overall relational mechanisms implementation maturity level is at 1.45 (initial or ad hoc); it includes cross-training, proper communication, business-IT participation, and shared learning. The process council (executive committee) has a regular agenda about the IT strategy, IT projects and performance of the IT activities etc. All IS work units deliver report to the VP IS two times a month, IS department compiled quarter reports and submit them to the monitoring and evaluation work unit. All CBE senior management and IT management have a quarter and annual meeting, based on quarter and annual performance report accordingly.

The qualitative data analysis also confirmed that VP Information Systems (IS) have no direct reporting line to the president, but through the monitoring and evaluation department. There is no job-rotation between business people working in IT and IT staff working in business units, but business and IT people close to each other for IT project requirements, gathering and testing and CAB meeting. Besides that, there is a rare case cross-training IT people about business and/or business people about IT. There is no formal GEIT awareness campaign that explains to business and IT people the need for GEIT. Moreover, there is no dedicated business/IT account management or BRM to bridge the gap between business and IT which acts as in-between.

CBE knowledge management tools are the CBE portal, CBE outlook and Graphical Intelligence Electronic Operational Management (GIEOM) among others. They are used to share and distribute knowledge about CBE policy and procedures, project, quarter and annual performance report, memo, tasks, etc. Currently, GEIT knowledge management was at an early stage and GEIT responsibilities, accountability and tasks are not defined.

4.4.3.2 Strategic business-IT alignment maturity

This section deals with data analysis qualitative of strategic business-IT alignment in terms of communication, competency/value, governance, partnerships, scope and architecture and skills in the case of CBE. The overall strategic business-IT alignment assessment results have shown that 53.13% of respondents agreed that the maturity level was level 3 (established, focused processes). Based on the quantitative data analysis, the qualitative data analysis on communication is presented as follows.

1) Communication alignment maturity

In quantitative data analysis, almost half of the respondents confirmed that there is good communication between IT and business and vice versa, resulting in information systems being utilised. The qualitative data analysis also confirmed that the CBE's communication is established under the business development process to increase communication and knowledge sharing as well as cultural change. Furthermore, there is knowledge sharing between IT and business employees with continuously updated information via various communication channels, (i.e., CBE portal, CBE Television program, CBE email and CBE website). CBE has established a centre of excellence under HR learning and development department to develop, arrange and give training in an organised manner. The core banking application (T24) implementation (2012/13) has a remarkable advantage for business and IT

staff. This is a good opportunity to develop a business-IT relationship. Intensive training is given to all T24 users by business and IT professionals. Emerging IT and business communication in CBE maybe after the implementation of core banking application (T24) (2012/13) and other huge projects such as ERP, upgrading infrastructure project, IS security project implementation among others. Intensive training is provided to all T24 users by business and IT professionals and this is a good opportunity to develop a business-IT relationship.

IS security awareness training is given to business and IT system users and technical staff. Furthermore, the application support team is composed of business and technical teams under the service desk and IT support at the district level (centralised and decentralised support system). The HR business partners act as liaison staff between business and IT. Besides IT in business, there is no formal liaison staff, which dedicates to bridge the gap between business and IT using Business Relationship Managers/IT account management, who act as in-between. This creates a lack of common language between IT professionals and senior management; hence it becomes difficult to understand emerging technology-related risks.

2) Competency/Value alignment maturity

The percentage of CBE competency/value measurement ranked fourth from the six components and a 3.28 agreement level overall, which means 47.69% of respondents agreed that the maturity level was level 3 (established, focused processes). Based on the quantitative data analysis, the qualitative data analysis on competency alignment maturity also confirmed that CBE focuses on benchmarking banks are selected from emerging economies (ICBC, Bank of China, Bancos do Brazil SA, Woori Financial Holdings (Korea), State Bank of India, ICICI Bank and Vietnam Bank for Agricultural and Rural Development) for strategic benchmarking. There are gaps in emerging technology-related

risks and control mechanisms. Moreover, there are no value/competence metrics, which measure IT contribution to the business and balanced metrics. CBE SLM process is under process design in the ITIL project. However, SLAs and Return on Investment (ROI) are not yet started across CBE. Service levels which help to the business and clearly define the rewards and penalties for exceeding or missing the objectives.

3) Governance alignment maturity

Governance alignment maturity criteria received an overall maturity agreement level at 3.66 (62.13%) ranked second of the six areas and the respondents agreed that the maturity level of governance alignment is at level 3 (established governance processes) in CBE. The quantitative analysis indicated that CBE prepares formal business strategy and this implies that across the enterprise, respondents agree that formal business strategy plan is prepared, the highest agreement level. The qualitative data analysis also confirmed that CBE five-year corporate business strategy plan (2015/16-2019/20) has prepared the involvement of the Office of Strategic Management (OSM), Business Development (BD), Electronic payment department and process council, as corporate strategy steering committee. However, the five-year IS strategic plan has not prepared in line with the corporate business strategic plan and absence of IS strategic plan technical team. CBE has centralised and decentralised organisational structure. CBE's IT projects lack prioritisation and schedule. Most IT investments in the bank are based on the IT capability to create a competitive advantage and to increase profit. CBE process council (senior executives) committee is absent from the IT professionals (subject matter expertise).

4) Partnership alignment maturity

The overall score of the partnership alignment maturity agreement level is ranked third from the six areas. The quantitative analysis indicated that out of partnership alignment criteria, IT-based initiatives have the highest rate of all and change adaptability is the lowest of all. This indicates that IT plays a role in defining business strategies. The qualitative analysis confirmed that CBE's senior staff of IS and Vice President IS have business champion on IT-based initiatives, mutual trust and sharing of risks and rewards are key attributes. CBE has drawn several IT initiatives to reach its vision. CBE PMO has managed all IT initiatives by implementing major IT projects together with the IT steering committee to follow-up on the IT projects in the bank.

5) Scope and architecture alignment maturity

The quantitative analysis indicated that scope and architecture alignment received the highest overall score of all in the CBE. It measures and evaluates the flexibility of IT infrastructure. The qualitative analysis confirmed that there is good IT architecture maturity integration across CBE. The comparison between 2011 assessment results vs. current assessment in CBE indicated that there is a dramatic change of flexible infrastructure. This flexible structure is transparent to all business partners and customers, emerging technologies improvement, increase customer base, number of employment, asset and branch expansion. Experiences of world-class banks are lesson drawn from a study conducted by Boston Consulting Group (18 of the top 35 retail banks). Banks are selected from emerging economies for strategic benchmarking in-terms of aggressively working on:

1) branch expansion;
2) continuously expand product and services;

3) utilise modern banking technology and simple access points to reach rural and small towns;
4) focused on service quality and customer compliant handling; and
5) continuously train and upgrade the skill of their employees.

It lacks an emerging technology-related risk control mechanism that has a major impact on strategic business-IT alignment and creates misalignment problem. IT change should be transparent across the enterprise and currently IS change management culture started in CBE. The CAB members are composed of IS managements, business representatives and subject matter expertise responsible for assessing business impact and change approval of weekly-based requests to ensure that changes are made with minimum disruption to the services.

6) Human resources/Skills alignment maturity

The quantitative analysis indicated that skills are established the lowest overall score of the six areas. The qualitative data analysis indicated that CBE HR development strategy implementation has been engaged in employee learning and development as one of its Human Resource Development (HRD) strategy to fill the skill gap. To accomplish this, a bank-wide competency gap assessment was made and different training programmes designed to enhance employees' competency and achieve the bank's strategic objectives. CBE has also started to use Oracle Learning Management (OLM) system to modernise its training provision and effectively manage employee learning tasks. Training implementation for the year 2017/18 started following the development of the annual training plan after it got the approval of the process council.

Moreover, skill assessment through integrated training needs assessment by Tech-Mahindra IT consultants, who are baselining the skill requirement

utilising Skills Framework for the Information Age (SFIA[4]), Frankfurt School of Finance and Management (FSFM) consultants and HRD staff were made to identify the most critical training needs. CBE has developed a career management system designed with the objectives for providing progressive career-development opportunities and experiences for employees, enhancing employee competency development and ensuring a ready supply of highly competent internal talent for the bank's current and projected talent requirements.

Additionally, ITIL and ISO 27001/2 trainings and certifications were given for selected IT staff and IS Security staff respectively, whereas the ITIL foundation course was given to most of the IT staff. KPMG has given for business and IT staffs in the area of GRC. Other trainings like change management, performance management and others have been offered by the Frankfurt School of Finance and Management (FSAM) consultants.

4.4.3.3 GEIT practice processes maturity gap assessment using COBIT 5

This study also focuses on GEIT practices processes capability assessment, using COBIT 5. Firstly, by mapping GEIT practices processes toward COBIT 5 processes, GEIT processes capability using GWPs are evaluated under the areas of process outputs, documentation, process plan, quality plan, quality record, policies and standards and performance improvement plan. It also includes a process measurement plan, process control plan and process performance records. GEIT practices processes capability assessment, using COBIT 5, as shown in Table 4-23.

[4]SFIA is one of the globally accepted common languages for the skills and competencies required in the digital world.

Table 4-23: GEIT practices processes capability level using COBIT 5

Process Attribute ID	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5		Results
Process Name		PA1.1	PA2.1	PA2.2	PA3.1	PA3.2	PA4.1	PA4.2	PA5.1	PA5.2	
APO01-Manage the IT management framework	F	L	P	N	N	N	N	N	N	N	Level 1
APO02-Manage strategy	F	L	P	N	N	N	N	N	N	N	Level 1
APO05-Manage portfolio	F	P	N	N	N	N	N	N	N	N	Level 1
APO06-Manage budget and costs Process	F	L	P	N	N	N	N	N	N	N	Level 1
APO09-Manage service agreements	F	P	N	N	N	N	N	N	N	N	Level 1
MEA01-Monitor, evaluate and assess performance and conformance	F	L	P	N	N	N	N	N	N	N	Level1
MEA02-Monitor, evaluate and assess the system of internal control	F	L	P	N	N	N	N	N	N	N	Level 1
BAI01-Manage programmes and projects	F	L	P	N	N	N	N	N	N	N	Level 1
EDM01-Ensure Governance framework setting and maintenance	F	N	N	N	N	N	N	N	N	N	Level 0
EDM02-Ensure benefits delivery	F	N	N	N	N	N	N	N	N	N	Level 0
DSS04-Manage continuity	F	N	N	N	N	N	N	N	N	N	Level 0

Most of GEIT practices processes are mapped to COBIT 5 APO domain and EDM processes. GEIT practices processes assessment capability levels by using COBIT 5, the rating scale involves six capability levels is N = (0-14%), P= (15%-49%), L= (50%-84%) and F= (85%-100%). COBIT 5 APO domain processes are also very important for strategic alignment improvement. Most IT of governance practices processes are mapped to COBIT 5 (APO and EDM domains) governance processes. GEIT processes assessment using COBIT 5 has shown that GEIT practices processes under APO capability level are at Level 1 (performed process), meaning the implemented process achieved its process purpose. Whereas, GEIT processes under EDM, the capability level is at 0, meaning the process is not implemented or fails to achieve its process purpose.

The qualitative data analysis indicated that the achievement of the capability level of GEIT processes are not defined and deployed based on international best practices and also confirms that the GEIT BSC is not yet implemented. Besides, the achievement capability level of GEIT processes implementation using COBIT 5 is under level 1.

4.4.3.4 SWOT analysis

The common technique used is strengths, weaknesses threats and opportunities (SWOT) analysis to evaluate a business activity (See Table 4-24).

Table 4-24: SWOT analysis

	Helpful to the enterprise	Harmful to the enterprise
Internal Environmental attributes	**Strengths** - The top management gives high attention for IT initiatives; - Large branch network and growing number of technology outlets; - Large investment in technology and rapid connectivity among bank branches; - Many projects are in pipeline, for example core banking upgrade, CRM, EMT, ITIL, Card Banking (MAGIX), …, this indicates that CBE is under change transformation; - Management commitment for Learning and Development; - GEIT best practices under implementation e.g. ITIL, ISO 270001.	**Weaknesses** - GEIT processes are not defined based on best practices, no communication of standard procedures and formal training or awareness campaign; - Lack of understanding of GEIT frameworks, procedures and practices; - Lack of the ability to leverage and fully utilise team members; - Inconsistent customer service quality; - Low employee engagement level; - Low but improving risk-awareness culture; - A lack of aligned approaches to problem solving; - Lack of GEIT system control; - IT organisational structure of the bank didn't commensurately go with the bank's fast growth; - A lack of teamwork among leaders that cascades through an enterprise and an inability to perform at the required level; - Frequent network failure (connectivity); - Lack of stakeholder involvement in IT project; - Unplanned task takes more time firefighting, most assignment start from scratch and no continual improvement plan.

	Helpful to the enterprise	Harmful to the enterprise
External Environmental attributes	**Opportunities** - Availa**b**ility of new banking technology in the market; - A number of consultants consult CBE in areas of hardware, software and integration, among them IBM, CISCO, DELL, HUAWEI, Temenos, Oracle, NCR, HP, Tech-Mahindra; - Frankfurt School of Finance and Management (FSFM) consultant CBE for the development of CBE's Human Resource Development (HRD) strategy; - T24 (Core banking) upgrade project upgrade from R10 to R17 including subsidiaries banking; - Core banking digitising end-to- end - Create centralised core banking system that gives single view of customer; - Expansion to new geographic markets.	**Threats** - More than 1.2 million transactions per day and more than 2 million transaction volume during the holiday week; - Total number accounts are around 22,461,352; - Difficult to change work culture; - Misalignment between IT professional and senior managements; - Skill gaps on GEIT practices; - Growing competition in the industry; - Skipping maturity level leads misalignment problem; - Lack of stakeholder involvement.

The SWOT analysis, under weakness (mentioned above), indicates the consequences of a misalignment problem such as lack of stakeholder involvement, frequent network failure (connectivity), skill gaps on GEIT practices, unplanned task takes more time firefighting and skipping maturity level leads misalignment problem. ITIL processes have been designed and

under implementation. Interpretation of the findings of the study is discussed in the next section.

4.5 INTERPRETATION OF FINDINGS

This study investigated GEIT practices implementation related to strategic business-IT alignment using COBIT 5 in the case of CBE. The instrument used 33 GEIT practices items and 38 strategic business-IT alignment items respectively. Out of 100 questionnaires, 68 were completed by the respondents.

4.5.1 Preliminary analysis

The preliminary analysis covers the validity and reliability of the instruments used in this study. The reliability test was tested using Cronbach's α and followed by the test of normality using KMO or Shapiro-Wilk in SPSS Q-Q plots for GEIT practices and strategic business-IT alignment data. It also covers the analysis of demographic distribution of respondents: gender, level of education, working experience and current position in the bank.

1) Validity and reliability of the survey instrument

The validity and reliability of the instruments are used through internal consistency reliability (across items) and the standardisation procedure through the employment of Cronbach's α. The Cronbach's α value of reliability for GEIT practices Cronbach's α based on standardised Items is .847 (it is greater than Cronbach's α .845 by 0.8). Accordingly, Cronbach's α for GEIT practices indicates that the overall reliability of a questionnaire and values greater than 0.8 are very good. Moreover, the mean inter-item correlation is .648, with values ranging greater than 0.4. This suggests that there is a relationship among the items. Each domain (structures, processes and

relational mechanisms) had Cronbach's α value greater than 8 (very good). Therefore, the individual question on a test or questionnaire gave consistent and appropriate results. The Cronbach's α for strategic business-IT alignment of reliability values is greater than 0.8, (very good) and the Cronbach's α based on standardised Items is .844 greater than Cronbach's α .843. Therefore, the individual question on a test or questionnaire gives consistent and appropriate results. Moreover, the mean inter-item correlation is .482, with values greater than 0.4. This suggests that there is a relationship among the items. Each independent domain on the instrument had Cronbach's α value greater than 7, acceptable for five criteria. The governance Cronbach's α value is .671, minimally acceptable for all eight items.

Tests for normality of data are used to check whether data are normally distributed, K-S Test in SPSS Q-Q plots and box plot. The result of tests for normality for both GEIT practices and strategic business-IT alignment indicated that GEIT practices were retaining/accepting the null hypothesis and conclude that GEIT practices are normal. It also indicates that strategic business-IT alignment in five criteria were retaining/ accepting the null hypothesis and scope and architecture approximately normal. Hence, it is safe to conclude that a strategic business-IT alignment is normal distribution.

2) Demographic data analysis

The demographic distribution of respondents included gender, level of education, working experience, and current position in the bank. The result revealed that the majority of respondents were male (76.8%) and the remaining 23.2% female, the response rate of female was higher, 80% (16 out of 20) than male respondent rate is 63% (50 out of 80). Educational background of the respondents were 58.8% postgraduate degree, 39.4% degree and 1.5% other levels of education. About 67.6% of the majority respondents had more than 10 years working experience (experienced

participants and good sample representative), 22.1% of the respondents between 6 and 10 years of working experience and 10.3% of the respondents 1-5 years of working experience. Finally, 1.5% of the respondent was a board of director, 33.8% of the majority respondents were business managers, 22.1% IT managers, 8.8% directors, 5.9% Process council members (including the president and vice presidents), 5.9 business executives and 5.9% IT auditors in the bank. Out of the 68 management members, 15 assigned experts filled the questionnaires and 11.8% IT and 10.3% business experts. The response rates seem to be a good representation of the target group by position in CBE and business representatives: 39 (56.5%) more respondents than IT representatives, 29 (43.5%). The highest average score for GEIT practices and strategic business-IT alignment were process council members and senior executives whereas the lower score was an IT auditor.

4.5.2 Quantitative data analysis

Quantitative data analysis and findings for GEIT practices implementation have shown that the overall GEIT practices implementation assessment result is around level 2 maturity level (repeatable but intuitive). The three GEIT practices implementation maturity level is at 1.69 (initial or ad hoc). GEIT practices structures implementation maturity level is at 2.18 (repeatable but intuitive) and GEIT practice relational mechanisms implementation maturity level is at 1.45 (initial or adhoc). GEIT practice structures on average were more matured compared to GEIT practice processes, indicating that it is easy to implement GEIT practice structures compared to GEIT practice processes. Nevertheless, GEIT practices are not defined, deployed and measured based on best practices. Then, the overall strategic business-IT alignment assessment result has shown that 3.41 (53.13%) agreed, which means half of the respondents agreed that strategic alignment business-IT is established at a focused strategic alignment maturity. IT is becoming embedded in the

business. The average agreement level of scope and architecture alignment agreement level is at 3.74 (69.49%) the highest of all.

Governance alignment agreement level is at 3.66 (62.13%). Partnership alignment agreement level is at 3.52 (57.84%); competency alignment agreement level is at 3.28 (47.69%); communication alignment agreement level is at 3.17 (45.34%) and finally, skills alignment agreement level is at 3.11 (41.61%) the lowest of all. All six strategic business-IT alignment criteria agreement levels are above 3, agreed that the six alignment criteria are established a focused strategic alignment maturity. Strong business-IT strategic alignment and integration will increase the competitive advantage of enterprises. The relationship between GEIT practices implementation and strategic business-IT alignment in CBE is found to be positive. The value of R^2 is .492, which tells us that strategic business-IT alignment can account for about 49.2% of the variation in the strategic business-IT alignment data is explained by GEIT practices implementation maturity.

4.5.3 Qualitative data analysis

GEIT practices implementation maturity level was at 2 (repeatable but intuitive); meaning that basic GEIT processes are not defined and implemented. The result indicated that there is no communication of standard procedures or formal training and responsibility is left to the individual. The qualitative data analysis also indicated that the achievement of the capability level of GEIT processes are not defined and deployed based on international best practices and also confirms that the GEIT BSC is not yet implemented. Besides, the achievement capability level of GEIT processes implementation using COBIT 5 is under level 2. The qualitative data analysis also confirmed that the CBE's communication is established under the business development process to increase communication and knowledge sharing as well as cultural change. This study also revealed that most of GEIT processes have a direct relationship to strategic business-IT alignment processes.

On the contrary, the comparison between 2011 vs. current assessment reports indicated that there were dramatic changes in terms of infrastructure, number of customers, employment number, asset, technology agility and branch expansion. There is awareness of GEIT practice structures and objectives are developed and applied by the ad hoc team. This indicates that CBE has been continuously passing through the change process, to be reaching a world-class commercial bank by 2025. Therefore, it is safe to conclude that there is no GEIT practices improvement in CBE, for the last four years (from 2014 to 2018).

4.5.4 Conclusion

Therefore, CBE senior management should be identified with basic GEIT measurements, assessment methods and techniques; hence, GEIT practices processes have been implemented across the CBE. Furthermore, formal GEIT training and communication on governance standards and responsibilities are given to all senior and IS/IT management. Moreover, governance charter should be developed and implemented by selecting small and pilot governance projects. GEIT awareness campaign has started to advertise reasons for its need in the enterprise.

Ideally, there should be an effective GEIT implementation, enterprises' need competency/value measurement or metrics between IT and business, effective communications, good partnerships and skills. Strong business-IT strategic alignment and integration will increase the competitive advantage of enterprises. Additionally, almost all GEIT practices processes implementation are very important to achieve strong strategic business-IT components namely; IT performance measurement, SISP, IT projects governance, IT Portfolio Management, SLM, Benefits management and reporting and GEIT framework. The next section provides the method on how enterprises use

COBIT 5 BSC (goals cascade) to implement an effective GEIT system to achieve strong strategic business-IT alignment.

4.6 DELIVERABLE OF THE STUDY

This study developed the appropriate way for how to effectively implement GEIT practices to reach strong strategic alignment using COBIT 5 BSC performance measurement tool (goals cascade). BSC system is another method of implementation of strategic alignment. COBIT 5 BSC performance measurement tool (goals cascade) is used as a framework to align enterprise goals to IT goals (i.e) using key COBIT 5 Principle1-meeting stakeholder needs. The stakeholder needs translation allows the enterprise to set specific goals in support of the overall goals and stakeholder requirements when implementing improved governance and management enablers. COBIT 5 framework guide, particularly in the appendix section, should be used for further mapping how stakeholders' needs cascade to the enabler goals to IT goals. The following section provides steps of strategic business-IT alignment formulation and implementation using the COBIT 5 BSC (goals cascade) tool.

Step 1. The key COBIT 5 principle1: Meeting stakeholder needs

COBIT 5 BSC performance measurement tool (goals cascade) is designed to show how enterprise goals cascade to IT goals to meet stakeholder requirements (COBIT 5 key Principle). How does GEIT meet stakeholder needs? The governance objective has value creation to meet stakeholders' requirements. A summary of the details of CBE is shown in Table 4-25.

Table 4-25: A summary the details of CBE

No.	Details	Description
1.	Enterprise name	Commercial Bank of Ethiopia (CBE)/Financial sector
2.	Established	1942
3.	Owners	Ethiopia Government
4.	Worth asset	Birr 712 billion as of June 30, 2019.
5.	Annual profit	Birr 17.9 billion as of June 30, 2019.
6.	Deposit	Birr 551.8 billion as of June 30, 2019.
7.	Account holders	More than 22 million as of June 30, 2019.
8.	Business	Core business processes are banking operation, credit and international trade. Over 1,444 online branches and three subsidiary banks abroad (two branches in South Sudan and one in Djibouti), 47,489 internet, 2,513 ATMs and 9,384 POS machines as of June 30, 2019.
9.	Partners	More than 50 foreign banks and 20 money transfer agents as of June 30, 2019; SWIFT bilateral arrangement 700 banks across the world as of June 30, 2019. 20 money transfer agents like Money Gram, Atlantic International (Bole), Xpress Money as of June 30, 2019.
10.	Employees	Number of employees: 37,894 as of June 30, 2019.
11.	Department	Banking service, banking operation, credit management, Human resource, Financial management, Legal, Information system, Internal Audit, Risk & compliance
12.	Critical IT applications	T24 core banking application, card banking (MAGIX), mobile banking, internet banking, POS, Security authentication, ERP, Mobile Money Solution (CBE Birr), SWIFT Application, Western Union (WU) and other foreign cash transfer applications. It includes CBE e-mail, CBE portal, Data warehouse and Business Intelligence (BI).
13.	Monitoring Tools	Enterprise Monitoring Tool (EMT), Aptra Vision for ATM Monitoring, TeamNet Audit Software, NG Screener, Network Monitoring Center (NOC), Security Monitoring Center (SOC) and Tivoli Storage Monitoring.
14.	Interfacing with T24 core banking system	ATS, ECX, Tax/Utility Payment Interface, Pay at Bank, Flow Cash, Coupon distribution system (prize linked saving scheme), Industrial park in Ethiopia
15.	Salary and pension upload service	Government organisations, public servant social security, government school and university teachers, federal police etc.
16.	Agent	DSTV, Ethiopia Airlines, Ethiopia Telecommunication, Ethiopia Energy

The current state of GEIT practices processes mapping COBIT 5 processes with other related frameworks and standards are shown in Table 4-26.

Table 4-26: GEIT practices implementation processes current and desired level using COBIT 5

#	GEIT processes (No. of items = 11 processes)	GEIT process mapping to COBIT 5 process	Current Maturity level	Desired level- level 4	Priority	Related Guidance Frameworks & Standards (ISACA, 2012b)
P1	P1-Strategic information systems planning process	APO02 Manage strategy	2.33	4.00	High	ISO/IEC 20000 and ITIL V3 2011
P2	P2-IT performance measurement (e.g. IT balanced scorecard)	MEA01-Monitor, evaluate and assess performance and conformance	2.39	4.00	High	ISO/IEC 20000, ITIL 2011
P3	P3-IT Portfolio management	APO05- Manage portfolio	1.70	4.00	High	ISO/IEC 20000, ITIL 2011 and SFIA
P4	P4-Methodology to charge back IT costs.	APO06 Manage budget and costs	1.15	4.00	Medium	ISO/IEC 20000 and ITIL 2013
P9	P9- IT budgets of control and report		2.30	4.00		
P5	P5-Service level agreements	APO09- Manage service agreements	1.33	4.00	High	ISO/IEC 20000 and ITIL 2011
P6	P6-GEIT frameworks	APO01- Manage the IT management framework.	1.35	4.00	High	ISO/IEC 20000, ISO/IEC 27002
		EDM01-Ensure governance framework setting and maintenance				COSO, ISO/IEC 38500, OECD and King III
P7	P7-Regular self-assessments or independent assurance	COBIT 5 for Assurance guide	1.23	4.00	Medium	COBIT 5 for Assurance guide
P8	P8-Manage IT projects	BAI01-Manage programs & projects	2.21	4.00	High	PMBOK, PRINCE2
P10	P10- benefits management and reporting process	EDM02- Ensure benefits delivery	1.73	4.00	High	COSO, ISO/IEC 38500, King III
P11	P11- COSO/ERM framework for internal control	MEA02 Monitor, evaluate and assess the system of internal control	1.39	4.00	High	None

The maturity model is providing a tool to help management in their journey to alignment between the IT and business (Van Grembergen et al. 2004). The current CBE GEIT practices processes implementation maturity level and 'as-is', industry practices and the desired maturity level 'to-be' as shown in Figure 4-27.

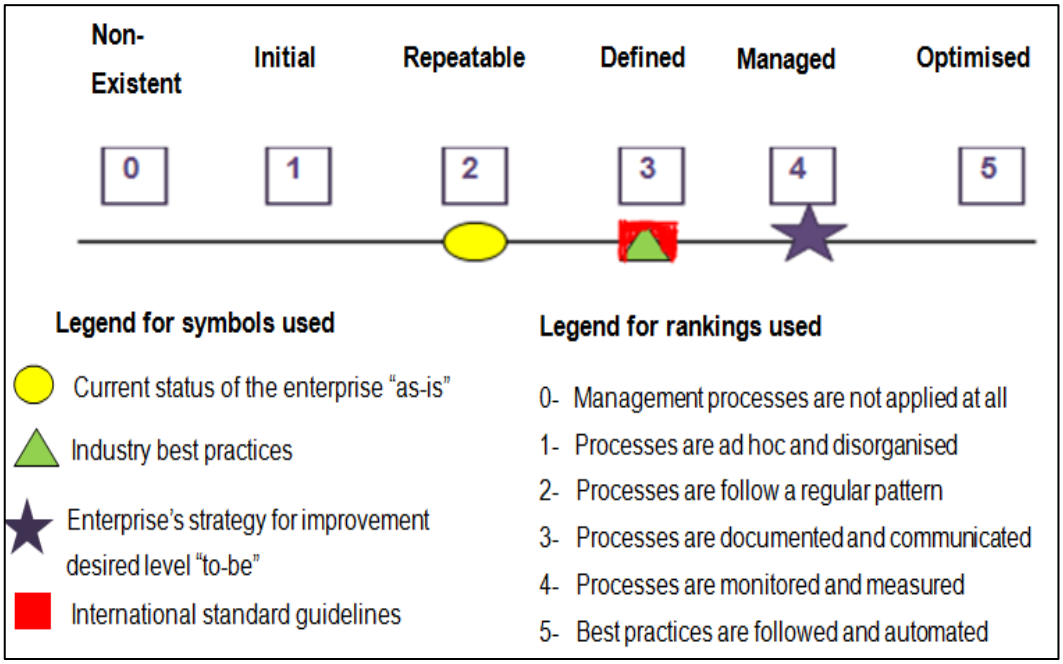

Table 4-27: Generic maturity model

The identified gaps between the current CBE GEIT practices implementation were around level 2 maturity level (repeatable but intuitive) and the desired level (level 4 – managed and measurable).

Step 2: Identifies the CBE's stakeholders

Internal and external CBE stakeholders' assessment questions using COBIT 5 enterprise goals to governance and management questions. Further reference mapping COBIT 5 enterprise goals to governance and management questions (See Appendix D). CBE stakeholders and their needs were

analysed. The CBE internal and external stakeholder needs are shown in Table 4-28.

Table 4-28: CBE stakeholder map

Stakeholder type	Description	Major needs
External stakeholders	Ministry of Finance and Economic Development (MoFED) (owners), business partners, vendors or suppliers, regulators/government, external users, customers, standardisation organisations, external auditors, consultants, commercial nominees and interfacing with T24 (core banking application)	▪ Continuity, privacy, security, availability, usability, capacity of CBE critical applications such as T24 Core Banking Application, ERP, CBE Birr, ATM, internet and mobile banking, SWIFT, CRM, external interfaces; ▪ Secure, available and reliable business partner's external interfacing operations; ▪ Compliance with data, production and safety standards; ▪ Compliance with applicable rules, policies, regulations and laws; ▪ Effective internal control system; ▪ Control information chain between business partners.
Internal stakeholders	Board of directors (Owners), managements and employees	▪ Continuity, privacy, security, availability, usability, capacity of CBE infrastructure and critical applications (e.g. Core banking (T24), ERP, CBE Birr, ATM, internet banking, mobile banking, SWIFT, CRM, external and internal interfaces) with T24 to meet required enterprise strategic objectives; ▪ Create value from IT-enabled investment; ▪ Achieve strong business and IT strategic alignment; ▪ Satisfy end-users with quality delivering of IT services; ▪ Manage IS performance; ▪ Transparency in finance and control IT costs; ▪ Exploit new technology for new strategic opportunities; ▪ Identify and manage IT-related risks; ▪ Running IT operation efficiently and resilience; ▪ Effective and efficient use IT resources; ▪ Develop and maintain staffs skills and manage IT performance; ▪ Secured information processing, improve business agility through a more flexible IT environment; ▪ Deliver IT projects quality, cost and time and meet requirements; ▪ Enabling business improvements, rather than IT effort goes to fighting fires; ▪ Required time for major IT-decisions making ; ▪ Compliance with regulations enterprise IT supports SLAs and all applicable regulations.

Step 3. Strategy: COBIT 5 goals cascades tool

Effective GEIT implementing to reach strong business-IT alignment using COBIT 5 goals cascades tool. The enterprise goals cascade to IT-related goal, which defines the enabler goals. This is followed by selecting enterprise and IT-related goals from 17 goals, cascading enterprise goals to IT-related goals, process goals with enabler goals using COBIT 5 family (See Appendix D, E and F) for each GEIT processes and IT processes. Mapping COBIT 5 IT-related goal 1 “Alignment of IT and business strategy” to processes is shown in Table 4-29.

Table 4-29: Mapping COBIT 5 IT-related goal to processes

Goal 1: Alignment of IT and business strategy to COBIT 5 processes	
IT-related goal	**COBIT 5 Processes**
ITG 1. Alignment of IT and business strategy	**APO01-** Manage the IT management framework
	APO02- Manage strategy
	APO03 Manage enterprise architecture
	APO05- Manage portfolio
	APO07 Manage human resources
	APO08 -Manage relationships
	BAI01- Manage programmes and project
	BAI02-Manage Requirements definition
	EDM01-Ensure governance framework setting and maintenance
	EDM02-Ensure benefits delivery

Step 4. Objective: strategic business-IT alignment

This study revealed that GEIT practices implementation and strategic business-IT alignment has a direction (linear) and the relationship is positive. Moreover, most of GEIT processes have a direct relationship with strategic

business-IT alignment processes and confirmed that GEIT processes play an important role in driving overall IT alignment. Therefore, GEIT processes should be defined based on standard processes and the performance measurement system is implemented using COBIT 5 processes with related guidance, frameworks and standards to reach the desired maturity level.

Step 5. Strategic business-IT alignment using COBIT 5 BSC goals cascade

COBIT 5 BSC goals cascade is the mechanism to translate stakeholder requirements into enterprise goals, IT-related goals and enabler goals (e.g. process goals). There are 17 IT-related goals, ITG01 Alignment of IT and enterprise strategy is one of the key goals of IT-related goals. Illustrative COBIT 5 goals cascade for strategic business-IT alignment as shown in Table 4-30.

Table 4-30: Illustrative COBIT 5 goals cascade for strategic business-IT alignment

Goals cascade	
Key IT-related goal	ITG01 Alignment of IT and business strategy
Related enterprise goals	EG01 Stakeholder value of business investments EG06 Customer-oriented service culture EG08 Agile responses to a changing business environment EG09 Information-based strategic decision making EG13 Managed business change programmes
Related IT goals	01 Alignment of IT and business strategy 03 Commitment of executive management for making IT-related decisions 07 Delivery of IT services in line with business requirements
Related Key COBIT 5 processes	A number of governance and management processes (from *COBIT 5: Enabling Processes*) are relevant in the context of strategic business-IT alignment: EDM01-Ensure Governance Framework Setting and Maintenance EDM02-Ensure benefits delivery APO01-Manage the IT management Framework APO02-Manage strategy APO03-Manage enterprise architecture APO05- Manage portfolio APO07-Manage human resources APO08- Manage relationships BAI01-Manage programmes and projects BAI02-Manage requirements definition

Step 6. Initiatives

GEIT practices processes should be defined using COBIT 5 with other related standards and good practices to achieve strong strategic business-IT alignment. How one of GEIT practices processes defined in terms of COBIT 5 enabler that helps to address strategic business-IT alignment, for example, define the related enablers for EDM01 governance process using COBIT 5 enabling processes:

1) Principles, policies and frameworks

Principles, policies and frameworks could be considered in defining processes such as decision-making model, enterprise governance principles, authority levels and other relevant principles, policies and frameworks.

2) Organisational structures

Organisational structures and functions are considered to be in defining the EDM01 governance process such as board, CEO, business executives, IT strategy executive committee and CIO.

3) Culture, ethics and behaviour

In defining the EMD 01 governance process for aligning business-IT strategy, the following enterprise-wide culture, ethics and behaviours should be defined: risk awareness, ethical behaviour, learning culture and sense of ownership.

4) Information

The following information items are essential for strategic business-IT alignment when defining the EDM 01 governance process for strategic business-IT alignment.

Input: governance/decision-making model and constitution/ bylaws/ statutes of enterprise; communications of changed compliance requirements; business environment trends; regulations.

Output: decision-making model; enterprise governance; guiding principles and authority levels.

5) Services, infrastructure and applications

CBE has various services, infrastructure and applications. The most relevant CBE services are core banking, Interest Free Bank (IFB), ERP, mail, payment services, which include internet banking, card banking, mobile banking, local transfer, and mobile money (CBE Birr). They are also international banking, credits, deposits, and media centre. CBE critical applications are T24 core banking application, card banking (MAGIX), Business Intelligence (BI) and Enterprise Resource Planning (ERP) among others.

6) Peoples, skills and competencies

In defining the EDM 01 governance process, taking into account key processes and key roles, the following skill sets are included for aligning business-IT strategy: knowledge of frameworks for GEIT, GEIT training and certification and others. Therefore, GEIT practices processes should be defined and implemented using COBIT 5 with related frameworks using COBIT 5 seven enablers and performance measurement system implemented using COBIT 5 BSC goals cascade. For example, GEIT frameworks map to COBIT 5 EDM01 (using COBIT 5 with COSO, ISO/IEC 38500, OECD and King III). Key (primary) IT-related goal and related metrics for EDM01process as discussed in COBIT 5: Enabling Processes. IT-related goal: 01 strategic business-IT alignment. RACI chart describes roles and responsibilities and contains several organisational structures. RACI chart-related guidance for EDM 01is depicted in Table 4-31 (ISACA, 2012b, p. 36).

Table 4-31: Illustrative RACI chart for EDM01 governance process

Domain: Evaluate, Direct and Monitor
Area: Governance
RACI Chart for EDM01

Key Governance Practice	Business Roles																	IT Function Roles								
	Board	Chief Executive Officer Chief	Chief Financial Officer	Chief Operating Officer	Business executives	Business process owners	Strategic executives committee	Steering (Programmes/Projects) committee	Project Management Office	Value management office	Chief Risk Officer	Chief Information Security Officer	Architecture Board	Enterprise Risk Committee	Head Human Resources	Compliance	Audit	Chief Information Officer	Head Architect	Head Development	Head IT Operations	Head IT Administration	Service e Manager	Information Security Manager	Business continuity manager	Privacy officer
EDM01.01 Evaluate the governance system.	A	R	C	C	R		R				C		C	C	C	C	C	R	C	C	C					
EDM01.02 Direct the governance system.	A	R	C	C	R	I	R	I	I	I	C	I	I	I	I	C	C	R	C	I	I	I	I	I	I	I
EDM01.03 Monitor the governance system.	A	R	C	C	R	I	R	I	I	I	C	I	I	I	I	C	C	R	C	I	I	I	I	I	I	I

(From *COBIT 5: Enabling Processes*)

Based on the above goal cascading steps, each GEIT process should be defined, measured and set accountability and responsibility using COBIT 5 enabling process with related frameworks and standards, to achieve strong strategic business-IT alignment. Therefore, GEIT processes should be defined based on standard processes and performance measurement system implemented using COBIT 5 processes. This should be done with related guidance, frameworks and standards to reach the desired maturity level (Level 4- managed and measurable), to achieve a strong strategic business-IT alignment (Level 4 - improved, managed processes).

4.7 CONCLUSION

This chapter analysed and interpreted the relationship between GEIT and strategic business-IT alignment using COBIT 5 in the case of CBE. This was done by using case study explanatory sequential method by integrating quantitative and qualitative data collection and analysis methods using multiple sources namely; questionnaires, focus group discussions, document review and analysis, observation and participation and gap assessment using COBIT 5. A preliminary analysis was conducted to test the reliability of the survey instrument, using Cronbach's α and internal consistency reliability (across items). Moreover, the test of normality for both GEIT practices and strategic business-IT alignment data was done. CBE's GEIT practices implementation maturity was determined and strategic business-IT alignment measured using the LAMM tool. The relationship between GEIT practices implementation related to strategic business-IT alignment was analysed.

The result of quantitative analysis shows that GEIT practices processes and relational mechanisms implementation achievable maturity level is under level 2 (repeatable but intuitive). GEIT practice processes on average were less mature compared to GEIT practice structures, indicating that it is easy to implement GEIT practice structures compared to GEIT practice processes. GEIT practice relational mechanisms are the lowest of all.

It also confirmed that the achievement capability level of GEIT processes implementation using COBIT 5 is level 1. Then the researcher integrated results to bring together the quantitative and qualitative methods. Therefore, the qualitative analysis confirmed that GEIT processes are not defined based on international standard processes and also confirmed that the GEIT BSC is not yet implemented.

The overall strategic business-IT alignment assessment result has shown that 53.53% (half of the respondents) agree that there is good strategic business-IT alignment (level 3-established, focused strategic alignment maturity) in the case of CBE. The average alignment agreement level of scope and architecture is at 3.74 (69.49%), the highest of all, the majority of respondents agreed that good, flexible infrastructure integrated across the bank. The average agreement level of governance alignment agreement level is at 3.66 (62.13%); partnership alignment agreement level is at 3.52 (57.84%); competency alignment agreement level is at 3.28 (47.69%); communication alignment agreement level is at 3.17 (45.34%) and finally, skills alignment agreement level is at 3.11 (41.61%) the lowest of all. All six strategic business-IT alignment criteria are above 3 agreement level (established a focused strategic alignment maturity). Strong business-IT strategic alignment and integration will increase the competitive advantage of enterprises. The relationship between GEIT practices implementation and strategic business-IT alignment in CBE is found to be positive. The value of R^2 is .492, which tells us that strategic business-IT alignment can account for about 49.2% of the variation in the strategic business-IT alignment data is explained by GEIT practices implementation maturity.

Furthermore, the comparison between 2011 CBE performance assessment reports vs. 2018/19 there is a dramatic change in infrastructure, number of customers, number of employees, asset, technology agility and branch expansion. This indicated that CBE has been continuously passing through the change process, to be reaching a world-class commercial bank by 2025. For effective GEIT, companies also need effective communications, partnerships, competency/value measurements, or metrics between IT and the business. On the contrary, the comparison between the 2014 assessment vs. this study result has also shown that GEIT practices implementation maturity level was around level 2 (repeatable but intuitive); meaning that basic GEIT processes are not defined, there is no communication of standard procedures

or formal training. The researcher concluded that without defining and implementing GEIT practices processes, it is difficult to reach a higher maturity level in GEIT practices and strategic business and IT alignment. Finally, the gap on GEIT processes using COBIT 5 was identified and a method was proposed to fill the gap. The next and final chapter of this study includes conclusions and recommendations.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter explains the link among research objectives, literature review and methodology used in answering research questions and the findings. The researcher integrates results to bring together quantitative and qualitative methods. The researcher measured GEIT practices implementation, strategic business-IT alignment according to LAMM and how GEIT practice implementation impacted strategic business-IT alignment. Finally, the gap on GEIT practices processes related to strategic business-IT alignment using COBIT 5 is assessed and identified; hence methods to fill the gap are provided.

5.2 RESEARCH OBJECTIVE SYNOPSIS

This section answers GEIT implementation related to strategic business-IT alignment using COBIT 5 a case study of the CBE. The study objectives are presented by answering research questions based on the literature reviewed and the methods used to reach the findings.

5.2.1 Implementation of GEIT practices in the CBE

The first objective of the study is to determine GEIT practices structures, processes and relational mechanisms implementation in CBE.GEIT practices implementation in CBE is at 1.77 around level 2 maturity level (repeatable but intuitive). This indicated that GEIT practices implementation in CBE are not effective. Moreover, GEIT practice structures implementation is at 2.18 maturity level (repeatable but intuitive). GEIT practice processes implementation is at 1.69, under level 2 maturity level (repeatable but intuitive)

and GEIT practice relational mechanisms is at 1.45 maturity level (initial or ad hoc); those indicated that GEIT practice processes have not developed and implemented and based on standards in the case of CBE. Accountability and responsibility are not defined exhaustively for GEIT processes. GEIT practice structures on average were better mature compared to GEIT practice processes, indicating that it is easy to implement GEIT practice structures compared to GEIT practice processes. GEIT practice relational mechanisms are the lowest of all. It indicated that there is a lack of communication of standard procedures or formal training, job rotation and responsibility is left to the individual. There is a lack of knowledge and awareness campaigns on GEIT in the case of CBE.

The qualitative study confirmed that GEIT practice processes are not defined and implemented based on best practices and standards. GEIT processes refer to "*formalisation* and *institutionalisation* of IT monitoring procedures or strategic IT decision-making". Accountability and responsibility are not defined exhaustively for GEIT processes. The advantages of defining, implementing, measuring and improving IT processes, based on standard processes are easy to communicate, better relationship and achieve overall IT-related goals. A process has one or more inputs and outputs, roles and responsibilities, as well as tools and control objectives to manage, execute and monitor different activities related to IT. The next section discusses a summary of findings on strategic business-IT alignment in the case of CBE.

5.2.2 Strategic business-IT alignment maturity using LAMM in the CBE

The second objective of the study was to assess the strategic business-IT alignment maturity of CBE, using the LAMM assessment tool. The result of strategic business-IT alignment maturity level in CBE according to the LAMM indicated that 53.13%, which means half of the respondents agreed that strategic alignment business-IT was level 3 (established, focused processes)

in the case of CBE. Scope and architecture received first ranked from the overall maturity and the agreement level was 69.49%, governance 3.66 (62.13%) ranked second, partnership 57.94% ranked third, the competency/value measurement of 47.69% ranked fourth, communication of 45.34% ranked fifth and skill of 41.60% ranked sixth of the six areas.

CBE has a lack of open communication and dysfunctional behaviour. Communication alignment maturity measures the effectiveness of the exchange of knowledge, ideas and information between IT and business enterprises. Key alignment processes include business relationship, strategic alignment, knowledge management, SLAs, IT/IS cost and project tracking of business value from IT. The qualitative data analysis confirmed that the CBE has prepared a five-year corporate business strategy, but lacks the technical team of an IS strategic plan. This creates a major gap in the IT performance measurement system. This study also revealed that the IT competency/value measurements or metrics on GEIT processes are not defined based on international standards. The IT/IS performance is measured subjectively without tracking and monitoring system. Besides, the IT performance measurement system evaluates and monitors non-IT people (business knowledge team). There is no SLA between branch/head office and IT as well as OLA with IT work units. Moreover, the decision-making mechanism is subjective and not transparent. IS projects are delivered without quality assurance reports. The qualitative data analysis on competency alignment maturity also confirmed that CBE focus on benchmarking banks in emerging economies for strategic benchmarking. There are gaps in emerging technology-related risks and control mechanisms. These are signals of misalignment between business-IT and IT work units. The next section summarises the findings on the relationship between GEIT practices implementation and strategic business-IT alignment in the case of CBE.

5.2.3 GEIT practices and strategic business-IT alignment in the CBE

The third objective of the study was to measure the relationship between GEIT practices implementation and strategic business-IT alignment maturity. The relationship between GEIT practices implementation and strategic business-IT alignment maturity; it was found to be positive in the case of CBE. GEIT processes play an important role in driving overall IT alignment. The benefits of implementing GEIT practice processes using best practices enterprises make sure that IT is aligned with business needs. There is an absence of GEIT processes document and accountability, responsibility and relational mechanisms.

Another problem of misalignment between business and IT is skipping maturity level to level 4 (managed and measurable) without defining and implementing IT processes. This gap creates challenges to measure and manage IT performance system in CBE. Skipping maturity level leads to either failures or delayed benefits, by taking more organisational changes. It is measurable; it can manage. Therefore, reliable and valid measurements, as well as skilled and capable IT team are important and transparent.

The performance reports 2011 vs. 2019 of CBE indicate that there is dramatic change in infrastructure, customer base, employment number, technology, and asset and branch expansion to reach a world-class commercial bank by 2025. This also indicates that CBE has been continuously passing through the change process, aiming to reach its vision. Unlike business processes BSC, IS performance measurement using BSC reports lack metrics and percentage of accomplishment (plan vs. actual). IT support requests at district levels are not tracked and monitored, except South Addis district, which records and tracks IT support requests using an excel sheet. Besides, the only IS monitoring reports are Aptra vision average, ATM performance report and T24 Core Banking application production monitoring reports. Average ATM

performance report explains the total uptime and total downtime in-terms of hardware fault, cash out, communication, host down and daily balancing.

Most IT assignments are urgent. Instead of using a planned approach, they start from scratch instead of incremental and continual improvement. IT systems audit had been established in 2005 but it was merged with internal audit during BPR in 2009 and re-established in 2012. These are signals of lack of GEIT skills to confirm the GEIT practices implementation as well as misalignment between business and IT as well as within IT work units; it may have a negative/adverse impact on strategic business-IT alignment.

5.2.4 GEIT processes and strategic alignment using COBIT 5 in the CBE

The final objective of the study was to analyse the gaps and provide the methods on how CBE could implement GEIT practice processes to achieve strong strategic business-IT alignment using COBIT 5 BSC. How is CBE trying to achieve strong strategic business-IT alignment by implementing effective GEIT practice processes using COBIT 5 BSC? This study in the case of CBE is an example to show enterprise stakeholders' need to cascade the enabler goals. GEIT practice processes capability assessment with management processes domain APO, the capability level is at Level 1 (performed process), meaning the implemented process has achieved its process purpose. With GEIT processes domain EDM, the capability level is around level 0, meaning that the process is not implemented or fails to achieve its process purpose.

The researcher analysed and provided method for the effective implementation of GEIT to reach strong strategic business-IT alignment (desirable level-4 managed and measurable) using COBIT 5 measurement tool (goals cascade). It is another method of implementing effective GEIT to reach strong strategic business-IT alignment to meet stakeholder requirements (COBIT 5 key principle). Finally, It is recommended that COBIT 5 framework guide

should be used for further mapping how stakeholders' needs to cascade to the enabler goals to IT goals. Steps of strategic business-IT alignment formulation and implementation using COBIT 5 BSC performance measurement method are developed.

5.3 CONTRIBUTION OF THIS STUDY

This study is anticipated to contribute immensely to practitioners handling misalignment problems in strategic business-IT. Misalignment restrains a team or company's ability to reach desired levels of performance and it is unacceptable since, in the end, the enterprise may fail owing to lack of effectiveness of IT activities. Tight alignment between business objectives and IT capabilities create an effective foundation for business execution. Without strong strategic business and IT alignment, companies face serious competitive and regulatory threats. The advantages of strong alignment include effective control of IT processes, responsibility and accountability for IT processes effective management of IT investments, prioritisation of IT initiatives and competitive advantage. Strategic business-IT alignment is an important component of GEIT, especially for large companies.

This study has built up the use of COBIT 5 to a practical GEIT practices implementation, for strong strategic business-IT alignment and CBE and other enterprises. Therefore, by implementing the GEIT system using COBIT 5 with other related good practices and standards, business and IT staff easily understand each other, security and privacy requirements are easily monitored, IS projects and information are delivered timely, meet quality and are more transparent and predictable. COBIT 5 consists of a set of IT control objectives for implementing effective GEIT control framework within the enterprise. COBIT 5 provides detailed guidance on strategic alignment using COBIT 5 goals cascade between enterprise goals and IT-related goals, between IT-related goals and COBIT 5 enablers to meet stakeholders needs

(Key COBIT 5 principle). Any enterprise exists to create value for its stakeholders. Value creation means realising benefits at an optimal resource cost, while optimising risk. There is a significant academic contribution in the use of COBIT 5 and other related GEIT frameworks for enterprises, especially in defining, deploying, measuring IT and GEIT practice processes for effective GEIT system implementation to achieve not only strategic business-IT alignment but stakeholder satisfaction too. The study will also be a basis for researchers interested to work in the area.

5.4 RECOMMENDATIONS

CBE has been continuously passing through a change process to become a world-class commercial bank by 2025. The CBE has selected three strategic pillars “Business Excellence‟, “Business Growth” and “Digitalisation’’ to reach its vision. CBE has a number of strengths and weaknesses. The banking industry nowadays is spending more on IT and banks are becoming essentially technology-supported institutions. Leaders should align teams and enterprises to work successfully. Successful enterprises should not waste time, energy, or money on frivolous activities.

5.4.1 Implementation of GEIT practices in the CBE

For effective implementation of GEIT practice processes should reach the desired maturity level 4 (managed and measurable), the following list of recommendations helps to fill the gaps observed during the study:

1) GEIT practice processes should be defined, managed, measured and continually improve based on standard processes to achieve strong strategic business-IT alignment;
2) Accountability and responsibility should be defined exhaustively for GEIT processes. Processes need organisational structures and roles

to operate, as expressed using RACI charts. The following GEIT practice structures are key roles: CIO, BRM, privacy officer, Value Management Office (VMO);

3) GEIT practice processes job objectives and role should be clearly defined.
4) GEIT function/office should be established and its roles and responsibilities defined.
5) IT portfolio management process should be defined and aligned with enterprise strategy and monitor the performance of the overall portfolio of services and programmes or change enterprise priorities and demands.
6) The adopted CBE GEIT frameworks and standards such as ITIL and ISO 270001 need to be further exercised.
7) GEIT practice processes should be defined, deployed, managed, measured and monitored using single integrated frameworks and standards to cover the enterprise end to end (COBIT 5 with other related frameworks and standards). Further, continual process improvement is simple, easy and forward using best practices;
8) Good practices such as operating principles, span of control, level of authority/decision rights, delegation of authority, compliance, escalation procedures and composition should be defined and applied;
9) Monitoring applications like Enterprise Monitoring Tool (EMT) are helpful for register, online track and monitor and follow-up for right decision-making;
10) GEIT awareness training should be given to both IT and business management too.

5.4.2 Strategic business-IT alignment maturity using LAMM in the CBE

1) Communication alignment

CBE should create mutual communication between understanding of business by IT and IT by business through knowledge sharing, inter-organisational learning and business relationship manager. One-way communication affects decision-making.

2) Competency/Value alignment

All GEIT and management processes should be recorded, tracked, monitored, reported, measured, and managed dashboard. Furthermore, CBE should be measured cost-effectiveness, partner value, formal assessment and continual improvement all CBE processes. Benefits management and reporting process should secure services and assets and the SLM process should be defined and documented. GEIT processes BSC should be integrated to the ERP performance measurement system. IT performance monitoring approach of IT processes should be established, set performance and confirm objectives, measurements, targets and initiatives. Furthermore, a dashboard of key performance indicators is essential for decision-making and managing disintermediation initiatives: such as SLAs, vendor performance, security-related incident data and legal and regulatory requirements should be tracked and monitored.

3) Governance alignment

GEIT practice processes should be managed across the bank. Strategic information systems planning process should be defined based on a standard process that helps us to understand enterprise direction, capabilities, performance, IT strategic plan, road map, and direction. IT budget control and

reporting process should define to facilitate the enterprise to make the right decision regarding the use of IT solutions and services.

4) Partnership alignment

IT should be enable or drive business strategy; IT projects should maintain a standard approach for programme and project management that reduces the risk of unexpected delays, quality and costs and understand business benefits.

5) Scope and architecture alignment

Scope and architecture alignment within CBE should be integrated between business and IT, within IT and partners. CBE enterprise architecture committee (composed of IT and business people) should be established to provide architecture guidelines and advise on their applications/IT road map.

6) Human resources/Skills alignment

Governance and management must be competent and have the necessary skills to confirm the implementation of the GEIT practices. CBE should be implementing a creative integration environment, shared emerging technology risks and reward mechanisms. It should be implementing an alignment behaviour that contributes to the building of strategic alignment and strongly influenced through cross training and GEIT awareness campaigns in an enterprise.

Transparency one GEIT principle and transparency on the adequacy of the internal control system should be established and exercised. This provides achievements of enterprise objectives, trust in operations and confidence in the adequate understanding of residual risk.

The important behaviours for maintaining GEIT practices are:

1) openness and interest in business and IT activities;
2) continuous improvement;
3) transparent and participative culture as an important focus point;
4) people respect the importance of information security policies and principles;
5) positive behaviour towards raising issues or negative outcomes; and
6) learning culture and people focus.

5.4.3 GEIT practices and strategic business-IT alignment in the CBE

Regarding the effectiveness of GEIT, companies need not only emerging technology but also need effective communications, skills, partnerships, competency/value measurements or metrics between IT and the business.

Strategy is one of GEIT focus areas. There are some COBIT 5 governance and management processes, which are relevant in the perspective of strategic business-IT alignment. Key GEIT practice processes related to strategic business-IT alignment such as IT portfolio management, strategic information systems planning, IT performance management, IT project management, and SLM. It also includes IT budget control and reporting; BRM and knowledge management.

Therefore, CBE senior management should properly implement GEIT practices using good practices and standards, for strong strategic business-IT alignment. Major advantages are:

1) IT processes performance data should track, validate and evaluate business, IT and process goals and metrics. It should analyse the performance data and report timely in a systematic manner.

2) Transparency on the adequacy of the internal control system should be established and exercised. This provides achievements of enterprise objectives, trust in operations and confidence in the adequate understanding of residual risk.
3) IT projects should maintain a standard approach for programme and project management that reduces the risk of unexpected delays, quality and costs and understand business benefits.
4) Effective GEIT skill categories required are governance of enterprise IT, IT strategy, enterprise architecture, IT policy formulation, innovation, IT financial management, portfolio management, requirements definition and management, business relationship management, procurement/contract management, business analysts, project manager, programme manager, compliance review and performance monitoring and controls.

5.4.4 GEIT processes and strategic alignment using COBIT 5 in the CBE

Implementing effective GEIT helps to ensure that stakeholder transparency, benefits delivery, risk optimisation, resource optimisation and governance framework setting and maintenance are met. This study developed the appropriate way for how to effectively implement GEIT practices to reach strong strategic alignment using COBIT 5 BSC performance measurement tool (goals cascade). The researcher recommends that the COBIT 5 BSC performance measurement system is another method of implementing effective GEIT to reach strong strategic business-IT alignment to meet stakeholder requirements (COBIT 5 key Principle). Finally, it is recommended that COBIT 5 framework guide should be used for further mapping how stakeholders' needs to cascade to the enabler goals to IT goals. Steps of strategic business-IT alignment formulation and implementation using COBIT 5 performance measurement method:

1) **Internal and external assessment** using COBIT 5 enterprise goals to governance and management questions (See Appendix D, E and F).
2) **Strategy:** using COBIT 5 BSC performance measurement tool implementing effective GEIT to reach strong business-IT alignment.
3) **Objective:** Implementing effective GEIT practice processes to reach strong strategic business-IT alignment using COBIT 5 BSC performance measurement tool.
4) **COBIT 5 BSC** (goals cascade) to translate stakeholder requirements into enterprise goals, IT-related goals and enabler goals.
5) **Initiatives:** define, implement and measure GEIT practice processes using COBIT 5 with other related standards and good practices to achieve strong strategic business-IT alignment, in terms of (1) Principles, policies and frameworks (2) Processes (3) Organisational structures (4) Information (5) Culture, ethics and behaviour (6) People, skills and competencies (7) Services, infrastructure and applications.

Key GEIT practice processes should be defined, deployed, managed and measured using COBIT 5 processes with other related frameworks and standards to reach strong strategic business-IT alignment such as:

1) Strategic information systems planning process map to COBIT 5 APO02 manage strategy process (using COBIT 5 with ISO/IEC 20000 and ITIL).
2) IT performance measurement map to COBIT 5 MEA01-Monitor, evaluate and assess performance and conformance process (using COBIT 5 with ISO/IEC 20000, ITIL).
3) IT portfolio management map to COBIT 5APO05- Manage portfolio process (using COBIT 5 with ISO/IEC 20000, ITIL and SFIA).
4) IT project management map to COBIT 5 BAI01-Manage programmes and projects process (using COBIT 5 with PMBOK, PRINCE2).

5) Benefits management and reporting process map to COBIT 5 EDM02-Ensure benefits delivery process (using COBIT 5 with COSO, ISO/IEC 38500, King III).
6) SLM map to COBIT 5 APO09- Manage service agreements process (using COBIT 5 with ISO/IEC 20000 and ITIL).
7) GEIT frameworks map to COBIT 5 EDM01-Ensure governance framework setting and maintenance process (using COBIT 5 with COSO, ISO/IEC 38500, OECD and King III).

Therefore, GEIT processes should be defined based on standard processes and performance measurement system implemented using COBIT 5 processes. This should be done with related guidance, frameworks and standards to reach the desired GEIT practices maturity level (Level 4-managed and measurable) to achieve strong strategic business-IT alignment (Level 4 - improved, managed processes).

5.5 FUTURE WORK

This study has built up the use of COBIT 5 to a practical GEIT practices implementation for strong strategic business-IT alignment for CBE and other enterprises. COBIT 5 is an overarching, leading and single-integrated framework for the GEIT that covers the enterprise end-to-end and makes clear separation between governance and management. COBIT 2019, the newest version of ISACA's flagship framework, defines the design factors that should be considered by the enterprise to build and sustain a tailored governance system. COBIT 2019 has shown how enterprise goals achieved by implementing a number of governance and management objectives in terms of processes; organisational structures; policies and procedures; information flows; culture and behaviours; skills and infrastructure components. COBIT 2019 focus areas are set up to organise certain hot governance topics, such

as small/medium sized businesses, cybersecurity, cloud computing, digital transformation, privacy and DevOps. COBIT is available at ISACA website.
As aligning business and IT is a crucial and complex area of research, further studies will help implement effective GEIT to achieve a strong strategic business-IT alignment using best practices context. Further studies are needed in the bank and other sectors such as energy, health, telecommunication, and transportation. The study will also be one of the bases for researchers interested to work in the area.

5.6 CONCLUSION

This explanatory sequential mixed methods (both quantitative and qualitative) case study to analysed GEIT practices implementation related to strategic business-IT alignment using COBIT 5 in CBE. The result of the quantitative analysis indicates that the maturity level of GEIT practices implementation was1.77, around level 2 maturity level (repeatable but intuitive). Additionally, GEIT practices processes on average were less mature compared to GEIT practice structures, indicating that it is easy to implement GEIT practice structures compared to GEIT practice processes. GEIT practice relational mechanisms are the lowest of all. The qualitative analysis also confirmed that GEIT practices are not defined, deployed and measured based on best practices. The achievement capability level of GEIT processes implementation using COBIT 5 is at level 1, GEIT practice processes are not defined and deployed based on international best practices and confirms that the GEIT BSC is not yet implemented. The result of this study revealed that there is a direct or positive relationship between the use of GEIT practices implementation and strategic business-IT alignment.

The overall strategic business-IT alignment assessment result of the quantitative analysis has shown that 53.53% (half of the respondents) agree that there is good strategic business-IT alignment (level 3-established, focused

strategic alignment maturity) in the case of CBE. The average alignment agreement level of scope and architecture is at 3.74 (69.49%), the highest of all. The majority of respondents agreed that good and flexible infrastructure was integrated across the bank. The qualitative study confirmed that GEIT practice processes related to strategic business-IT alignment are not defined and implemented based on best practices and standards. The advantages of defining, implementing, measuring and improving strategic alignment processes, based on standard processes are easy to communicate, better relationships and achieve overall IT-related goals. Regarding the effectiveness of GEIT, companies also need effective communications, partnerships, competency/value measurements or metrics between IT and the business.

The good news for COBIT 5 BSC performance measurement tool consists of a set of IT control objectives, for implementing effective GEIT and control framework within the enterprise by aligning the IT strategy with enterprise goal. The result demonstrated should sway other enterprises to implement COBIT 5 for strong strategic business-IT alignment and implementing effective GEIT system. COBIT 5 is designed in a way whereby enterprise goals and IT goals meet stakeholder needs (key COBIT 5 Principle1). Implementing effective GEIT using a single integrated framework (COBIT 5 with other related frameworks and standards) is very important in mitigating emerging technology-related risk, enterprises were avoiding to re-inventing the wheel. This will improve customer satisfaction and responsiveness; clear accountability and responsibilities; improved trust; credibility and confidence; create common language between IT professional and business; cover enterprises end-to-end, consistent, streamline and measurable governance and management processes; faster acceptance and deployment. COBIT 5 principles and enablers that support enterprises in the definition, implementation and continuous improvement and monitoring of best IT-related governance and management control objectives/practices. Therefore, it is safe to conclude that implementing effective GEIT practice processes, significantly

and positively improves enterprises performance, using COBIT 5 with other related standards and frameworks to reach desirable level 4 (managed and measurable) and ultimately to achieve strong strategic business-IT alignment (level 4- improved/managed strategic alignment maturity).

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APPENDIX A: QUESTIONNAIRES

Section A: Biographical information

Please select the applicable by placing "√" in the box.

1. What is your gender?

Sex	√
a) Male	
b) Female	

2. What is your highest level of education?

Credential	√
a) College Diploma	
b) Degree?	
c) Postgraduate degree?	
d) Other	

If Other, Please specify_____

4. Years of experience in your profession

Working Experience	√
a) Less than one year	
b) 1 - 5years	
c) Between 6and 10 years	
d) More than 10 years	

5. What is your position in the bank?

Position	√
a) Board member	
b) Process Council member	
c) IT executive	
d) Business executive	
e) IT manager	
f) Business manager	
h) Project manager	
i) IT Auditor	
j) Other	

If Other, Please specify_____

Section B: Maturity level of business-IT alignment

Strategic Alignment Maturity Model (SAMM/LAMM) assessment tool covers 38 questions in six domains, using **communication**, **competency** and **value measurement**, **governance**, **partnership**, **scope and architecture**, and **skills**. Each question is scale from one to five levels of agreements:

1=strongly disagree, 2= Disagree, 3= Nether agree or disagree,

4= Agree and 5= strongly agree.

Based on your experience, please evaluate the maturity level of the bank on business-IT alignment by placing "√"in the box.

1. EFFECTIVENESS OF IT AND BUSINESS COMMUNICATIONS (EC1–EC6)

Alignment Criterion: Communication		Agreement level				
		1 (Strongly Disagree)	2 (Disagree)	3 (Neither agree or disagree)	4 (Agree)	5 (Strongly Agree)
1.	CBE IT managers understand the organisation's business environment					
2.	CBE business managers understand the IT environment.					
3.	Our organisational learning is structured					
4.	There is easy and accessible communication protocol between IT and businesses					
5.	There is knowledge sharing between IT and businesses					
6.	There is liaison staff between IT and businesses					

2. MEASUREMENT OF COMPETENCY AND ITS VALUE (CV1–CV7)

Alignment Criterion: Competency		Agreement level				
		1 (Strongly Disagree)	2 (Disagree)	3 (Neither agree or disagree)	4 (Agree)	5 (Strongly Agree)
1.	There are IT metrics to measure IT contributions to businesses					
2.	There are business metrics to measure IT contribution to businesses					
3.	There are Balanced metrics (integrated business-IT metrics) to measure IT contributions to businesses					
4.	Our organisation uses service level agreements between IT and businesses, i.e. including partners					
5.	The bank uses benchmarking or industry best practices					
6.	CBE needs to formally assess/review IT investments					
7.	The organisation has business-IT improvement practices					

3. MEASUREMENT OF IT GOVERNANCE (ITG1–ITG8)

Alignment Criterion: Governance		Agreement level				
		1 (Strongly Disagree)	2 (Disagree)	3 (Neither agree or disagree)	4 (Agree)	5 (Strongly Agree)
1.	CBE prepares formal business strategy					
2.	The Bank designs formal IT strategy					
3.	CBE has central organisation structure					
4.	At the bank, Chief Information Officers report to Vice President					
5.	At CBE IT function budget is allotted as in profit centers					
6.	IT investment in the bank is based on the IT capability to create competitive advantage and to increase profit					
7.	CBE has formal IT steering committee with senior-level IT and business management participation					
8.	CBE's IT project prioritisation is determined by senior IT and business management					

4. PARTNERSHIPS BETWEEN IT AND BUSINESS FUNCTIONS (PA1–PA6)

Alignment criterion: Partnership		Agreement level				
		1 (Strongly Disagree)	2 (Disagree)	3 (Neither agree or disagree)	4 (Agree)	5 (Strongly Agree)
1.	The bank's IT department works in partnership with business units					
2.	IT and businesses adapt quickly to change and enable and drive strategic objectives					
3.	IT and the business management share goals, risks and rewards / penalties associated with IT-based initiatives					
4.	There are formal and continuous improvements in place that enhance partnership between IT and businesses					
5.	This association is a long-term partnership and valued service provider					
6.	CBE's IT-based initiatives have senior-level IT and Vice President business sponsor or champion					

5. SCOPE AND ARCHITECTURE (SA1–SA4)

Alignment criterion: Scope and Architecture		Agreement level				
		1 (Strongly Disagree)	2 (Disagree)	3 (Neither agree or disagree)	4 (Agree)	5 (Strongly Agree)
1.	CBE's IT is a catalyst for change in the business strategy					
2.	IT standards of the bank are defined and enforced across functional units					
3.	The components of IT infrastructure are integrated and evolving with business partners					
4.	A business or IT change is transparent across the organisation					

6. HUMAN RESOURCES/SKILLS (SM1–SM7)

Alignment Criterion: Skill		Agreement level				
		1 (Strongly Disagree)	2 (Disagree)	3 (Neither agree or disagree)	4 (Agree)	5 (Strongly Agree)
1.	Entrepreneurship/innovation is highly encouraged at every level with business partners					
2.	Key/ important IT HR decisions are made by the top management					
3.	Change readiness programs are in place at corporate level					
4.	There is Cross-Functional Training and Job Rotation at corporate level					
5.	Career crossover opportunities are available across the organisation					
6.	There is interpersonal/ social interaction between IT and business partners					
7.	There are effective programs in place to attract and retain top talent					

Section C: Validated list of IT governance practices (structures, processes and relational mechanisms)

How do you personally rate the maturity level of the following IT governance practices in CBE? Select the applicable by placing "√" *in the box*.

1. IT governance Practice: Relational Mechanisms

0 =Non-existent, **1**=Initial or ad hoc, **2**=Repeatable but intuitive, **3** =Defined **4** =Managed & measurable and **5** =Optimized

IT governance Practice: Relational Mechanisms		IT governance maturity level					
		0	1	2	3	4	5
1.	There is job-rotation between IT staff working in business units and business people working in IT						
2.	Co-location of business and IT (physically locating business and IT people close to each other)						
3.	Cross-training business people about IT and/or training IT people about business						
4.	Knowledge management on IT governance (systems, intranet. . .) to share and distribute knowledge about IT governance framework, responsibilities, tasks, etc.)						
5.	Business Relationship Manager (BRM) or Business-IT account management is dedicated to bridge the gap between business and IT by means of Business Relationship Managers who act as in-between						
6.	Senior management sets good examples (Senior business and IT management acting as "partners")						
7.	Informal meetings between business and IT executives/senior management. (Informal meetings with no agenda, where business and IT senior management talk about general activities, directions)						
8.	IT leadership /Chief Information Officers or similar role ability to articulate a vision for IT role in the company and ensure that this vision is clearly understood by managers throughout the organisation.						
9.	Corporate internal communication that addresses IT on a regular basis. (There is regular Internal corporate communication which addresses general IT issues)						
10.	There is IT governance awareness campaigns that explain to business and IT people the need for IT governance.						

2. IT governance practice: Structures

0 =Non-existent **1**=Initial or ad hoc **2**=Repeatable but intuitive **3** =Defined

4 =Managed & measurable **5** =Optimized

IT governance practice: Structures		IT governance maturity level					
		0	1	2	3	4	5
1	IT Strategy Committee at the level of Board of Directors to ensure that IT is a regular agenda item and which reports about issues to the Board of Directors.						
2	IT expertise at the level of Board of Directors members and experience regarding the value and risk of IT.						
3	(IT) Audit Committee at the level of Board of Directors to oversee IT assurance activities independently.						
4	Chief Information Officer /IS VP is a full member of the executive (Process Council).						
5	Chief Information Officers has a direct reporting line to VP of IS and/or Chief Operation Officer.						
6	IT Steering Committee at executive or senior management level responsible for determining business evaluates / prioritizes IT investments.						
7	IT governance function / officer in the organisation responsible for promoting, driving and managing IT governance processes.						
8	Security / compliance / risk officer responsible which possibly impacts IT.						
9	There is IT Project/Portfolio and Change Management Steering Committee composed of business and IT people focusing on prioritising and managing IT projects.						
10	There is IT Security Steering Committee composed of business and IT people that focus on IT related risks and security issues.						
11	There is Architecture Steering Committee (composed of business and IT people) providing architecture guidelines and advice on their applications /IT road map.						
12	IT Governance roles and responsibilities documented include Integration of governance/ alignment for business and IT people.						

3. IT governance practice: Processes

0 =Non-existent **1**=Initial or ad hoc **2**=Repeatable but intuitive **3** =Defined

4 =Managed & measurable **5** =Optimized

IT governance practice: Processes		IT governance maturity level					
		0	1	2	3	4	5
1	There is a formal strategic information systems planning process to define and update IT strategy.						
2	IT performance measurement (e.g. IT balanced scorecard) in domains of corporate contribution, user orientation, operational excellence and future orientation.						
3	There is Portfolio Management / prioritisation process that includes business cases, information economics, ROI, payback, for IT investments and projects in which business and IT are involved.						
4	There is a methodology to charge back IT costs to business units, to enable an understanding of the total cost of ownership (e.g. activity-based costing)						
5	There are service level agreements (formal agreements between business and IT about IT development projects or IT operations).						
6	There are IT governance frameworks such as COBIT Control Objectives for Information and Related Technologies (COBIT), Information Technology Infrastructure Library (ITIL), and ISO 27000 Process-based IT governance and control framework.						
7	There are regular self-assessments or independent assurance activities on the governance and control over IT.						
8	There are processes and methodologies to govern and manage IT projects						
9	There are processes to control and report upon budgets of IT						
10	There are benefits management and reporting process to monitor planned business benefits during and after						

APPENDIX B: ETHICAL CERTIFICATON

UNISA university of south africa

UNISA COLLEGE OF SCIENCE, ENGINEERING AND TECHNOLOGY'S (CSET) RESEARCH AND ETHICS COMMITTEE

14 June 2018

Ref #: 017/MSF/2018/CSET_SOC
Name: Mrs Martha Sileshi Fiseha
Student #: 45477280

Dear Mrs Martha Sileshi Fiseha

Decision: Ethics Approval for 3 years
(Humans involved)

Researchers: Mrs Martha Sileshi Fiseha,
691/1250, N/Lafto Sub-city, Wereda 01, Addis Ababa, Ethiopia
45477280@mylife.unisa.ac.za, +25 1966688321, +25 1911696277

Project Leader(s):
Ms H Abdullah, abdulh@unisa.ac.za, +27 11 670 9100
Mr M Mujinga, mujinm@unisa.ac.za, +27 11 471 3154

Working Title of Research:

Analysis of the relationship between IT governance and strategic business/IT alignment using Control Objectives for Information and related Technology (COBIT 5): A case study in a commercial bank of Ethiopia

Qualification: MSc in Computing

Thank you for the application for research ethics clearance by the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee for the above mentioned research. Ethics approval is granted for a period of three years, from 14 June 2018 to 14 June 2021.

1. The researcher will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Unisa College of Science, Engineering and

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
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Technology's (CSET) Research and Ethics Committee. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

3. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
4. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
5. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
6. No field work activities may continue after the expiry date (14 June 2021). Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number 017/MSF/2018/CSET_SOC *should be clearly indicated on all forms of communication with the intended research participants, as well as with the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee.*

Yours sincerely

Dr. B Chimbo
Chair: Ethics Sub-Committee SoC, College of Science, Engineering and Technology (CSET)

Prof I. Osunmakinde
Director: School of Computing, CSET

Prof B. Mamba
Executive Dean: CSET

Approved - decision template – updated Aug 2016

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APPENDIX C: KEY FRAMEWORKS AND STANDARDS SUPPORTING GEIT

key frameworks and standards		Description	COBIT
1	**ISO/IEC 38500: 2008 Corporate Governance of IT**	An international Standard based on an Australian Standard, AS 8015-2005	COBIT 5 is aligned with ISO/IEC 38500 and it fully addresses the 'Governance of Enterprise IT'.
2	**IT Service Management**	ITIL (Information Technology Infrastructure Library) In particular, - ISO9000 (Quality) - ISO/IEC 27001 (Information security). - ISO/IEC 20000 (service management system) (SMS)	ITIL align COBIT processes
3	**Project Management**	- Managing Successful Programmes (MSP) - Management of Risk (MoR). - PRINCE2, an acronym for **PR**ojects **IN** Controlled Environments - PMBOK, the Project Management Body of Knowledge.	PRINCE2 and PMBOK are referenced by COBIT 5 as providing guidance for two of the 37 COBIT 5 processes.
4	**Risk Management**	Standards and frameworks covering risk management including: - **COSO ERM** (the Committee of the Sponsoring Organisation of the Tread-way Commission) ERM (Enterprise Risk Management) - **Risk IT (2009)** from ISACA. - **Management of Risk (MoR) (**2002 with latest 2010) from The Cabinet Office. - **OCTAVE** (2001 and onwards) (Operationally Critical Threat, Asset and Vulnerability Evaluation) - **ISO 31000:2009**: Risk Management Principles and guidelines.	ISO31000 is referenced by COBIT 5 as being guidance for one of the COBIT 5 processes.
5	**Value Delivery**	Value delivery frameworks are: - **Val IT V2.0** (2008) from ISACA. - Management of Value (MoV) (2010) from the UK Cabinet Office.	One of the ISACA frameworks used to build COBIT 5.
6	**Information Security**	Information technology and Security techniques: - **ISO/IEC 27000** Series	ISO/IEC 27001 is referenced by COBIT 5 as being guidance for five of the COBIT 5 processes

key frameworks and standards		Description	COBIT
7	**Enterprise Architecture (EA)**	Enterprise architectures commonly used are: - **TOGAF** **T**he **O**pen **G**roup **A**rchitecture **F**ramework - **Zachman Framework** for Enterprise Architecture - **CEAF-** **C**ommission **E**nterprise **A**rchitecture **F**rame work - **FEA- F**ederal **E**nterprise **A**rchitecture	ISACA states in the *COBIT 5: Enabling Processes* book that TOGAF 9 provides related guidance for two of the 37 COBIT 5 processes.
8	**Quality**	Historically, there have been many frameworks and standards concerned with quality and all of them are still widely used. - **Juran's Managerial** Breakthrough – mid-1960s, also in Japan. - **Kaizen – the Kanji** (Japanese) word for improvement also started post Second World War in Japan. - **Total Quality Management (TQM)** devised by Feigenbaum and based on PDCA. - **Six Sigma** – 1981 at Motorola in Japan. - **Baldridge National Quality Program** (BNQP) 1987 as an excellence award for quality in the US. - **Lean – late 1980s** in Toyota, Japan. - **Lean Six Sigma**, devised in 2002. - **ISO9000** –currently ISO 9001: 2008 notably developed the quality management system (QMS).	ISO9001 is referenced by COBIT 5 as being guidance for one of the COBIT 5 processes. The Deming Cycle – post Second World War from the US and into Japan, particularly. Known by everyone as Plan – Do – Check – Act (PDCA).
9	**Maturity Assessment**	**CMM,** a maturity assessment framework for assessment of software development projects.	CMM used by ISACA to create the COBIT Maturity Model that was used for all COBIT processes.
		The following are the current versions of CMMI (2010): - ***CMMI-DEV*** is used to assess and improve engineering and development processes in an organisation that develops products. - ***CMMI-SVC*** is used to assess and improve management and service delivery processes in an organisation that develops, manages and delivers services. - ***CMMI-ACQ*** is used to assess and improve supplier management processes in an	

key frameworks and standards		Description	COBIT
		organisation that deals with multiple suppliers for its business. - **CMMI fulfills** the requirements of ISO15504	
	ISO15504 Process Capability Model	ISO15504 covers the assessment process and defines a PAM that requires a PRM to be devised and specifies how the PRM should be structured.	ISACA made the decision that COBIT 5 should use ISO15504 to assess and improve COBIT 5 processes
10	**Internal Controls**	**COSO** The framework is separate from, but complementary to, the COSO/ ERM framework for enterprise risk management.	COSO is referenced by COBIT 5 as providing guidance for four of the 37 COBIT 5 processes.
		Sarbanes-Oxley Act Section 40450 of SOX is important because it covers the assessment of internal controls on financial reporting.	Sarbanes-Oxley was identified by ISACA as being used to assist with the development of COBIT 5.
		Basel III Framework Basel III, the 2010-11 update to Basel II, is a framework for internal control systems in banking organisations. It has to be implemented between 2013 and 2018 and has banks worldwide complying with it.	Basel III was identified by ISACA as being used to assist with the development of COBIT 5.
11	**Cultural Change Enablement**	The most commonly adopted approach to cultural change enablement is **Kotter's 8 Steps** to Transformation.	**Kotter's** cultural change enablement was identified by ISACA as being used to assist with the development of COBIT 5.
12	**Semiotic Framework**	**Semiotic model of Syntactic**, **Semantic and Pragmatic** layers to take into account the introduction of information technology.	COBIT 5 has an Information Model, which includes the Semiotic Framework (or Semiotic Ladder)
13	**Business Continuity Management**	The International **Standard ISO22301:2012** (formerly a British Standard BS25999-2 published in 2007) specifies the requirements for a **Business Continuity Management System (BCMS)** to protect a business from disruptive incidents in addition to reducing the likelihood that such incidents might occur.	BS25999-2:2007 is referenced by COBIT 5 as being guidance for one of the COBIT 5 processes

APPENDIX D: COBIT 5 ENTERPRISE GOALS MAPPING TO GOVERNANCE AND MANAGEMENT QUESTIONS 'Adapted from: (ISACA 2012a, pp. 55 & 56)'

STAKEHOLDER NEEDS	1. Stakeholder value of business investments	2. Portfolio of competitive products and services	3. Managed business risk (safeguarding of assets)	4. Compliance with external laws and regulations	5. Financial transparency	6. Customer-oriented service culture	7. Business service continuity and availability	8. Agile responses to a changing business environment	9. Information-based strategic decision making	10. Optimisation of service delivery costs	11. Optimisation of business process functionality	12. Optimisation of business process costs	13. Managed business change programmes	14. Operational and staff productivity	15. Compliance with internal policies	16. Skilled and motivated people	17. Product and business innovation culture
How do I get value from the use of IT? Are end users satisfied with the quality of the IT service?	■	■				■	■						■			■	■
How do I manage performance of IT?		■			■				■	■	■	■		■			
How can I best exploit new technology for new strategic opportunities?	■	■						■					■			■	■
How do I best build and structure my IT department?								■		■	■	■		■	■	■	
How dependent am I on external providers? How well are IT outsourcing agreements being managed? How do I obtain assurance over external providers?			■	■						■							
What are the (control) requirements for information?				■					■						■		
Did I address all IT-related risk?			■				■		■						■		
Am I running an efficient and resilient IT operation?					■		■										
How do I control the cost of IT? How do I use IT resources in the most effective and efficient manner? What are the most effective and efficient sourcing options?										■		■		■			
Do I have enough people for IT? How do I develop and maintain their skills, and how do I manage their performance?										■		■		■			
How do I get assurance over IT?				■											■		

APPENDIX E: DETAILED MAPPING ENTERPRISE GOALS AND IT RELATED GOALS 'Adapted from: (ISACA 2012a, pp. 50)'

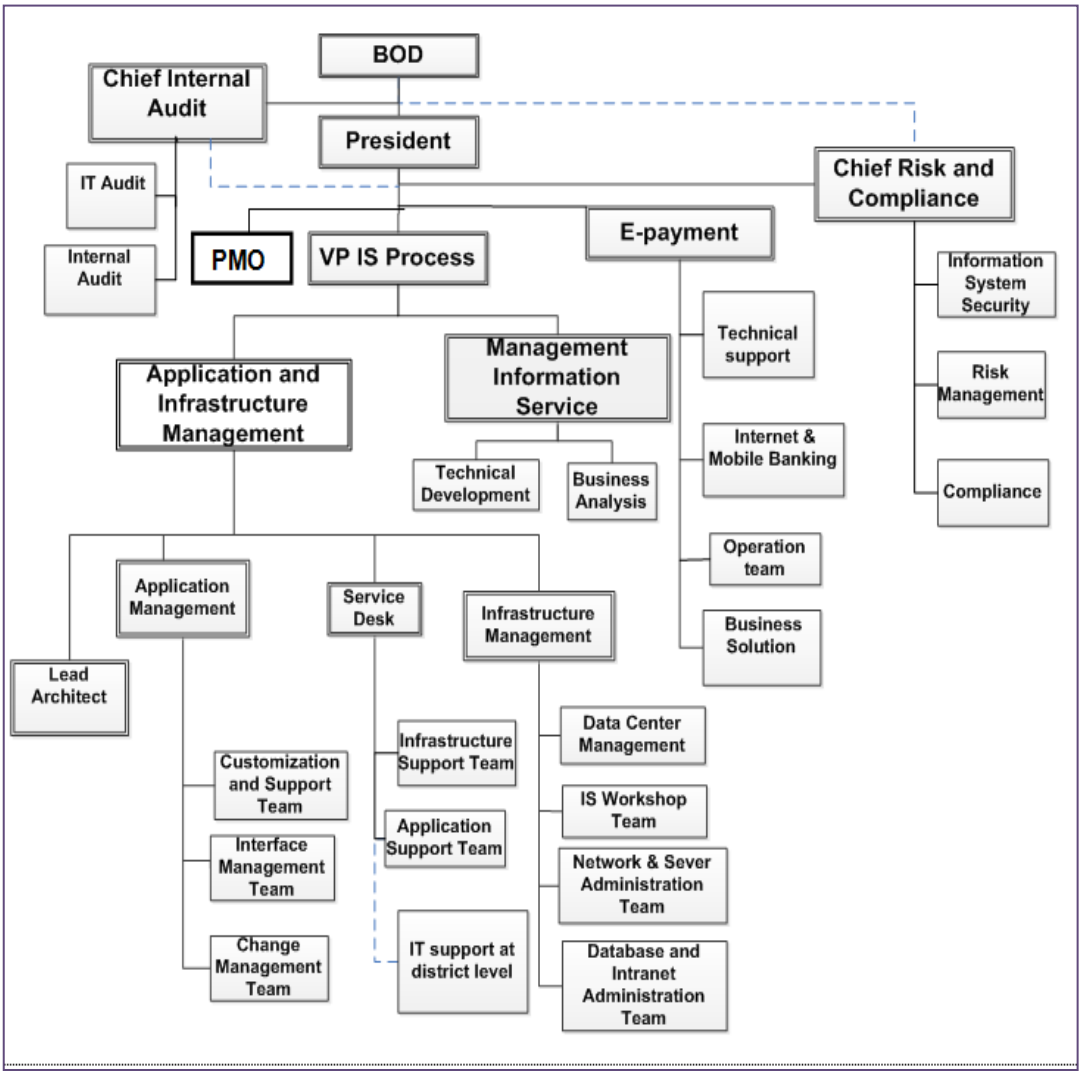
			Enterprise Goal																
			Stakeholder value of business investments	Portfolio of competitive products and services	Managed business risk (safeguarding of assets)	Compliance with external laws and regulations	Financial transparency	Customer-oriented service culture	Business service continuity and availability	Agile responses to a changing business environment	Information-based strategic decision making	Optimisation of service delivery costs	Optimisation of business process functionality	Optimisation of business process costs	Managed business change programmes	Operational and staff productivity	Compliance with internal policies	Skilled and motivated people	Product and business innovation culture
			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
		IT-related Goal	Financial					Customer					Internal					Learning and Growth	
Financial	01	Alignment of IT and business strategy	P	P	S			P	S	P	P	S	P	S	P			S	S
	02	IT compliance and support for business compliance with external laws and regulations			S	P											P		
	03	Commitment of executive management for making IT-related decisions	P	S	S					S	S		S		P			S	S
	04	Managed IT-related business risk			P	S			P	S		P			S		S	S	
	05	Realised benefits from IT-enabled investments and services portfolio	P	P				S		S		S	S	P		S			S
	06	Transparency of IT costs, benefits and risk	S		S		P				S	P		P					
Customer	07	Delivery of IT services in line with business requirements	P	P	S	S		P	S	P	S		P	S	S			S	S
	08	Adequate use of applications, information and technology solutions	S	S	S			S	S		S	S	P	S		P		S	S
Internal	09	IT agility	S	P	S			S		P			P		S	S		S	P
	10	Security of information, processing infrastructure and applications			P	P			P								P		
	11	Optimisation of IT assets, resources and capabilities	P	S						S		P	S	P	S	S			S
	12	Enablement and support of business processes by integrating applications and technology into business processes	S	P	S			S		S		S	P	S	S	S			S
	13	Delivery of programmes delivering benefits, on time, on budget, and meeting requirements and quality standards	P	S	S			S				S		S	P				
	14	Availability of reliable and useful information for decision making	S	S	S	S			P		P		S						
	15	IT compliance with internal policies			S	S											P		
Learning and Growth	16	Competent and motivated business and IT personnel	S	S	P			S		S						P		P	S
	17	Knowledge, expertise and initiatives for business innovation	S	P				S		P	S		S		S			S	P

APPENDIX F: MAPPING COBIT 5 IT RELATED GOALS AND IT RELATED PROCESSES 'Adapted from: (ISACA 2012a, pp. 52 &53)'

			IT-related Goal																
			Alignment of IT and business strategy	IT compliance and support for business compliance with external laws and regulations	Commitment of executive management for making IT-related decisions	Managed IT-related business risk	Realised benefits from IT-enabled investments and services portfolio	Transparency of IT costs, benefits and risk	Delivery of IT services in line with business requirements	Adequate use of applications, information and technology solutions	IT agility	Security of information, processing infrastructure and applications	Optimisation of IT assets, resources and capabilities	Enablement and support of business processes by integrating applications and technology into business processes	Delivery of programmes delivering benefits, on time, on budget, and meeting requirements and quality standards	Availability of reliable and useful information for decision making	IT compliance with internal policies	Competent and motivated business and IT personnel	Knowledge, expertise and initiatives for business innovation
			01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
		COBIT 5 Process	Financial						Customer		Internal							Learning and Growth	
Evaluate, Direct and Monitor	EDM01	Ensure Governance Framework Setting and Maintenance	P	S	P	S	S	S	P		S	S	S	S	S	S	S	S	S
	EDM02	Ensure Benefits Delivery	P		S		P	P	P	S			S	S	S	S		S	P
	EDM03	Ensure Risk Optimisation	S	S	S	P		P	S	S		P			S	S	P	S	S
	EDM04	Ensure Resource Optimisation	S		S	S	S	S	S	S	P		P		S			P	S
	EDM05	Ensure Stakeholder Transparency	S	S	P			P	P						S	S	S		S
Align, Plan and Organise	AP001	Manage the IT Management Framework	P	P	S	S			S		P	S	P	S	S	S	P	P	P
	AP002	Manage Strategy	P		S	S	S		P	S	S		S	S	S	S	S	S	P
	AP003	Manage Enterprise Architecture	P		S	S	S	S	S	S	P	S	P	S		S			S
	AP004	Manage Innovation	S			S	P			P	P		P	S		S			P
	AP005	Manage Portfolio	P		S	S	P	S	S	S	S		S		P				S
	AP006	Manage Budget and Costs	S		S	S	P	P	S	S			S		S				
	AP007	Manage Human Resources	P	S	S	S			S		S	S	P		P		S	P	P
	AP008	Manage Relationships	P		S	S	S	S	P	S			S	P	S		S	S	P
	AP009	Manage Service Agreements	S			S	S	S	P	S	S	S	S		S	P	S		
	AP010	Manage Suppliers		S		P	S	S	P	S	P	S	S		S	S	S		S
	AP011	Manage Quality	S	S		S	P		P	S	S		S		P	S	S	S	S
	AP012	Manage Risk		P		P		P	S	S	S	P			P	S	S	S	S
	AP013	Manage Security		P		P		P	S	S		P				P			

			IT-related Goal																
			Alignment of IT and business strategy	IT compliance and support for business compliance with external laws and regulations	Commitment of executive management for making IT-related decisions	Managed IT-related business risk	Realised benefits from IT-enabled investments and services portfolio	Transparency of IT costs, benefits and risk	Delivery of IT services in line with business requirements	Adequate use of applications, information and technology solutions	IT agility	Security of information, processing infrastructure and applications	Optimisation of IT assets, resources and capabilities	Enablement and support of business processes by integrating applications and technology into business processes	Delivery of programmes delivering benefits, on time, on budget, and meeting requirements and quality standards	Availability of reliable and useful information for decision making	IT compliance with internal policies	Competent and motivated business and IT personnel	Knowledge, expertise and initiatives for business innovation
			01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
		COBIT 5 Process	Financial						Customer		Internal							Learning and Growth	
Build, Acquire and Implement	BAI01	Manage Programmes and Projects	P		S	P	P	S	S	S			S		P			S	S
	BAI02	Manage Requirements Definition	P	S	S	S	S		P	S	S	S	S	P	S	S			S
	BAI03	Manage Solutions Identification and Build	S			S	S		P	S			S	S	S	S			S
	BAI04	Manage Availability and Capacity				S	S		P	S	S		P		S	P			S
	BAI05	Manage Organisational Change Enablement	S		S		S		S	P	S		S	S	P				P
	BAI06	Manage Changes			S	P	S		P	S	S	P	S	S	S	S	S		S
	BAI07	Manage Change Acceptance and Transitioning				S	S		S	P	S			P	S	S	S		S
	BAI08	Manage Knowledge	S				S		S	S	P	S	S			S		S	P
	BAI09	Manage Assets		S		S		P	S		S	S	P			S	S		
	BAI10	Manage Configuration		P		S		S		S	S	S	P			P	S		
Deliver, Service and Support	DSS01	Manage Operations		S		P	S		P	S	S	S	P			S	S	S	S
	DSS02	Manage Service Requests and Incidents				P			P	S		S				S	S		S
	DSS03	Manage Problems		S		P	S		P	S	S		P	S		P	S		S
	DSS04	Manage Continuity	S	S		P	S		P	S	S	S	S	S		P	S	S	S
	DSS05	Manage Security Services	S	P		P			S	S		P	S	S		S	S		
	DSS06	Manage Business Process Controls		S		P			P	S		S	S	S		S	S	S	S
Monitor, Evaluate and Assess	MEA01	Monitor, Evaluate and Assess Performance and Conformance	S	S	S	P	S	S	P	S	S	S	P		S	S	P	S	S
	MEA02	Monitor, Evaluate and Assess the System of Internal Control		P		P		S	S	S		S				S	P		S
	MEA03	Monitor, Evaluate and Assess Compliance With External Requirements		P		P	S		S			S					S		S

APPENDIX G: CBE GEIT STRUCTURE (FROM 2013- MAY 2018)



APPENDIX H: LANGUAGE EDITING CERTIFICATE

7542 Galangal Street

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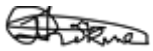
0008

04 December 2020

TO WHOM IT MAY CONCERN

This certificate serves to confirm that I have edited MS Fiseha dissertation entitled, **Analysis of the relationship between governance of enterprise information technology and strategic business-IT alignment using Cobit 5 in the case of commercial bank of Ethiopia.**

I found the work easy and intriguing to read. Much of my editing basically dealt with obstructionist technical aspects of language, which could have otherwise compromised smooth reading as well as the sense of the information being conveyed. I hope that the work will be found to be of an acceptable standard. I am a member of Professional Editors' Guild.
Hereunder are my particulars:



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