ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES

SCHOOL OF INFORMATION SCIENCE

Designing Implementation Guideline for Information Technology Infrastructure Library (ITIL) Framework Processes: The Case of Commercial Bank of Ethiopia

A Thesis submitted to the School of Information Science for the Degree of Master of Science in Information Science

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March, 2020

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Name and signature of Members of the Examining Board

Million Meshesha (PhD) Advisor	_____ Signature	_____ Date
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_____ Examiner	_____ Signature	_____ Date

Declaration

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

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

Signature: _____

Selam Tesfaye

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

Advisor's Signature: _____

Million Meshesha (PhD)

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Acknowledgements

First of all, thanks to the Almighty God for giving me the strength to start and finalize this study. I am also deeply grateful to my advisor Dr. Million Meshesha for his precious remarks, constructive comments and suggestions during the course of this study. I also would like to express my deep gratitude to all IT staffs and managements of Commercial Bank of Ethiopia who participated in this study during the data collection, demonstration and evaluation process.

I would like to thank my colleagues Ato Tariku Abera and Ato Robel Arega for encouraging me to keep going and finalize this thesis and the entire MSC program as well.

Finally, I am thankful for everyone at the College of Natural and Computational Science, School of Information Science, AAU, who has encouraged and assisted me throughout the completion of this thesis.

Abstract

Many organizations that decide to implement Information Technology Infrastructure Library (ITIL) framework fail completely or keep implementing long after the planned deadline. This is because there is no clear guideline for implementing ITIL framework. The purpose of this study is to propose such a guideline based on the result of a maturity level assessment of the existing and desired ITSM practices of Commercial Bank of Ethiopia (CBE) against ITIL framework. For this purpose, a design science research methodology is followed. The result of the maturity level assessment indicated that out of twenty six ITIL processes in scope, twenty four (92% of ITIL processes) was rated between Level 0 (Non-Existent) and Level 1 (Initial) stages and the rest two processes achieved a maturity level between Level 1 (initial) and Level 2 (Repeatable) stage which is also very low or Initial process stage. The result of the perceived importance of ITIL processes in CBE indicated that from the total of twenty six processes in scope, nine processes were categorized in to "Very Important" stage.

Accordingly, an implementation guideline is proposed for those highly prioritized processes using ITIL framework literature as template and then being modified according to the needs and contexts of CBE. The implementation guideline includes the objective, scope, major activities, flowchart including description and metrics of each of the processes under the guideline. Demonstration is done through proof of concept on specific three processes. Evaluation is also conducted through comparing the objective of a solution to actual observed results from use of the artifact in the demonstration and using expert validation through focus group discussion. Consequently, the guideline is redesigned using the expert's feedback. Absence of detailed workflows policies and procedures was a major challenge. The study concludes by presenting future study areas, with the need to focus mainly in defining major activities of ITIL framework using RACI (Responsible, Accountable, Consulted and Informed) matrix, explore the impact of ITIL framework implementation in organizations and design performance measurement metrics or framework, explore the concept of cloud computing in relation to ITIL.

Key words: CBE, ITIL, ITIL framework, ITIL Implementation Guideline

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List of Acronyms

CMMI	Capability Maturity Model Integrated
CMMI-SVC	Capability Maturity Model Integrated for Service
CORE	Centralized Online Real-time Exchange
CAB	Change Advisory Board
CSI	Continual Service Improvement
HP ITSM	Hewlett Packard IT service management
ITIL	Information Technology Infrastructure Library
ITSM	Information Technology Service Management
IOS/IEC	International Organization for Standardization/ International Electrotechnical Commission
OGC	Office of Government Commerce
OLA	Operation Level Agreement
RACI	Responsible, Accountable, Consulted and Informed
RFC	Request For Change
SIPs	Service Improvement Plans
SLA	Service Level Agreement
SLM	Service Level Management
SLR	Service Level Requirement
SPSS	Statistical Package for Social Science
UC	Underpinning Contracts

Chapter 1

INTRODUCTION

1.1. Background

Increasing use of information technology (IT) within firms has resulted in a demand for efficient and effective IT services and solutions. IT departments are expected to respond to agile business needs and satisfy both internal and external customers (Pilarczyk, 2016). Besides, businesses are growing in demanding better and more disciplined provision of IT services to ensure smooth operation and service excellence. This level of service can be achieved through the result of effective IT Service Management (ITSM) (Mushtaque, Ahsan, & Umer, 2015).

ITSM is a process-oriented, customer-focused methodology which assists organizations in making improvements to their IT services delivery and support, by aligning different IT services with business needs (Cater-Steel, Gacenga, Marrone, & Kolbe, 2014). ITSM can also be referred to as the way of operating the IT by focusing on the day to day services provided by the IT department in an organization, so as to meet customer's needs (Winniford, Conger, & Erickson-Harris, 2009).

A variety of frameworks and standards are developed in order to control the existing business dynamicity and align each and every IT services with the business. Some of the popular frameworks and standards include; International Organization for Standardization/ International Electrotechnical Commission (ISO/IEC) 20000, Microsoft Operation Framework (MOF) Process Reference Model for Information Technology (PRM-IT), HP IT Service Management Reference Model, IBM Process Reference Model, Control Objectives for Information and related Technology (COBIT), Information Technology Infrastructure Library (ITIL) (Galup, Dattero, Quan, & Conger, 2009); (Winniford, Conger, & Erickson-Harris, 2009).

Among the variety of frameworks and standards mentioned previously, ITIL is the most popular and influential framework for ITSM. It is comprised of definitions and best practices developed in 1980's by British Government Central Computer Telecommunication Agency (Galup, Quan, Dattero, & Conger, 2007). The development of ITIL was a response to the agency's growing dependence on IT and the need for greater efficiency and effectiveness. ITIL and ITSM are both

concerned with IT operational activities, not with system or technology development. In short, ITSM is the concept and ITIL is the framework for IT functions and one can apply service management to IT operations (Iden & Eikebrokk, 2013); (Cater-Steel, Gacenga, Marrone, & Kolbe, 2014).

The evolution of ITIL involved three versions of ITIL (Galup, Dattero, Quan, & Conger, 2009). The first version (ITIL V1) was released between 1989 and1994. The second version (ITIL V2) was released between 2000 and 2004. The focus of this version was on process improvement, delivery, and support and infrastructure management. The third version (ITIL V3) was released in 2007 with focus on management of service life cycle including Service Strategy, Service Design, Service Transition, Service Operations and Continual Service Improvement (OGC, 2007). Each of ITIL service life cycle described above defines key set of 26 processes and 4 functions.

According to Mushtaque, Ahsan, and Umer (2015), banking and finance is one of the business sectors which relies heavily on the performance of IT. IT in this sector is used not only to improve their service efficiency and keep profit sustainability but also to earn and maintain best reputation. They also stated that anything which is critical and that can have a significant power to create an impact as an IT should be managed rigorously. Therefore, taking full advantage of IT by managing IT services through implementing ITIL framework has become one of the highly rated priorities of banking and financial institutions.

1.2. Overview of CBE

Commercial Bank of Ethiopia (CBE) established in 1942. Currently it has more than 1456 branches stretched across the country (Ethiopia, 2018). According to the Bank official web site report, CBE is the leading African bank with assets of 711.96 billion birr as on June 30th 2019. It is the first bank in Ethiopia to introduce modern banking and Automated Tailor Machine (ATM) service for local users. The Bank has more than 22 million account holders. Among these customers, more that 2.5 million are Mobile and Internet banking users. 2513 ATM machine and 9539 Point-of-Sales (POS) machines are available to deliver services through electronic payment systems. It has a strong correspondent relationship with more than 50 renowned foreign banks and a SWIFT bilateral arrangement with more than 700 others banks across the world. Four

branches are opened in South Sudan and have been in the business since June 2009. CBE is also a pioneer to introduce western union money transfer services and currently working with other 20 money transfer agents. The Bank combines a wide capital base and reinforces all the above resources with more than 37,894 employees.

The vision of CBE is to become a world-class commercial bank by the year 2025. The mission is to best realize stakeholders' needs through enhanced financial intermediation globally and supporting national development priorities, by deploying highly motivated, skilled and disciplined employees as well as state-of-the-art technology. CBE strongly believes that winning the public confidence is the basis for success (Ethiopia, 2018).

According to a report from the bank's website, (2018) CBE has expanded service delivery by implementing CORE banking system which is providing banking service by a group of networked branches. The implementation has allowed customers to manage their accounts and use various banking facilities from any branch across the country regardless of branch they have opened their account. The report stated CBE CORE banking (T24) is capable of interfacing with different delivery channels or E- payment services like ATM, Internet Banking, Mobile Banking, and POS.

According to the organizational structure of CBE, the main IS process, represented by IS vice president, consists of two directors; Application and Infrastructure Management (AIM) and Management Information System (MIS) (Appendix C). The CBE IS process has also two additional directors directly reporting to the president, Project management office and E-payment. In addition to this, IT audit and Information security management which are under chief internal audit and chief risk and compliance respectively are part of the CBE-IS Team (Appendix B).

1.3. Motivation

Since the banking sector is heavily dependent on IT system, implementing ITSM framework has a paramount effect on the delivery of IT service (Pilarczyk, 2016). Unfortunately, prior studies indicate that the implementation of ITIL is challenging and complex (Pereira & Silva, 2015). This comes from the lack of clear guidelines to implement ITIL framework and shortage of research on this research area (Iden & Eikebrokk, 2013). In addition to that, there is no

universally appropriate framework that fits to all organization in all circumstance. ITIL is also not a "one-sized fits for all" framework (Lloyd, Wheeldon, Lacy, & Hanna, 2011). Therefore, ITIL implementation has to be contextualized according to the needs and priorities of the organizations.

The motivation of the researcher to conduct research on this topic arise from the desire to put a contribution by filling the research gap and support the bank to accomplish its vision for the year 2025 of becoming a world class bank with respect to IT service delivery and management. Since ensuring the minimum qualified IT service delivery is one of the criteria to be a world-class bank, the researcher believes this study can be a valuable input to accomplish the implementation of ITIL framework in CBE.

On the other hand, the REUTERS report (Reuters, 2013) below illustrates how the lack of adequate ITSM can affect customers and costs a bank money and reputation.

Millions of Royal Bank of Scotland customers was affected by problem with online banking and payments after a software upgrade went wrong. The problem existed for three hours on Monday, one of the busiest online shopping days of the year. As it was described, that cost the bank 175 million pounds (286 million dollars) in compensation for customers and extra payments to staff after the bank opened branches for longer in response (Reuters, 2013).

Therefore, preventing unnecessary financial loss and reputational damage that comes from lack of efficient IT service delivery and management is another motivating factor for the researcher to conduct this study.

1.4. Statement of the Problem

The result of a preliminary survey conducted to assess the existing ITSM practices of CBE indicates that CBE has a very ambitious business growth plan, including, being a world class bank in 2025. Accordingly, many IT initiatives are on the way in all areas of the bank. One of these initiatives is the implementation of ITSM framework to enable the bank to deliver effective and efficient IT services that meet current and future business requirement. To this end, the Bank has selected ITIL framework, allocated the necessary budget and established a dedicated project team of staffs. However, due to the vastness of the bank, lack of consulting organ which has the capability to understand the working culture, environment and situations of CBE coupled with

the complexity of implementing ITIL framework, the bank has missed the one year implementation deadline. Consequently, the framework has not formally implemented yet (Appendix A).

Many organizations that decide to implement ITIL framework fail completely or keep implementing long after the planned deadline (Pereira & Silva, 2015). The authors explain that this is because there is no clear guideline for implementing ITIL framework. Muhammad also states that even though there are many publications on ITIL framework, the publications do not include the implementation guideline for ITIL framework implementation (Muhammad, 2015).

Along with the overall challenges, the implementation of ITIL framework is usually long, expensive and risky (Pereira & Silva, 2015); (Nicewicz-Modrzewska & Stolarski, 2008). In addition, it is important to emphasize that ITIL framework is not "one-sized fits for all" and every organization is different. Therefore, it is recommended each organization to implement the framework from their specific context and needs (Lloyd, Wheeldon, Lacy, & Hanna, 2011)

There are a number of local and foreign studies related to this research area. These studies show that ITIL framework implementation is in developing stage and it is one of the most potential research area (Proehl, Erek, Limbach, & Zarnekow, 2013); (Iden & Eikebrokk, 2013); (Hochstein, Tamm, & Brenner, 2005); (Marrone, Kießling, & Kolbe, 2011). Muhammed (2015) presented guidelines to implement ITIL framework to address lack of strategies or step by step guidelines for ITIL framework implementation. On the other hand, Ahmad, Amer, Qutaifan, & Alhilali (2013) has proposed a 12 step ITIL framework implementation roadmap that aimed to address the challenges of aligning IT services with critical business requirements. However, both studies neither conducted the maturity assessment of a given organization nor described metrics and major activities of ITIL processes.

Locally, Senait (2011) investigated the status of IT governance at CBE using COBIT framework, and she found that IT governance is at lower stage. Dabi (2017) also investigated the existing ITSM practice of Bunna International Bank. Seife (2015) explored influencing factors that act as barriers and critical success factors to the implementation of ITIL framework in EthioTelecom. His result was focused on influencing factors and barriers of ITIL framework implementation. However, none of them addressed the challenges of ITIL framework implementation from the

context of CBE or others. Therefore, the researcher found it interesting to propose an ITIL framework process implementation guideline according to CBE's priority.

To the best of the researchers' knowledge, there is no study conducted locally which addressed the challenges of ITIL framework implementations. In particular, the researcher has not come across a local study that proposes an implementation guideline for the context of CBE. Therefore, in order to address the above problems and frame the research, the following research questions are formulated:

- What are the existing and desired states of ITSM practices of CBE according to ITIL framework?
- What suitable ITIL framework implementation guideline can be designed for CBE?

1.5. Objective of the Study

1.5.1. General Objective

The general objective of the study is to propose an ITIL framework implementation guideline so as to improve existing ITSM practice of Commercial Bank of Ethiopia.

1.5.2. Specific Objectives

To achieve the general objective of the study, the following specific objectives of the study are formulated:

- To assess and define the existing and desired maturity level of ITSM practice of CBE against ITIL framework.
- To propose an ITIL framework implementation guideline for the context of CBE.
- To evaluate the proposed ITIL framework implementation guideline.

1.6. Significance of the Study

This study has a theoretical contribution to the existing literature gap regarding ITIL framework implementation. It may also serve as a starting point for academic researchers who want to conduct more comprehensive research in this area from Ethiopian banking sector perspective.

The practical contribution of the study is to propose an ITIL framework implementation guideline according to CBE's priority. Moreover, this study will be a significant endeavor;

- To advance CBE's ITSM practice as per international standard.
- To support IT managers in banking industry to make ITIL framework implementation decisions and increase operational efficiency.
- To help banks by proposing an ITIL framework implementation guideline which can be used to mitigate the challenges of the implementation?
- To help banks in fulfilling the qualification of ISO 20000 Standards certification which ensures the IT service provider fulfills the minimum ISO standard qualification.
- To bridge the gap between practitioner and academic research and provides valuable insights to both communities.
- Other Ethiopian banks and financial institutions can benefit by using the proposed ITIL framework implementation guideline with modification.

1.7. Scope and Limitation of the Study

The main focus of this study is to propose an ITIL framework processes implementation guideline for CBE. In order to identify the bank's priority, ITSM maturity assessment has been conducted against ITIL framework. Therefore, proposing an ITIL framework processes implementation guideline for other commercial banks is out of the scope of this study.

Even though there are four significant dimensions to be considered proactively in order to achieve the goal of ITSM framework in a given organization, i.e. people, process, organization and technology, the people, organization and technology implementation of this framework is not included in the scope of this research. Thus, this study focuses only on ITIL framework processes implementation. In addition to this, there are 26 processes and 4 functions described within the ITIL V3 framework. However, this study focused only on those highly prioritized processes from the context of CBE and functions are not included in the scope of this study.

The limitation of this study is that it is a case study which is bound only in one organization, i.e, CBE. The results obtained from the case study cannot be generalized to other banks or organizations. The accessibility of recent literatures and survey instruments were limited. Therefore, the researcher used accredited ITIL assessment sample question and customized for the purpose of this study. Due to the time and budget constraint, this study only included participants from IT department or technical IT staffs. In addition to this, the number of

interviews conducted as well as respondents to questionnaires is small. This puts a limitation on the quality of the study result.

1.8. Ethical Consideration

The data which was collected primarily or secondarily for the purpose of this study is kept confidentially and only used for this study. Due to the confidentiality of the data, corporate strategy report and plans is not attached. Moreover, the identity of the participants was not revealed and also their responses are only used for this academic research.

1.9. Organization of the Thesis

This thesis report is organized into six chapters. Chapter one presents the background, motivation and the problem of the study. In chapter two a systematic literature review is used to explain the concept of ITSM, ITSM frameworks, ITIL, benefits of ITIL, ITIL framework implementation, ITSM maturity assessment and highlight the gaps in literature relating to the ITIL framework implementation guideline. In addition, current research attempts are summarized and used to formulate research questions. In chapter three, the research methodology is described. The six steps of Design Science Research Model (DSRM) are briefly presented including research strategy and approach that was used for this study. Chapter four describes the problem identification and objective of the study. The existing and desired state of ITSM practice of CBE is discussed. The results of the statistical tests on the survey data and the content of qualitative data including validation of data through triangulation are presented. Chapter five focuses on the design of ITIL framework implementation processes guideline and describes the design science steps taken to develop the ITIL framework implementation guideline artifact. The results of the design and development, demonstration, as well as the outcomes of the evaluation and communication, are presented. Finally, chapter six presents the conclusion and recommendation.

Chapter 2

Literature Review

The following chapter presents the theoretical background of the research topic. The chapter is divided into nine sections. The first section provides an overview of IT service management (ITSM). In the second section various IT Service Management frameworks are discussed briefly. The ITIL framework is detailed in the third section. Section four and five covers the ISO/IEC 20000 standard and benefits of ITIL respectively. In the sixth section the challenges of ITIL framework implementation are discussed. In the seventh section the concept of ITSM maturity assessment and the maturity model used in this study are discussed. Local and foreign researches related to this topic are presented in the eighth section. In the last section, the research gap is discussed.

2.1. IT Service Management

Katzan (2008), defines service as 'a provider/client interaction that creates and captures value'. On the other hand, Vargo & Lusch (2004a) defined service as the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself. In spite of a number of definitions given for service, the basic concept remains the same; it is about delivering value. For the purpose of this study the service and IT service definition provided by the UK's Office of Government Commerce (OGC) is adopted. According to OGC, a service is a means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks. IT Service is performed by IT Service providers through an appropriate mix of People, Process and Information Technology and should be defined in a Service Level Agreement (OGC, 2007).

People: Manpower to provide better IT service level and arranges proper tasks in organization.

Process: A structured set of activities designed to accomplish a specific objective. A process takes one or more defined inputs and turns them into defined outputs. A process may include any of the roles, responsibilities, tools and management controls required to reliably deliver the

outputs. A process may define policies, procedures, guidelines, activities, and work instructions if they are needed.

Information Technology: The use of technology for the storage, communication or processing of information. The technology typically includes computers, telecommunications, applications and other software. The information may include business data, voice, images, video, etc. IT is often used to support business processes through IT services.

According to OGC (2007), ITSM is "Specialized set of organizational capabilities for providing value to customers in the form of services". These specialized organizational capabilities include all of the processes, methods, functions, roles, and activities that a service provider uses to enable it to deliver services to its customers. As a discipline ITSM is one of the components of the service science that concentrates on IT operations. It deals with defining, managing, and delivering IT services to support organization goals and address customer expectation in IT Operations (Galup, Dattero, Quan, & Conger, 2009). ITSM has proved to be very beneficial for IT organizations, as it allows them to be more adaptive, flexible, and cost effective and service oriented (Galup, Quan, Dattero, & Conger, 2007).

In ITSM, there are four significant dimensions that should be considered proactively in order to achieve the goal of ITSM (Chen & Chou, 2010). These dimensions are People, Organization, process and technology. McNaughton, Ray, & Lewis (2010) also stated this dimensions as the main components of ITSM. The first dimension is people, which are the major roles in ITSM framework, including customer, provider, supplier, and user. The second dimension is organization. Many issues must be well-managed, such as "How to integrate the IT and Business strategy goals and planning"? "How to manage/control the frequently change"? The third dimension is process. ITSM take the process approach which can systematically identifies and manages the linkage, combination, and interaction of a system of processes within an organization. The last dimension is technology, including all the tools and products that enhance the effectiveness and efficiency of providing services. These four dimensions can regard as four pillars of ITSM and must take into account simultaneously.

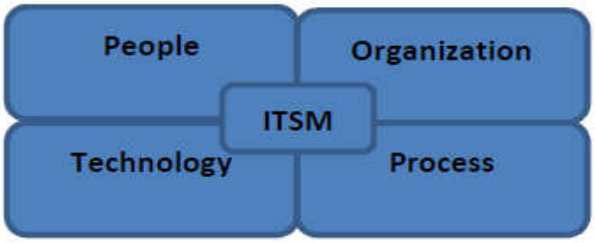

Figure 2-1 Dimensions of ITSM. Source (Chen & Chou, 2010)

2.2. IT Service Management Frameworks

There are a variety of ITSM frameworks in use in the industry. Every framework contains different processes and structure but the objective of all the frameworks is only the governance of IT in any organization comprising IT. The frameworks are not "one-size fits for all" and implementation of the same need to be risk-based and commensurate with size, nature and types of products and services and complexity of IT operations of the individual organization context (Lapão, 2011).

Many IT industry leaders have introduced their own versions of ITSM frameworks by using the ITIL framework as a basis. (Salle, 2004). Such kinds of frameworks have mainly been proprietary in nature and company specific, e.g. Microsoft Operations Framework (MOF), the IBM's Systems Management Solution Lifecycle (IBM SMSL) and the Hewlett Packard IT service management (HP ITSM). As can be understood from their names, these frameworks are developed by most prominent market leader vendors in IT products to benefits their clients from ITIL processes while using their technologies.

Various groups have developed world wide known frameworks, standards and regulations that specify the best methods for managing IT functions of a company. These frameworks and standards are used in order to control the existing business dynamicity and align each and every IT services with the business requirement.

The frameworks cover their own specific aspect of IT as information security, service management, quality, regulatory or legal compliance, etc. Some of these popular frameworks and standards are; COBIT, ITIL, IOS/IEC 20000, ISO 27001, ISO 15504, and CMMI,

(Winniford, Conger, & Erickson-Harris, 2009); (Galup, Quan, Dattero, & Conger, 2007); (Proehl, Erek, Limbach, & Zarnekow, 2013). Adopting these frameworks and standards are very important in transforming the IT function as per the best practices. Whereas these frameworks have a solid harmony and co-exist with an organization to meet a variety of IT needs. They are also important to assist and guide the technical persons who run and control the IT in their respective organization.

2.3. Information Technology Infrastructure Library (ITIL)

ITIL is considered as a framework of best practices which aims for facilitating the delivery of high quality IT services at a reasonable cost. IT departments can employ ITIL best practices in order to achieve IT service management (Iden & Eikebrokk, 2013). ITIL is developed with a perspective of a process based system for controlling and managing IT operations, including continuous improvement and metrics.

It was developed during the 1980s by the Central Computer and Telecommunications Agency (CCTA) of British Government. Currently, ITIL is a trademark and is owned by the Office of Government Commerce (OGC) in UK. Until now, three versions of ITIL has been released and because of its popularity, ITIL has become a “de facto standard for ITSM” (Iden & Eikebrokk, 2013).

The first version (ITIL V1) was released between 1989 and1994. The second version (ITIL V2) was released between 2000 and 2004. The focus of this version was on process improvement, delivery, and support and infrastructure management. The third version (ITIL V3) was released in 2007 with focus on management of service life cycle including Service Strategy, Service Design, Service Transition, Service Operations and Continual Service Improvement (OGC, 2007). Figure 2-1 shows ITIL framework service life cycle.

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Figure 2-2 ITIL Lifecycle (Muhammad, 2015).

Each phase of the ITIL life cycle defines key set of processes and functions. Processes are examples of closed-loop systems because they provide change and transformation towards a goal, and use feedback of self-reinforcing and self-corrective action (OGC, 2007). Functions are units of organizations specialized to perform certain types of work and responsible for specific outcomes (OGC, 2007). Both processes and functions operate across the entire service lifecycle but belong predominantly to one lifecycle stage. Table 2-1 presents the ITIL V3 lifecycle phases and their defined key processes and functions.

<table>
<tr><th>Service Strategy</th><th>Service Design</th><th>Service Transition</th><th>Service Operation</th><th>Continual Service Improvement</th></tr>
<tr><td>Strategy management for IT services</td><td>Design coordination</td><td>Transition planning and support</td><td>Event management</td><td rowspan="9">Seven-step improvement process</td></tr>
<tr><td>Service portfolio management</td><td>Service catalogue management</td><td>Change management</td><td>Incident management</td></tr>
<tr><td>Financial management for IT services</td><td>Service level management</td><td>Service asset and configuration management</td><td>Request fulfilment</td></tr>
<tr><td>Demand management</td><td>Availability management</td><td>Release and deployment management</td><td>Problem management</td></tr>
<tr><td rowspan="5">Business relationship management</td><td>Capacity management</td><td>Service validation and testing</td><td>Access management</td></tr>
<tr><td>IT service continuity management</td><td>Change evaluation</td><td>Service desk function</td></tr>
<tr><td>Information security management</td><td rowspan="3">Knowledge management</td><td>Technical management function</td></tr>
<tr><td rowspan="2">Supplier management</td><td>IT operations management function</td></tr>
<tr><td>Application management function</td></tr>
</table>

Table 2-1 Processes and functions across the ITIL service lifecycle. Source (Muhammad, 2015).

Service Strategy

Service Strategy is the first phase of ITIL and is considered as being the core of the lifecycle. It sets out guidance to all IT service providers and their customers to help them operate and thrive in the long term by building a clear service strategy (ITIL Service Strategy, 2011).

Service Design

The Service Design phase ensures that the newly designed or changed services are in accordance to business needs. The purpose of this phase is the design of appropriate and innovative IT services, including their architectures, processes, policies and documentation, to meet current and future agreed business requirements. This phase starts with the set of business requirements and ends with service solution design. At the end of this phase the Service Design Package is handed over to the succeeding phase, i.e. the transition phase (ITIL Service Design, 2011).

Service Transition

Service Transition ensures that new, changed or retired services are in accordance to business needs as stated in the Service Strategy and Service Design phases of the lifecycle. This phase aims to deliver services that are required by the business into operational use. Service Transition delivers this by receiving the Service Design Package from the Service Design stage and delivering to the Operational stage every necessary element required for ongoing operation and support of that service (ITIL Service Transition, 2011).

Service Operation

The Service Operation phase aims to deliver agreed levels of service to users and customers, and to manage the applications, technology and infrastructure that support delivery of the services. It is only during this stage of the lifecycle that services actually deliver value to the business, and it is the responsibility of Service Operation staff to ensure that this value is delivered (ITIL Service Operation, 2011).

Continual Service Improvement

This phase maintains value for the customers through continuous evaluation and improvement of quality of services throughout the ITSM lifecycle and all underlying processes. Principles, methods and practices from quality, management, change management and capability

improvements are applied to improve each step in the service life cycle and also for current services, technology and related processes (ITIL Continual Service Improvement, 2011).

2.4. ISO/IEC 20000

Unlike frameworks, ISO 20000 is a standard which is used to measure the maturity of ITSM (Vaitha & Francis, 2016). The IT services providers use this standard as a benchmark due to the fact that it helps in provision of specifications to the service providers as well as pointing out if the management standard related to the services of the organization is adequate for use. ISO 20000 and ITIL are very compatible, even though their approaches are different.

2.5. Benefits of ITIL

By adopting industry best practices like ITIL and updating IT infrastructure, companies can lower annual downtime by up to 85%, greatly reduce interruptions to daily IT operations (Spremic, Bajgoric, & Turulja, 2012). Galup, Dattero, Quan, & Conger (2009), stated the result of recent studies show that an IT service organization could achieve up to a 48% cost reduction by applying ITIL framework. This indicate that, implementation of ITIL framework combined with other IT-related solutions can deliver substantial business risk reduction and result with reduced system downtime.

Adoption of ITIL framework leads to improvements in IT services, customer satisfaction, reduce operational costs, develops service oriented culture and a standardize way of communication both within and external to the organization (Iden & Eikebrokk, 2014). In addition to that, a successful implementation of ITIL framework in an organization will offer various benefits. Marrone & Kolbe (2011), has discovered the benefits of ITIL by reviewing conference papers and peer reviewed articles as shown in Table 2-2

Improvement of...	Hochstein et al., 2005	Potgieter et al., 2005	Kießling et al., 2009	Cater-Steel et al., 2006	Cervone, 2008
Service Quality	X	X	X	X	X
Standardization of Service	X		X	X	
Customer Satisfaction		X	X	X	
Return on Investment			X	X	X
Reduction of Downtime				X	X
Best Practice	X				
Financial Contribution Control				X	
Call Fix Rate				X	
Morale of IT				X	

Table 2-2 Benefits of ITIL Framework implementation to customers and the IT organization. Source (Marrone, Kießling, & Kolbe, 2011)

Table 2-2 revealed that among the listed benefits of ITIL, improving service quality was taken as a major benefit in all of the reviewed researches. Besides, standardization of services, customer satisfaction, and return on investment were considered as second important benefits in most of the reviewed researches.

2.6. ITIL Framework Implementation

Implementing ITSM framework, particularly ITIL is not easy and it is common that ITIL implementations end in failure (Schmidtbauer, Sandkuhl, & Stamer, 2013). According to Ruben (2010), implementing ITIL is not only very difficult but also there are no recommendations and guidelines for it. Many organizations that decide to implement ITIL fail completely. Many others keep implementing ITIL long after the planned deadline. Empirical evidence shows that several organizations underestimate the time, effort, and risks – not to mention the cost – of implementing ITIL.

There are many publications on ITIL, but they do not describe methodologies, strategies or step by step guidelines for ITIL implementation. Even the publication from ITIL governing organization, OGC, does not include a guideline for successful implementation (Muhammad, 2015). The documentation explains all the processes but it doesn't tell how that implementation should be made. It also dictates organizations “what they should do” but it is not clear in “how

they should do it" based on a large number of tightly integrated processes. Consequently, ITSM implementations are usually long, expensive and risky (Nicewicz-Modrzewska & Stolarski, 2008). Therefore, Chief Executive Officers (CEOs) should think twice before going forward with the implementation.

In addition, although there are twenty six processes that in ITIL V3 framework, it is unlikely that all this processes to be found in every business (Lloyd, Wheeldon, Lacy, & Hanna, 2011). Thus, during implementation, those processes that make sense and fit into the way the organization wants to do business in the future hast to be identified. Some processes may be abandoned later when post-implementation reviews show limited value, while others may be implemented as gaps are uncovered or needs change. Additionally, trying to adopt the whole processes of not only ITIL but also any other frameworks lead the framework implementation into complexity and difficult scenario (Taghva, Tlaghavifard, & Fasihi, 2016).

2.7. ITSM Maturity Assessment

The term "maturity" is understood as the stages or levels of improvement that characterize a specific entity (Andersen & Henriksen, 2005). An assessment is used to establish status relative to a standard or general requirement and used to identify opportunities for improvement (Oehrlich, Mann, Garbani, O'Donnell, & Rakowski, 2012). A maturity assessment can be used to measure the current maturity level of a certain aspect of an organization in a meaningful way, enabling stakeholders to clearly identify strengths and improvement points, and accordingly prioritize what to do in order to reach higher maturity levels (Svatá & Fleischmann, 2011).

Before starting an ITIL framework implementation, an organization needs to understand "where we are today" (current state) in order to know "where do we want to be" (desired state). The gap between the current and desired state will become the basis for an ITIL framework implementation plan (Lloyd, Wheeldon, Lacy, & Hanna, 2011). Weill and Ross also underline the importance of defining the current state and the desired state before initiating any improvement initiatives (Ross & Weill, 2004). To define the current state and starting the ITIL framework implementation by establishing an 'as-is' baseline, several different methods or a combination of methods are available (Addy, 2007). One of the most commonly used methods is to do a maturity assessment.

ITSM maturity assessment is used to determine the quality and effectiveness of the ITSM practice in an IT organization as compared to best practices or frameworks. Assessing an ITSM practice maturity level indicates how much of the framework to implement, and where to start. The result provides a point-in-time snapshot of existing ITSM practices to be used in continual service improvement activities. The objectives of assessment is to provide a baseline assessment of current ITSM practice maturity, identify key areas of improvement in relation to organizational needs and compare existing ITSM practices against a set of best practices.

One of the options to measure the IT service maturity is by comparing the IT service team's operations, planning and processes against the international frameworks. A maturity model can be viewed as a set of structured levels that describe how well the behaviors, practices and processes of an organization can reliably and sustainably produce required outcomes (Becker & Knackstedt, 2009). The model provides a theoretical continuum along which process maturity can be developed incrementally from one level to the next. Skipping levels is not allowed or feasible. For example, it is not possible to go from the 1st to the 4th without going through the intermediate stages. It is also impossible to manage processes unless they are defined and described. Also, cannot improve the processes if they are not measured and not controlled.

Most maturity models define five evolutionary levels an organization passes through as it becomes more competent. At each maturity level organizational competence increases. The bottom stage stands for an initial state that, for instance, can be characterized by an organization having little capabilities in the domain under consideration. In contrast, the highest stage represents a conception of total maturity. In short, organizational maturity indicates how much of best practices or frameworks to implement, and where to start. Thus assessing organization maturity is critical to ITSM Implementation.

CMMI (Capability Maturity Model Integration) is an improved model of capability maturity model in order to be used in a more diverse range of fields. It is used for the development of products and services. CMMI can be used to guide process improvement across a project, division, or an entire organization. CMMI introduces work activities that organizations can follow to manage, improve, and assess their processes within a framework of five maturity levels each of which indicates how an organization execute required software development processes. CMMI currently addresses three areas of interest:

- Product and service development — CMMI for Development (CMMI-DEV),
- Service establishment, management, — CMMI for Services (CMMI-SVC), and
- Product and service acquisition — CMMI for Acquisition (CMMI-ACQ).

CMMI-SVC, known worldwide, is a very complete model, focuses on service and contains concepts of CMMI and the well-known standards like in ITIL, COBIT and others. It's also a very detailed model. Describes both continuous and staged models and that is excellent. Besides, the evolution of CMMI-SVC is focused on services. The five Maturity Levels are set from 0 to 5 each level representing a foundation of continuous improvement of processes.

2.8. Related Works

Muhammed (2015) presented guidelines to implement ITIL framework to address lack of strategies or step by step guidelines for ITIL framework implementation. The author identified the importance of ITIL, its benefits and facilitating and challenging factors associated with implementation. The extracted factors were compiled, grouped and analysed to develop implementation steps. Finally, developed an implementation steps, which any organisation can use as guideline to adopt ITIL framework. However, the study did not contextualized ITIL framework as per the context of a case study organization by identifying the maturity assessment of existing and desired ITSM practices. In addition to this, the study did not discribe ITIL processes major activities through flowchart and the key performance indicators for the processes.

On the other hand, Ahmad, Amer, Qutaifan, & Alhilali (2013) has proposed a 12 step ITIL framework implementation roadmap that aimed to address the challenges of aligning IT services with critical business requirements. The implementation roadmap is proposed based on experience and knowledge gained during a practical attempt to implement ITIL in a case study organization. It focuses on the organizational commitment, employee awareness and implementation requirement rather than the detailed implementation of the processes. Furthermore, the research is more targeted towards practitioners like IT experts than academicians and executives. Even if the critical success factors are identified for implementing ITIL, no maturity assessment is done in order to demarcate the existing and desired state of ITIL

processes. Moreover, details of ITIL process description and flowchart is not included in the study.

Bovim, Johnston, Kabanda, Tanner, & Stander (2014), studied the adoption of ITIL in South African through the lens of the CMMI. The study assessed capability maturity level of ITIL processes of using a case study approach. The result revealed how the service desk and the development of the incident management process was the initial drivers for ITIL adoption and quick wins with tangible benefits were crucial to gain continued management commitment for the further implementation of ITIL processes. The report makes a contribution to the empirical examination of ITIL adoption; however, more in depth analysis of all the ITIL processes are not addressed.

Seife (2015) explored influencing factors that act as barriers and critical success factors to the implementation of ITIL framework in EthioTelecom. The study was used the inductive approach as research design and pattern matching as mode of data analysis. His result was focused on influencing factors and barriers of ITIL framework implementation, but not on proposing implementation guideline.

Dabi (2017), investigates the existing ITSM practice of Bunna International Bank. The results indicated that out of the twenty four ITIL V3 processes in scope, twenty two did not fully or largely achieve their intended purpose in the case study organization. Finally, he developed a tailored IT service management process framework based on ITIL for Ethiopian commercial banks. He suggested that future studies can also carry out to propose work flows, policies and procedures to implement ITIL framework.

Senait (2011), on her thesis entitled “IT Governance in Ethiopian Financial Sector: a case Analysis of Commercial Bank of Ethiopia” used qualitative research method to investigate the status of IT Governance at CBE using COBIT framework with regard to strategic alignment, risk management, IT resource management and performance measurement. She found that IT Governance status at CBE is at a very low level even though there is awareness; practically there is no standardized way of governing IT. Regarding alignment of IT with business there is visible gap (misalignment of IT with business); there is also a gap in managing IT resource and risks.

According to her result, in CBE there is no standard way of governing IT and there is a misalignment of IT with business.

2.9. Research Gap

Prior studies focused on ITSM/ITIL maturity assessment, development of tailored ITIL framework, identifying influencing factors of ITIL framework implementation, developing ITIL framework implementation steps based on experience and knowledge gained during a practical attempt to implement ITIL and extracted and compiled the factors of ITIL framework.

To the best of the researcher knowledge there is no study conducted locally which addressed the challenges of ITIL implementations by proposing an ITIL framework processes implementation guideline according to organizations priority using the result of assessment as a benchmark input.

However, the majority of the implementations of such programs was not successful and did not provide the expected benefits. This is because there is no clear guideline for ITIL framework implementation. Besides, implementation of ITIL is one of the top challenges of IT department, because it brings changes in the organizational culture, processes and staff which help in reorganizing the approaches used to do business supported by IT (Vaitha & Francis, 2016). Moreover, studies indicate that ITIL implementation guideline is one of the current potential research areas. Therefore, in this study the researcher attempts to propose an ITIL V3 framework processes implementation guideline by assessing the existing and desired ITSM practices of case study organization.

Author	Objective	Method	Finding	Gap
Senait (2011)	Examine maturity of IT Governance status at CBE	Qualitative research	Very low IT Governance status at CBE; misalignment between business and IT; not managed IT risk	ITSM/ITIL implementation was not addressed.
Dabi (2017)	Develop a tailored ITSM Framework based on ITIL framework	Inductive approach	Out of 24 ITIL processes, 22 not fully implemented in the case study organization. Finally, tailored ITIL framework is proposed.	Implementation guideline was not proposed
Seife (2015)	Explored influencing factors that act as barriers and critical success factors to the implementation of ITIL framework in EthioTelecom	Inductive approach	Identified the influencing factors and barriers of ITIL framework implementation	ITIL implementation was not addressed.
Muhammed (2015)	To propose guideline for ITIL framework implementation guideline.	Deductive approach	Proposed guidelines for ITIL framework implementation which are based on the important factors that facilitates or become barriers while implementing ITIL processes.	Proposed guideline is not contextualized and ITIL processes major activities and key performance indicators are not included in the study.
Ahmad, Amer, Qutaifan, & Alhilali (2013)	To help the decision maker to better map ITIL processes with business performance.	UTAUT theory qualitatively	Proposal of a roadmap for ITIL framework implementation	Proposed guideline is not contextualized and ITIL processes major activities and key performance indicators are not included in the study.
Bovim, et al. (2014)	Evaluate the adoption of ITIL in South African through the lens of the Capability Maturity Model	Mixed approach	Service desk and incident management process are the initial drivers; quick wins with tangible benefits were crucial	More in depth analysis of all the ITIL processes are not assessed.

Table 2-3 Summary of Related works

Chapter 3

Research Methodology

This chapter describes the Design Science Research Method (DSRM) methodology used to propose an ITIL framework processes implementation guideline for the context of CBE. Each stages of the DSRM along with what is done, why it is done and how it is done in this study is described.

3.1. Research Design

Research design is a consistent and a sound process undertaken by a researcher to collect, analyze and interpret data (Yin, 2009). The plan and the structure of the process that the researcher undertook in this study to collect and analyze the research data is described below.

This research used a case study research method to identify the existing and desired ITSM practice of CBE. A case study is a widely accepted and used method in ITSM and it's useful for making in depth analysis of specific organization (Iden & Eikebrokk, 2013). The rationale for selecting CBE as a case study organization is because it is the biggest in terms of customer base, capital and banking services provided. It is also the first bank in Ethiopia to introduce modern banking and ATM service for local users (Commercial Bank of Ethiopia, 2012). The other rationale is CBE has a vision to become a world-class commercial bank by the year 2025 and implementing ITIL framework is one of its five year corporate strategic plans.

According to Hevner, March, Park & Ram, (2004), two paradigms describe much of the research in the Information Systems discipline which are behavioral science and design science. Design science 'creates and evaluates IT artifacts intended to solve identified organizational problems'. Accordingly, in this study, an ITIL framework implementation guideline is considered as an IT artifact that can address the challenge and complexity of ITIL framework implementation. Therefore, this study follows design science paradigms.

Design Science Research Methodology (DSRM) offered by Peffers, Tuunanen, Rothenberger, & Chatterjee, (2008) was used to develop an ITIL framework processes implementation guideline.

It is used as a tool to create and evaluate an IT artifact. The DSRM has six stages: problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation and communication. Figure 3-1 presents the six stages of DSRM method.

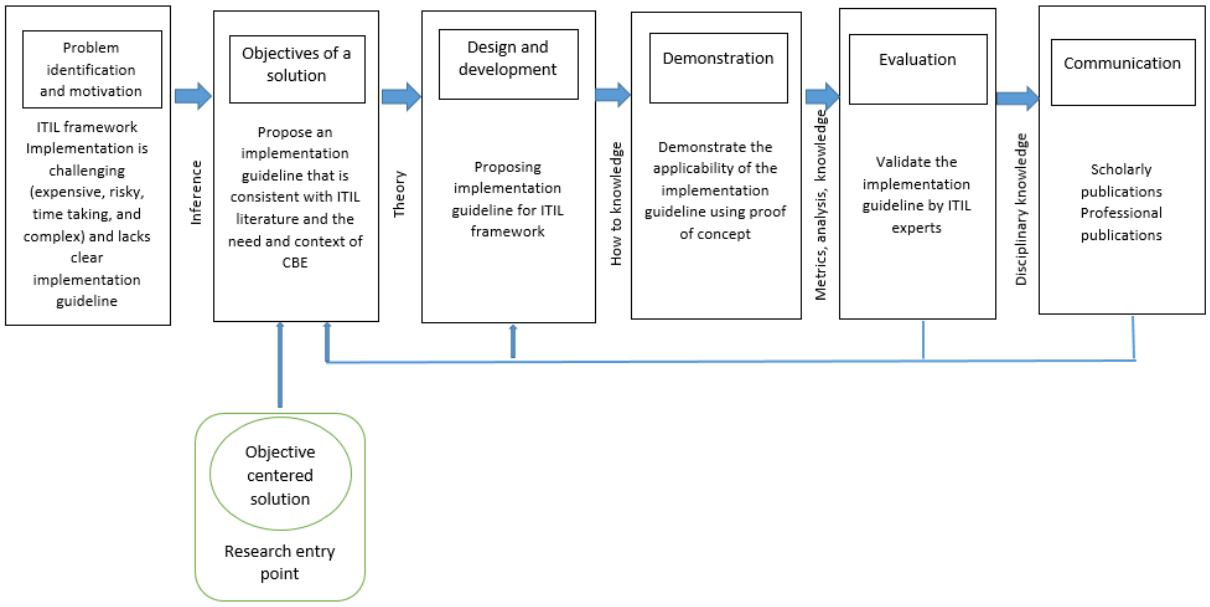

Figure 3-1 Design Science Research Methodology process model (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2008)

3.2. Problem Identification and Motivation

In DSRM, problem identification and motivation is the first stage in which the specific research problem is clearly defined and the value of proposing a new solution is justified. This task helps the researcher and audience of the research to understand the state of the problem and motivates the researcher to pursue the solution. The problem identification and motivation can be done using literature review and survey.

In this study, a literature review has served multiple purposes. Firstly, it has motivated the researcher to have interest in the research area. Secondly, it is used to identify the problem and understand the state of the problem in both foreign and local contexts. Accordingly, in both contexts the researcher has observed ITIL framework implementation is a challenging problem and not thoroughly researched area of study. The detail of the literature review used for problem identification is given in chapter 2.

In addition to this a survey is conducted to justify the necessity and value of proposing a solution for ITIL framework processes implementation guideline. The survey used questionnaire and semi-structured interview as a data collection instrument. The questionnaire is adapted from PinkSCAN ITSM tool suite assessment service (Pink Elephant, 2008), which is a standardized self-assessment methodology and online toolset that has been developed by Pink Elephant (Appendix D).

The rational for selecting PinkSCAN ITSM survey instrument is that sample questions can easily accessed from the internet without payment and subscription fee. In addition to that, the instrument is similar with APMG processes assessment instrument.

PinkSCAN uses CMMI-SVC process assessment model to describe five evolutionary stages (levels) in which an organization manages its processes through maturity. The rationale for selecting this model is that CMMI-SVC focuses on the service quality and delivery. It is also designed based on the concept of known standards and frameworks like ITIL.

A one-to-one interview with participants is also used to solicit additional information to support the results of the questionnaire and to make triangulation (Appendix E). The interviewees were selected purposively based on their role, experience and involvement in ITSM within CBE. The number of interviewee selected for this study was five.

The target population for the survey and interview was CBE technical IT employees and managers who have a direct linkage with the IT service delivery and management. According to the bank's Enterprise Resource Planning (ERP) system report, currently there are 534 IT staffs throughout the bank. Since the target population is heterogeneous, the researcher used proportional stratified sampling technique for the quantitative analysis in order to get proportional representative sample from the users of the six IT departments (Appendix F). The main purpose of using stratified sampling is to reduce bias and ultimately improve the precision level of the output of the study. The target population is stratified according to the differentiation of their profession and specialization in the population. Sample size is determined based on the sampling formula of Choheran (1977), sample size (n_0=384) determined by considering a target population of 534 IT staffs with 90% confidence level and 5% confidence interval (Appendix F). Finally, the number of the questionnaire, used for the survey, distributed to the respondents was (70) which include (10) more questionnaires to the number of determined sample size which is

60. Of the total number of distributed questionnaires, 64 were collected. This indicates the achievement of 91% response rate. Of the 64 responses collected, 2 responses deemed incomplete, leaving 62 usable responses that are ready for analysis of the study.

3.3. Objectives of a Solution

The objective of a solution to be proposed is inferred from the problem definition in the first stage of the DSRM. The objectives can be quantitative or qualitative. In this study two qualitative objectives are set so as to propose an ITIL framework processes implementation guideline. The first objective is that the artifact must be consistent with available ITIL literature. The second is it must be consistent with the needs and priority of the case study organization.

3.4. Design and development

The design and development stage of DSRM is concerned with creating an artefactual solution for the identified problem according to the objectives of a solution. Prior literature and ITIL publications were used as a conceptual foundation for the development of the proposed implementation guideline. Based on the conceptual foundation, an assessment of the existing and desired ITSM practice of CBE according to ITIL frameworks is conducted. CMMI-SVC processes assessment model is for the assessment. The result of the assessment is used as a benchmark and input for developing the implementation guideline. Moreover, the assessment result is used to define the requirement for the design and development phase of the study. Accordingly, out of 26 ITIL V3 processes in scope, processes which are categorized as “Very Important” for the context of CBE are highly prioritized and selected to be incorporated in the design and development of the artifact.

3.5. Demonstration

Demonstration is a stage in which the efficacy of the artifact to solve the problem is demonstrated. Demonstration can be done using experimentation, case study, proof, or other appropriate activity. In this study we used proof of concept to demonstrate the efficacy of the proposed ITIL framework processes implementation guideline. Accordingly, a worked example of applying the proposed ITIL framework implementation guideline is provided on three CBE’s IT change, service request and incident management scenarios under the IS department. The rationale for selecting these processes for demonstration is that the impacts of these processes are

more tangible and convenient for demonstration. Particularly, Incident management process is the first suggested process to be implemented according to (Lemma, Calvo-Manzano, Colomo-Palacios, & Magdalena, 2015), whereas Service request and change management processes are suggested as next processes to be implemented after incident management.

3.6. Evaluation

In the sixth stage of DSRM, observation and measurement is performed in order to evaluate the capacity of the artifact to resolve the problem identified in the first stage. This can be done by comparing the results of using the artifact in the demonstration with the objectives of a solution set in the previous stage. An IT artifact can also be evaluated by observational, analytical, experimental, testing, expert validation, and descriptive methods (Hevner, March, Park, & Ram, 2004). These evaluation methods can be applicable depending on the type of the study at hand. In this study, expert validation is used to evaluate the proposed framework. Accordingly, focus group discussion is used to gain expert validation (Appendix G). The rational for selecting expert validation technique is due to the nature of the study and the different constraints of the study. The constraints are inability of observing, experimenting and testing the proposed implementation guideline in practical environment.

3.7. Communication

Communication is the final stage of DSRM. In this stage all the study result obtained in the previous stages including, problem and its importance, the artifact, its utility, novelty, the rigor of its design and its effectiveness is presented. Communication can be done using various scholarly and professional publications. In this study communication is being done through this M. Sc. Thesis report. In the future, the researcher has plans to publish the study on international journals and do presentation on conferences. The artifact has also been presented to CBE IS managers and ITIL implementation project team members.

Chapter 4

Problem Identification and Defining the Objective of the Solution

In this chapter the first two DSRM steps i.e. problem identification and objective of the solution are described in detail. As described in the methodology, in order to identify the problem a literature review and a survey in a case study organization is used. Accordingly, the specific problem and research gap is identified by measuring the maturity level of ITSM practice in CBE using CMMI-SVC process assessment model against ITIL framework. In the first section the requirement identification of the study is presented. The result of the existing and the desired level of ITSM practice in CBE according to ITIL framework is discussed in section two and three respectively. The fourth section presented the existing problem which is the gap between the existing and desired ITSM practice of CBE according to ITIL framework. Finlay, the objective of the solution is presented in the last section.

4.1. Requirement Identification

In order to identify ITSM requirements of CBE a face to face semi structured interview with five IT department managers has been conducted (Appendix A). Along with the semi-structured interview, document analysis is done through review of provided documents some of these documents are IT service delivery announcement memos from the library of internal portal and five year corporate strategy. In this section the compiled responses of the interview questions are presented along with the document analysis. The responses are collected from managers of CBE's IT departments. The managers are from Infrastructure Management, Application Management, Service Desk Management, IT Security Management and Program Management Office.

From the responses of the interviewee for the question "What core IT services does your department currently provides?" The following core IT services provided by each department is identified:

- Design, implementation and maintenance of IT infrastructure
- T24 CORE banking solution operation and maintenance

- IT Project Management
- Design, develop, customize and integrate different applications
- Network, systems and storage management
- E-payment services like ATM, POS, mobile banking and internet banking

The interviewees stated that Due to expansion of CBE in terms of ICT Infrastructure and applications, it would be difficult to manage IT in one process alone. As we can see from the organizational structure (Appendix A), in CBE IT departments are handled by different Chiefs. The first and the core process is handled by the Vice president of IS. This person represents the overall IS process and reports for the president regarding any issue related with IS. The next chief is E-payment director and this person only represents E-payment process, besides he/she is reports for the president regarding any issue related with E-payment service. The other chief is PMO director and this person control overall IT projects and reported for the president. In addition to that, Management Information Security and IT audit, which are under Chief Risk and Compliance Officer and Chief Internal Auditor are other IT departments which are included in other sub processes.

According to the organizational structure of IS at CBE, the main IS process is divided into two directors; Application and Infrastructure Management (AIM) and Management Information System (MIS) (Appendix C). AIM coordinates three managers: Infrastructure Management, Application Management and Service Desk. MIS coordinates two teams; Business Analysis Team and Technical Development Team. The AIM structure followed a tired support structure that consists of three support levels.

4.1.1. Application and Infrastructure Management

AIM coordinates three managers: Infrastructure Management, Application Management and Service Desk. The AIM structure followed a tiered support structure that consists of three support levels.

I. Level-1 Support (First Line Support)

This line consists of the first group of technical generalists who receive an incident. Staff at this tier will attempt to provide users with needed information and resolve the problems. The three

units that act as Level-1 Support under Service Desk are Infrastructure (Network) Support, Application Support and IS Workshop Team

II. Level-2 Support (Second Line Support)

This line consists of professionals that solve issues that were not resolved by the Level 1 support team. Staffs at this level are expected to be professionals with greater technical skills to solve specific problems than first-level support personnel. Three units act as Level-2 Support under Application Management and Infrastructure Management. Application Management includes Application Customization and Support, Change Management and Interface Management Team. Infrastructure Management includes Network & Sever Administration, Database and Intranet Administration and Data Center Management (includes Facilities and Physical Security).

III. Level 3 Support (Third Line Support)

This last level of support is expected to be provided by the respective suppliers of each product. Only few issues that were beyond the capacity of the Level 2 support group are routed to this tier.

4.1.2. Management Information System (MIS)

The MIS Sub-process is mainly responsible for managing the business intelligence and reporting requirements of the bank. MIS coordinates two teams; Business Analysis Team and Technical Development Team. The Business Analysis team is responsible for identifying the information needs of the bank which will be analyzed and synthesized in a presentable manner. The team promotes data standards, data quality, and manages Data Warehouse metadata and ensures the establishment of a comprehensive data warehouse. The Technical Development team is responsible for the technical aspects of the MIS related tasks including: development of scalable solution architecture, managing the MIS database, performing extraction, transformation, development and customization of reports and managing the Enterprise Data Warehouse of the Bank.

4.1.3. Program Management Office (PMO)

CBE's PMO team is also responsible in researching, testing and analyzing new products and services while continuing to leverage cutting-edge technology to meet and exceed the growing expectations of customers.

4.1.4. Information Security Management (ISM)

CBE's Information Security team is responsible in employing infrastructure safeguards and controls in order to protect the Bank information and information assets. The security team also provides security information and incident management, vulnerability scanning, firewall services, intrusion detection/prevention services, and security awareness training for all CBE staff.

4.1.5. Electronic Payment (E-payment)

E-payment is a way of delivering banking services using different electronic channels like ATM, Internet Banking, Mobile Banking, and POS. And this feature helps the Bank to provide services across range of channels. CBE's E-payment team is a dedicated team to ensure stable, secured and 24/7 E -payment services and timely provision and delivery of all applicable software/hardware, along with proper network configuration and deployment, for E-payment systems.

The interview responses for the question, "How well are you currently meeting your ITSM objectives?" , it is found out that currently the service desk receives user requests most via telephone and Email with a little number of requests via memo. Anyone who happened to receive a call from the customer can act as a service desk agent and ad-hoc support activities are done afterward. If the support requested need 2nd level support, the request will escalated to second level support team according to the service category. If the problem cannot be resolved by the 2nd level support team it will be escalated to 3rd level support or communicate the supplier/vendor.

The service desk team is available six days in a week and nine hours per day (6x9). The team works in two shifts for accepting user requests. The first shift is from 8:00AM to 5:00 PM excluded an hour for lunch time and the second shift is from 3:00AM to 6:00PM. This shift is adapted from the bank official service delivery hours. User can send their request through email, either call using service desk department lined telephone numbers or individual's mobile phone for support.

For the question “Are you currently using tools that support the ITSM processes?” The respondents stated there are some tools in use, which are mostly used for monitoring of systems, network and ATM status; however the tools did not defined according to ITSM processes. On the other hand, for the question “Do you have policies and procedures that support ITSM processes?” the interviewee’s are informed that they have user access, backup and network policies however, the policies are not presented according to best practices or ITSM framework.

For the question “Is there any challenge on the achievement of ITSM objectives and IT service delivery?” the interviewees stated that there is no central repository for IT service that include list of IT services, the responsible and support organ. This may create difficulty on users to identify the service owners and for whom they have to send their request, incident and problem. On the other hand, the interviewees stated the level of IT services delivery and availability is not defined and there is no agreement between IT service provider and IT department. This causes difficulty on the users to understand on what level they can get the service and to measure the delivery of service. In addition to these, the respondents stated sometimes changes may be uncontrolled and causes service interruptions and such kinds of scenarios may create bank wide impact.

Finally, the interviewees responded the rest of two questions together which are “Do you think that there is a need for ITSM framework in order to meet the needs of your customer?” and “Is there any strategy plan regarding IT services or governance?”

Based on the interviewee’s responses, CBE has a very ambitious business growth plan, including, being a world class bank in 2025. Accordingly, many IT initiatives are on the way in all areas of the bank. One of these initiatives is the implementation of ITSM framework to enable the bank to deliver effective and efficient IT services that meet current and future business requirement. To this end, the Bank has selected ITIL framework, allocated the necessary budget and established a dedicated project team of staffs. However, due to the vastness of the Bank, lack of consulting organ which has the capability to understand the working culture, environment and situations of CBE coupled with the complexity of implementing ITIL framework, the bank has missed the one year implementation deadline. Consequently, the framework has not formally implemented yet.

4.2. Maturity Level of ITIL processes in CBE

The first step in implementing ITIL framework is to start with a comprehensive assessment of the maturity level of existing ITSM practice using frameworks as a benchmark. Therefore, this study has identified the existing maturity level of ITSM practice of CBE according to ITIL framework. For this purpose, respondents were presented with six point Likert scale questionnaire where 0(Zero) being the lowest score and representing "Non-Existent" stage and 5 (Five) being the highest score and representing "Optimized" staged (Appendix D). Based on the scale, the respondents were asked to choose the level that best describes the existing maturity level of 26 ITIL V3-2011 processes. The ITIL processes assessment has been done based on the CMMI-SVC process assessment model scale.

During data interpretation, non-responded elements of the questionnaire were analyzed based on the responded values. For each process there were five states with each state having different rating factors and the respondents' agreement on each processes maturity level are stated with their respective service life cycle phase. In situations where the mean value is found to be in between the five states, the result will be rounded to the lowest state if it is below the middle value. On the other hand if the result is equal to the middle value or above it will be rounded to the higher state. Then the survey result was complemented and triangulated with semi structured interview with managers and the result is presented below.

4.2.1. Maturity Level of Service Strategy Processes

As shown on table 4.1, out of the five ITIL Service Strategy processes, the average maturity level of Strategy Management for IT Service process were rated 0.6 which is close to 1 or "Initial" stage. The rest four processes were rated below 0.5 which is close to 0 or "Non-Existent" stage.

Regarding the maturity level of Service Strategy processes the interviewees indicated that, currently none of ITIL service strategy processes are implemented in CBE. However, IT strategic plan is included in the corporate strategic plan. Since Strategy Management for IT Service is a subset of IT Service strategy, there is an effort on IT service strategy management process than other service strategy processes. Another respondent also confirmed that the

inclusion of IT strategy in corporate strategy is relatively a recent concept and Service strategy processes have never been applied at all in CBE.

Concerning the existing maturity level of ITIL Service Strategy processes, the questionnaire result agrees with the interview result. Therefore, it is concluded that the maturity level of ITIL Service Strategy processes at CBE is very low or "Non-existent" stage except a starting effort on Strategy Management for IT service process.

4.2.2. Maturity Level of Service Design Processes

As indicated in table 4.1, from the eight ITIL Service Design processes, the average maturity level of Information Security Management process was rated 1.3 which is close to 1 or "Initial" stage. Capacity Management and IT Service Continuity processes were rated above 0.5 which is close to 1 or "Initial" stage. The maturity level of Availability Management process is rated 0.5 and rounded to 1 or "Initial Stage". The rest of processes are rated below 0.5 which is close to 0 or "Non-Existent" stage.

On the subject of the maturity level of Service Design processes, the interviewees argued that CBE has structured and dedicated IT Security department and security monitoring center with full time security practitioners. However, not yet matured security practices are observed in CBE wide. Information security policy, standards, procedures, guidelines and documentation are not being maintained based on ITIL framework. The respondents also stated that there are attempts with respect to capacity, availability and IT service continuity management. However, the attempts lack consistency, integration and alignment with ITIL framework.

The questionnaire results of existing maturity level of ITIL Service Design processes complement each other. Therefore, it can be concluded that maturity level of Service design processes at CBE is at "Non-Existent" stage except for Capacity Management, Availability Management and IT Service Continuity processes which are at "Initial".

4.2.3. Maturity Level of Service Transition Processes

According to Table 4.1, out of seven ITIL Service Transition processes, the average maturity level of Change Management process was rated above 1 or 1.3 which is close to 1 or "Initial" stage. The other processes were rated below 0.5 which is close to 0 or "Non-Existent" stage.

The interview result about the maturity level of Service Transition processes revealed that, CBE has structured Change Management department even though some change management activities are not performed as per ITIL framework recommendation. According to the interviewees the rest of service transition processes are not formally adopted.

About the existing maturity level of ITIL Service Transition processes the questionnaire result agrees with the interview result. Therefore, it is determined that the maturity level of ITIL Service Transition processes at CBE is very low or "Non-existent" stage except Change Management process.

4.2.4. Maturity Level of Service Operation and Continual Service Improvement Processes

The maturity level of Service Operation and Continual Service Improvement processes are presented on Table 4.1. As shown in the table, from five ITIL Service Operation processes, the average maturity level of Event Management process was rated 0.87 which is close to 1 or "Initial" stage. The other processes rated below 0.5 which is close to 0 or "Non-Existent" stage. The maturity level of Continual Service Improvement process was rated 0.2 which is close to 0 or "Non-Existent" stage. This indicates that the service improvement process is not applied in CBE.

In relation with Service Operation and Continual Service Improvement processes the interview result shows that even though there is a service desk team which is dedicated first level support team, CBE has not formally applied Service Operation and Service Improvement processes. Other respondents also confirmed some activities of the service operation processes are being practiced. However, the activities are not guided by ITIL framework and incidents, problems and requests are not properly controlled and managed.

The result of the questionnaire and interviews complemented each other on both Service Operation and Services Improvement processes. Therefore, the researcher concludes the maturity level of Service Operation processes and CSI is at CBE is at "Non-Existent" stage except for Event Management process.

ITIL Framework V3 Processes with respect to their Life Cycle		Scale	Non-Existent	Initial	Repeatable	Defined	Managed	Optimized	Total	Mean
Maturity Level of Service Strategy Processes	Strategy Management for IT Service	Frequency	34	18	10	0	0	0	62	**0.61**
		Percent	54.8	29	16.2	0	0	0	100	
	Service Portifolio Management	Frequency	37	20	5	0	0	0	62	**0.48**
		Percent	59.7	32.3	8	0	0	0	100	
	Demand Management	Frequency	41	14	7	0	0	0	62	**0.45**
		Percent	66.1	22.6	11.3	0	0	0	100	
	Financial Management for IT service	Frequency	53	9	0	0	0	0	62	**0.14**
		Percent	85.5	14.5	0	0	0	0	100	
	Business Relationship Management	Frequency	46	13	2	0	0	0	61	**0.27**
		Percent	74.2	21	3.2	0	0	0	98.4	
Maturity Level of Service Design Processes	Design Coordination	Frequency	51	9	2	0	0	0	62	**0.2**
		Percent	82.3	14.5	3.2	0	0	0	100	
	Service Level Management	Frequency	56	6	0	0	0	0	62	**0.09**
		Percent	90.3	9.7	0	0	0	0	100	
	Availability Management	Frequency	38	17	7	0	0	0	62	**0.5**
		Percent	61.3	27.4	11.3	0	0	0	100	
	Capacity Management	Frequency	36	20	6	0	0	0	62	**0.51**
		Percent	58	32.3	9.7	0	0	0	100	
	Supplier Management	Frequency	59	2	0	0	0	0	61	**0.03**
		Percent	95.2	3.2	0	0	0	0	98.4	
	Information Security Management	Frequency	9	30	18	5	0	0	62	**1.3**
		Percent	14.5	48.4	29	8.1	0	0	100	
	Service Catalog Management	Frequency	50	12	0	0	0	0	62	**0.19**
		Percent	80.6	19.4	0	0	0	0	100	
	IT Service Continuity Management	Frequency	35	20	7	0	0	0	62	**0.54**
		Percent	56.4	32.3	11.3	0	0	0	100	
Maturity Level of Service Transition Processes	Change Management	Frequency	9	28	21	4	0	0	62	**1.32**
		Percent	14.5	45.2	33.9	6.4	0	0	100	
	Release and Deployment Management	Frequency	55	7	0	0	0	0	62	**0.11**
		Percent	88.7	11.3	0	0	0	0	100	
	Knowledge Management	Frequency	51	11	0	0	0	0	62	**0.17**
		Percent	82.3	17.7	0	0	0	0	100	
	Transition Planning and Support	Frequency	54	7	1	0	0	0	62	**0.14**
		Percent	87.1	11.3	1.6	0	0	0	100	
	Change Evaluation	Frequency	34	26	2	0	0	0	62	**0.48**
		Percent	54.8	42	3.2	0	0	0	100	
	Service Validation and Testing	Frequency	46	11	5	0	0	0	62	**0.33**
		Percent	74.2	17.7	8.1	0	0	0	100	
	Service Asset and Configuration Management	Frequency	55	7	0	0	0	0	62	**0.11**
		Percent	88.7	11.3	0	0	0	0	100	
Maturity Level of Service Operation and Continual Service Improvement Processes	Incident Management	Frequency	37	22	3	0	0	0	62	**0.45**
		Percent	59.7	35.5	4.8	0	0	0	100	
	Event Management	Frequency	17	36	9	0	0	0	62	**0.87**
		Percent	27.4	58.1	14.5	0	0	0	100	
	Problem Management	Frequency	47	14	1	0	0	0	62	**0.25**
		Percent	75.8	22.6	1.6	0	0	0	100	
	Access Management	Frequency	49	11	2	0	0	0	62	**0.24**
		Percent	79	17.7	3.3	0	0	0	100	
	Request Fulfillment Management	Frequency	53	9	0	0	0	0	62	**0.14**
		Percent	85.5	14.5	0	0	0	0	100	
	Service Improvement	Frequency	49	13	0	0	0	0	62	**0.2**
		Percent	79	21	0	0	0	0	100	

Table 4-1 Maturity Level of ITIL V3 Processes at CBE (Source, 2018)

4.3. Perceived Importance of ITIL processes in CBE

Assessment of the level of importance for each process is used to pinpoint the desired state or "Where do CBE want to be". Besides, the level of importance is used to identify very important ITIL framework processes for the context of CBE. Accordingly, respondents were also presented with six point Likert scale questionnaire where 0(Zero) being the lowest score, process is "Non-Applicable" and 5 (Five) the highest score, process is "Very Important" and asked to choose the level that best describe how important the process is in his or her daily job role. . In situations where the mean value is found to be in between the five states, the result will be rounded to the lowest score if it is below the middle value. On the other hand if the result is equal to the middle value or above it will be rounded to the higher score. Process with a low perceived importance may be an indicator that the given process is not important for CBE and process with high importance indicate the process is very important for CBE. The perceived importance of ITIL framework processes has been measured based on the CMMI-SVC process assessment model scale from zero "Non Applicable" to Five "Very Important".

4.3.1. Importance of Service Strategy Processes

As can be shown on table 4.2, out of five ITIL Service Strategy processes, the perceived importance of Strategy Management for IT Service process were rated 3.6 which is close to Level 4 or "Important" process. The perceived importance result of the other Service Strategy processes is close to Level 3 or "Fairly Important" processes.

For the perceived importance of Service Strategy processes interviewees agree that Strategy Management for IT service is an important process in articulating objectives, and defining how to meet those objectives. Similarly, they pointed out that the rest of Service Strategy processes are also important processes for CBE, but their importance is not as much of Strategy Management for IT Services.

Therefore, according to the results of the two instruments Service Strategy processes are "Fairly Important" processes for CBE except Strategy Management for IT Service which is "Important".

4.3.2. Importance of Service Design Processes

According to the result shown on Table 4.2, out of eight Service Design processes, Service Level Management, Availability Management, IT Security Management and Service Catalog Management processes were rated 4.5 and above. This indicates that these processes are close to Level 5 and hence they are "Very Important" processes for CBE. The other three processes namely, Design Coordination, Supplier Management and Capacity Management were rated 3.5 which is rounded to 4 and hence are determined to be "Important" processes. Supplier Management process is determined to be "Fairly Important" process by scoring a rating of 2.5 which is also rounded to 3.

Regarding the perceived importance of Service Design processes the interviewees reflected that Information Security Management, Service Level Management, and Availability Management, and Service Catalog Management processes are crucial processes for the bank. Adopting these processes is the best way of ensuring IT service delivery and improving customer's satisfaction. According to the interviewees, Design Coordination, Capacity Management, and IT Service Continuity Management processes are also important for CBE following the crucial processes. Supplier Management process is less important process than the other Service Design phase processes according to our objectives priorities.

The perceived importance of the questionnaire result on Service Design processes agrees with the interview result. Therefore, according to the results of the two instruments the Service Design processes are determined to be "Very Important", "Important" and "Fairly Important" processes for CBE.

4.3.3. Importance of Service Transition Processes

As per the result of the survey on table 4.2, Change Management process was rated 4.7 which is close to Level 5 or "Very Important" process and Service Asset Configuration Management (SACM) process rated 4.4 which is close to Level 4 or "Important" process. All the other five Service transition processes scored a rounded rating value of Level 3 and hence are determined to be "Fairly Important" processes for CBE.

Concerning the perceived importance of Service Transition processes the result of the interviewee stated that Change Management is a very important processes to CBE. Changes should be controlled to mitigate and avoid the impacts of change in the production system. SACM is also important to keep all Configuration Items (CIs) used in the provision of live service (production) including their configuration. The interviewees also agreed that the rest of Service Transition processes like Release and Deployment Management, Transition Planning and Support, Service Asset and Configuration and Change Evaluation can be covered by Change Management process. Therefore they are considered as fairly important processes for CBE.

The perceived importance of the questionnaire result on Service Transition processes agrees with the interview result. Therefore, as per the triangulation the seven Service Design processes are determined to be "Very Important", "Important" and "Fairly Important" processes for CBE.

4.3.4. Importance of Service Operation and Continual Service Improvement (CSI) Processes

As it can be understood from the table 4.2, Incident Management, Event Management, Problem Management and Request Fulfillment Management processes were rated above 4.5 which is close to Level 5 and hence they are Very Important processes for CBE. Access management process was rated 3.6 which is close to Level 4 and hence it is "Important" process and Service Improvement process was rated 3.2 which is close to Level 3 or "Fairly Important" process.

About the perceived importance of Service Operation and CSI processes the interviewees answer pointed that since CBE is financial service provider, Service Operation processes are visible and directly utilized by the business. Therefore, the importance of these processes is really high for CBE to make the current IT support more effective and efficient. However, Access management process can be covered by Information Security Processes. Therefore, it can be considered as fairly important process for CBE. The interviewees also confirmed that Service Improvement process is considered as important process for CBE.

The perceived importance of the questionnaire result on Service Operation and CSI processes agrees with the interview result. Therefore, as per the triangulation the five Service Operation and CSI processes are determined to be "Very Important", "Important" and "Fairly Important" processes for CBE.

ITIL Framework V3 Processes with respect to their Life Cycle		Scale	Non-Applicable	Not important	Somewhat Important	Fairly Important	Important	Very Important	Total	Mean
Percived Importance of Service Strategy Processes	Strategy Management for	Frequency	1	0	3	18	32	8	62	3.6
		Percent	1.6	0	4.8	29	51.6	13	100	
	Service Portifolio	Frequency	7	0	2	24	20	9	62	3.3
		Percent	11.3	0	3.2	38.7	32.3	14.5	100	
	Demand Management	Frequency	3	0	9	28	19	3	62	3.1
		Percent	4.8	0	14.5	45.2	30.7	4.8	100	
	Financial Management for	Frequency	7	5	13	14	16	7	62	2.7
		Percent	11.3	8	21	22.6	25.8	11.3	100	
	Business Relationship	Frequency	5	0	2	29	17	7	60	3.3
		Percent	8	0	3.2	46.8	27.4	11.3	96.7	
Percived Importance of Service Design Processes	Design Coordination	Frequency	8	0	6	21	22	5	62	3.1
		Percent	12.9	0	9.7	33.9	35.5	8	100	
	Service Level Management	Frequency	0	0	0	0	30	32	62	4.51
		Percent	0	0	0	0	48.4	51.6	100	
	Availability Management	Frequency	0	0	0	1	29	32	62	4.5
		Percent	0	0	0	1.6	46.8	51.6	100	
	Capacity Management	Frequency	3	0	4	21	23	10	61	3.5
		Percent	4.8	0	6.5	33.9	37.1	16.1	98.4	
	Supplier Management	Frequency	20	0	3	20	15	0	58	2.5
		Percent	32.3	0	4.8	32.3	24.2	0	93.6	
	Information Security Management	Frequency	0	0	0	0	16	46	62	4.7
		Percent	0	0	0	0	25.8	74.2	100	
	Service Catalog Management	Frequency	0	0	0	1	27	34	62	4.53
		Percent	0	0	0	1.6	43.5	54.9	100	
	IT Service Continuity Management	Frequency	0	0	7	21	24	9	61	3.5
		Percent	0	0	11.2	34	38.7	14.5	98.4	
Percived Importance of Service Transition Processes	Change Management	Frequency	0	0	0	1	15	46	62	4.7
		Percent	0	0	0	1.6	24.2	74.2	100	
	Release and Deployment	Frequency	0	11	11	21	16	3	62	2.8
		Percent	0	17.7	17.7	34	25.8	4.8	100	
	Knowledge Management	Frequency	0	5	2	24	24	6	61	3.3
		Percent	0	8.1	3.2	38.7	38.7	9.7	100	
	Transition Planning and	Frequency	0	10	5	19	20	8	62	3.1
		Percent	0	16.1	8.1	30.6	32.3	12.9	100	
	Change Evaluation	Frequency	0	15	3	11	24	9	62	3.1
		Percent	0	24.2	4.8	17.7	38.7	14.6	100	
	Service Validation and	Frequency	0	9	2	15	26	10	62	3.4
		Percent	0	14.6	3.2	24.2	41.9	16.1	100	
	Service Asset and	Frequency	0	0	0	2	29	31	62	4.46
		Percent	0	0	0	3.2	46.8	50	100	
Percived Importance of Service Operation and Continual Service Improvement Processes	Incident Management	Frequency	0	0	0	2	18	42	62	4.64
		Percent	0	0	0	3.2	29	67.8	100	
	Event Management	Frequency	0	2	0	2	11	47	62	4.59
		Percent	0	3.2	0	3.2	17.7	75.9	100	
	Problem Management	Frequency	0	0	0	1	8	53	62	4.83
		Percent	0	0	0	1.6	12.9	85.5	100	
	Access Management	Frequency	0	2	8	17	19	16	62	3.6
		Percent	0	3.2	13	27.4	30.6	25.8	100	
	Request Fulfillment	Frequency	0	0	0	1	18	43	62	4.67
		Percent	0	0	0	1.6	29	69.4	100	
	Service Improvement	Frequency	1	1	7	17	24	12	62	3.58
		Percent	1.6	1.6	11.3	27.4	38.7	19.4	100	

Table 4-2 Perceived Importance of ITIL V3 Processes at CBE (Source, 2018)

4.4. Gap Analysis

In addition to the requirement identification survey, maturity assessment for existing and desired ITSM practice of CBE is conducted according to ITIL framework. The result of the survey identified the gap between existing and desired ITSM practice of CBE using ITIL framework. Accordingly, the existing ITSM practices or where CBE is today is defined by measuring the maturity level of each of ITIL V3 processes based on CMMI-SVC process assessment model. In addition to that, the desired ITSM practices or where do CBE want to be was also defined by predicting the level of importance of each of ITIL V3 processes based on CMMI-SVC process assessment model. In this section the first research question which was "What are the existing and desired state of ITSM practices of CBE?" is answered according to the actual data. As can be seen on Figure 4.1, out of twenty six ITIL V3-2011 processes the average maturity level of the twenty four (92% of ITIL processes) was rated between Level 0 (Non-Existent) and Level 1 (Initial) based on the CMMI-SVC process maturity assessment model scale. The average maturity level of the rest of two processes namely IT Security Management and Change Management(8% of ITIL processes achieved a maturity level between Level 1 (initial) and Level 2 (Repeatable) stage which is also very low or Initial process stage. Particularly out of 92%, only 21% were above 0.5 mean values which are close to 1 or Initial process stage, the rest 79% is rated below 0.5 which is Non-Existence or processes were not applied at all in CBE. This shows that the maturity level of the existing ITSM practices of CBE is very low or Non-existent according to ITIL framework.

Regarding the perceived importance of each ITIL processes, 39% of the processes were considered to be "Very Important" processes. 19% and 42% of the processes were perceived as 'Important' and 'Fairly Important' processes respectively. The average perceived importance of Service Level Management, Availability Management, IT Security Management, Service Catalog Management, Change Management, Incident Management, Event Management, Problem Management and Request Fulfillment Management processes was between Level 4 (Importance) and Level 5(Very Importance). Besides, Strategy Management for IT Service, Capacity Management, IT Service Continuity, Access Management, and Service Improvement processes were rated between Level 3 (Fairly Important) and Level 4 (Important) with mean

value between 3.5 and 4. This indicates that all of these processes have perceived importance of Level 4(Importance) process.

On the other hand, Service Portfolio Management, Demand Management, Business Relationship Management, Design Coordination, Knowledge Management, Transition Planning and Support, Change Evaluation and Service Validation and Testing processes were rated between Level 3 (Fairly Important) and Level 4 (Important) with average value between 3.0 up to 3.49. This indicates that these processes have a perceived importance of Level 3 (Fairly Important) level. The rest of processes namely Supplier Management, Financial Management for IT Service and Release and Deployment Management were rated between Level 2 (Somewhat Important) and Level 3 (Fairly Important) with average value between 2.5 and 2.99. This indicates that these processes have a perceived importance of Level 3 (Fairly Importance) level.

An organization's ITSM maturity assessment indicates how much of best practices or frameworks to implement, and where to start. Thus assessing organization maturity is critical to ITIL Implementation. Therefore, as per the maturity assessment conducted the researcher has identified the following nine ITIL processes in order to propose an ITIL framework implementation guideline. The identified processes are: Service Level Management, Availability Management, Information Security Management, Change Management, Incident Management, Problem Management, and Request Fulfillment Management. These processes are selected on the premise that while their maturity level in CBE is at "Non-Existent" or "Initial" stage, their perceived importance is found to be "Very Important". Implementing these processes in advance fits CBE's requirement to improve IT service delivery and also the ITSM practice in the organization. Accordingly, an implementation guideline is proposed for these nine processes.

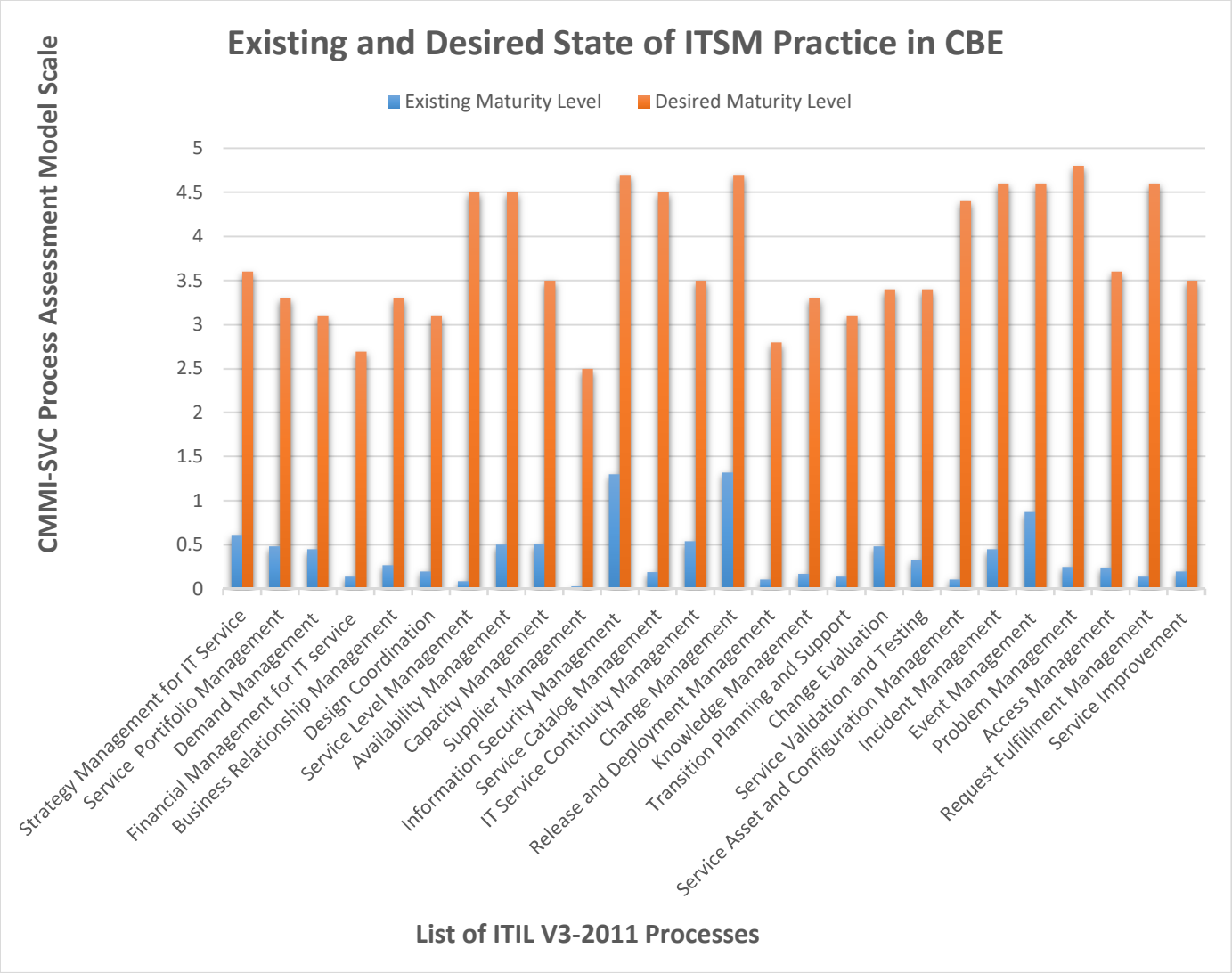

Figure 4-1 Existing and Desired Maturity Level of ITIL Processes in CBE. Source: (Survey result 2018)

4.5. Objective of the Solution

In the previous chapter we have defined two qualitative objectives for the ITIL framework processes implementation guideline to be proposed. The first objective is that the solution should be consistent with available ITIL framework literature. The second is that it also should be consistent with the needs and priority of the case study organization i.e. CBE.

The rationale for the first objective is that ITIL is the most popular and de facto framework in the IT industry and the process maturity gap identification in this study is conducted according to the ITIL framework. Therefore, in order to be consistent with the problem identification and measure the improvements as well the artifact to be proposed shall be consistent with the ITIL framework.

On the other hand, the second objective is set based on the understanding that ITIL is not "one size fit for all" framework and requires to be customized according to specific organizational needs. Therefore, the implementation guideline has to focus on the processes that are required as per the context of the case study organization i.e. CBE in order to meet the specific needs of the organization.

4.6. Discussion of Results

In this chapter existing and desired state ITSM assessment has been done in CBE against ITIL framework based on CMMI-SVC processes assessment model. The result has shown that 92% of ITIL processes are at "Non-Existent" or "Initial" stage. On the other hand, 39% of ITIL processes are perceived to be "Very Important" for CBE. Therefore, this shows that implementing these ITIL implementation successfully is very critical for CBE to improve its IT service delivery and management. Accordingly, the next chapter will discuss the proposed ITIL framework processes implementation guideline for those processes which are categorized as "Very Important" processes.

Chapter 5

ITIL Framework Implementation Guideline

In this chapter, the proposed ITIL framework process implementation guideline is presented including the objective, scope, major activities, flowchart with description and metrics of each process. Moreover, this chapter addressed the demonstration, evaluation and communication of the proposed implementation guideline by following DSRM steps. The proposed ITIL framework processes implementation guideline used the result of the survey in order to identify the requirements of the design. Accordingly, highly prioritized ITIL processes are selected from the context of CBE. Consequently, the proposed implementation guideline is designed based on the conceptual foundation of ITIL framework literatures.

5.1. Design and Development of Proposed ITIL Framework Processes Implementation Guideline

To design the ITIL framework processes implementation guideline, the overall processes descriptions and literatures are taken as templates from ITIL framework books and then modified according to the CBE's needs and context. Currently, there are twenty six processes mentioned in ITIL Framework V3. However, the design requirement is taken from the gap identified through survey result. Therefore, only processes that are identified as "Very Important" are included in the proposed implementation guideline (ITIL Service Strategy, 2011); (ITIL Service Design, 2011); (ITIL Service Operation, 2011); (ITIL Service Transition, 2011).

5.1.1. Service Level Management Process

The Service Level Management (SLM) process is responsible for developing, monitoring and reporting service levels defined by CBE. This process aims to ensure that agreed levels of services are provided to its customers as per the agreement defined. The process also deals with various Operational Level Agreements (OLAs) which need to be in place for inter-dependencies on CBE internal teams. Scope of this process is applicable to all services provided by CBE to its internal customers. The actual delivery of these services to internal customers is documented in Service Catalog and Service Level Agreement (SLA).

Major Activities in Service Level Management process

- Determining, negotiating, documenting and agreeing requirements for new or changed services.
- Services in Service Level Requirements (SLRs), managing and reviewing them through the service lifecycle into SLAs for operational services.
- Monitoring and measuring service performance achievements of all operational services against targets within SLAs.

- Collating, measuring and improving customer satisfaction, in cooperation with business relationship management.

  To see how these activities are performed please look at figure 5-1,

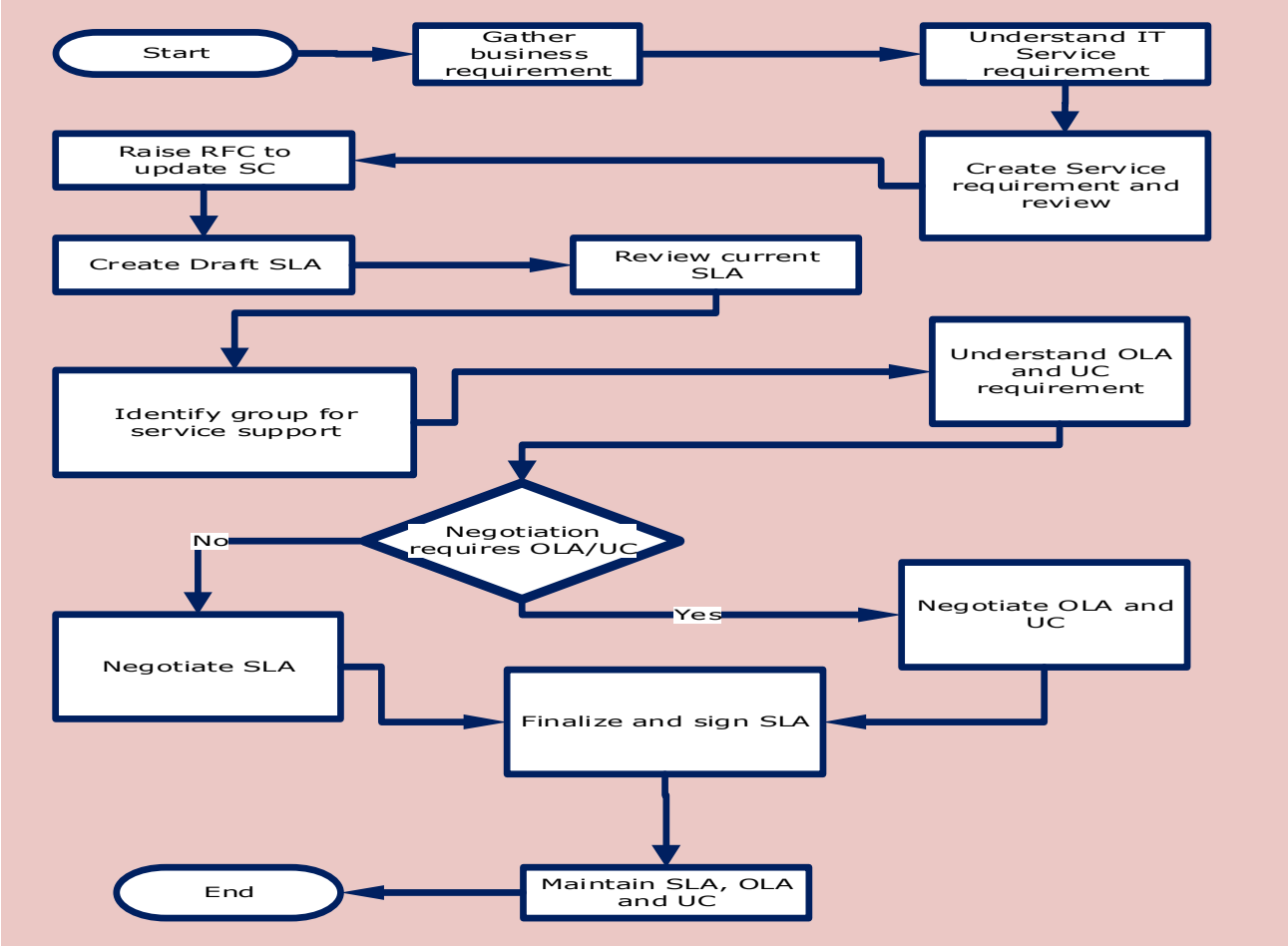

Figure 5-1 Service Level Management Process Flowchart

Service Level Management process major activities are started by gathering business requirement. The requirement can be for new or existing IT service and it include negotiation, amendment, changes and needs that provided by IT to satisfy the business. Once the business requirement is gathered, it is needed to understand the IT requirement and capability of IT to deliver the requested service. Then the service requirement will be created and reviewed by the concerned stakeholders. When a consensus is reached between the concerned stakeholders on the created service requirement, Request for Change (RFC) will be raised to update the service catalog. Then draft Service Level Agreement (SLA) will be created to understand the perception of the customer (the user comment) and to show the delivery level of the service. SLA will be reviewed according to the feedback of the customers. Then, the responsible body to deliver the service is identified. At this point it is important to understand whether operational level agreement (OLA) and underpinning contract (UC) with other departments and vendors about the

service is required. If so, proceed to negotiate OLA, UC and SLA. If no OLA and UC requirement is necessary, proceed to negotiate the SLA alone. Based on the negotiation, SLA will be finalized and signed between the concerned stakeholders. Finally, the SLA along with OLA and UC, if any, has to be maintained through monitoring.

Key performance Indicator for Service Level Management Process

The followings are key performance indicators for Service Level Management process:

- Total number and percentage of service increase in fully documented SLAs in place
- Percentage increase in SLAs agreed against operational services being run
- Percentage increase in the speed of developing and agreeing appropriate SLAs

5.1.2. Availability Management Process

Availability is one of the most critical parts of the warranty of a service. The objective of Availability Management process is to ensure that the level of availability in all IT services meets the agreed availability needs and or/service level targets in cost effective and timely manner. If a service doesn't deliver the levels of availability required, then the bank will not experience the value that has been promised. Scope of this process includes all existing and new IT services delivered by the respective units of CBE to meet the current and future availability needs.

Major Activities in Availability Management process

- Monitoring, measuring, analyzing, reporting and reviewing service and component availability.
- Investigating all service and component unavailability and instigating remedial action. This includes looking at events, incidents and problems involving unavailability.
- Produce and maintain an availability plan.

To see how these activities are performed please look at the following diagram figure 5-2,

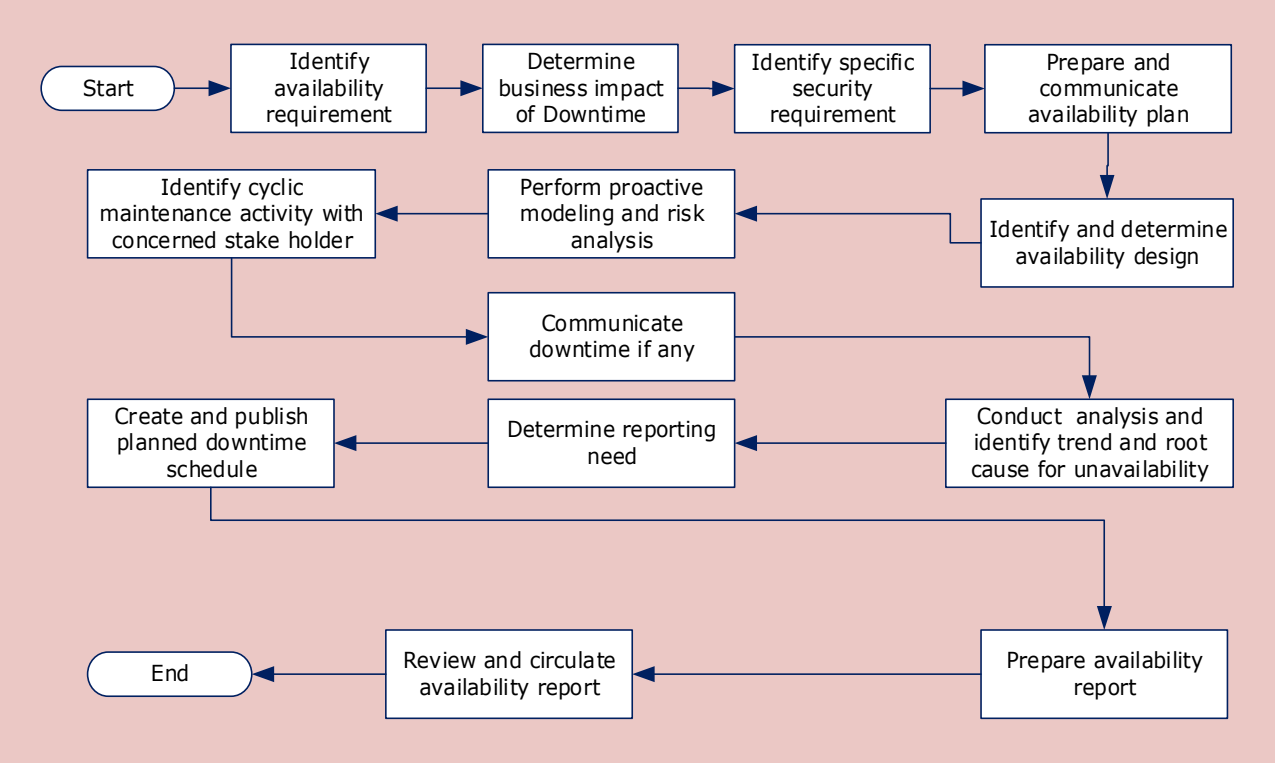

Figure 5-2 Availability Management Process flowchart

Availability Management process can be initiated by any IT service availability requirement. Based on the requirement determine the business impact of the specified service downtime. On the next step identify the associated risk and security requirement. Using the business impact and associated security requirement as input, prepare and communicate an availability plan. Then, identify and determine availability design like redundancy, contingency, backup, etc. Based on the availability design and plan perform proactive modeling and risk analysis in order to identify single point of failure of components and their risk. Prepare cyclic maintenance by scheduling maintenance period to avoid the risk of single component failure. Communicate to stakeholders or customers if there is any failure that affects the service availability and analyze the root cause of the service unavailability. Determine the need, time and type of report and then create and publish planned downtime schedule if necessary. Finally, review and circulate availability report.

Key Performance Indicator for Availability Management Process

The followings are key performance Indicators for Availability Management Process:

- Percentage reduction in the cost of unavailability

- Percentage reduction in the service delivery costs
- Timely completion of regular risk assessment and system review
- Timely completion of root cause analysis for unavailability
- Timely delivery of availability report

5.1.3. Information Security Management Process

This process is responsible to establish Information Security Management policy within the organization. Adoption and implementation of this process provides a structured method to ensure that the adequate security controls exists within all aspects of the IT environment. The objective of the Information Security Management process is to protect the interests of those relying on information by ensuring confidentiality, integrity and availability. The scope of this process is applicable to all new, changed and existing IT services in CBE.

Major Activities in Information Security Management Process

- Production and maintenance of an overall information security policy and a set of supporting specific policies.
- Communication, implementation and enforcement of the security policies, including provision of advice and guidance to all other areas of the business and IT on all information security-related issues.
- Assessment and classification of all information assets and documentation.

To see how these activities are performed please look at the following diagram figure 5-3.

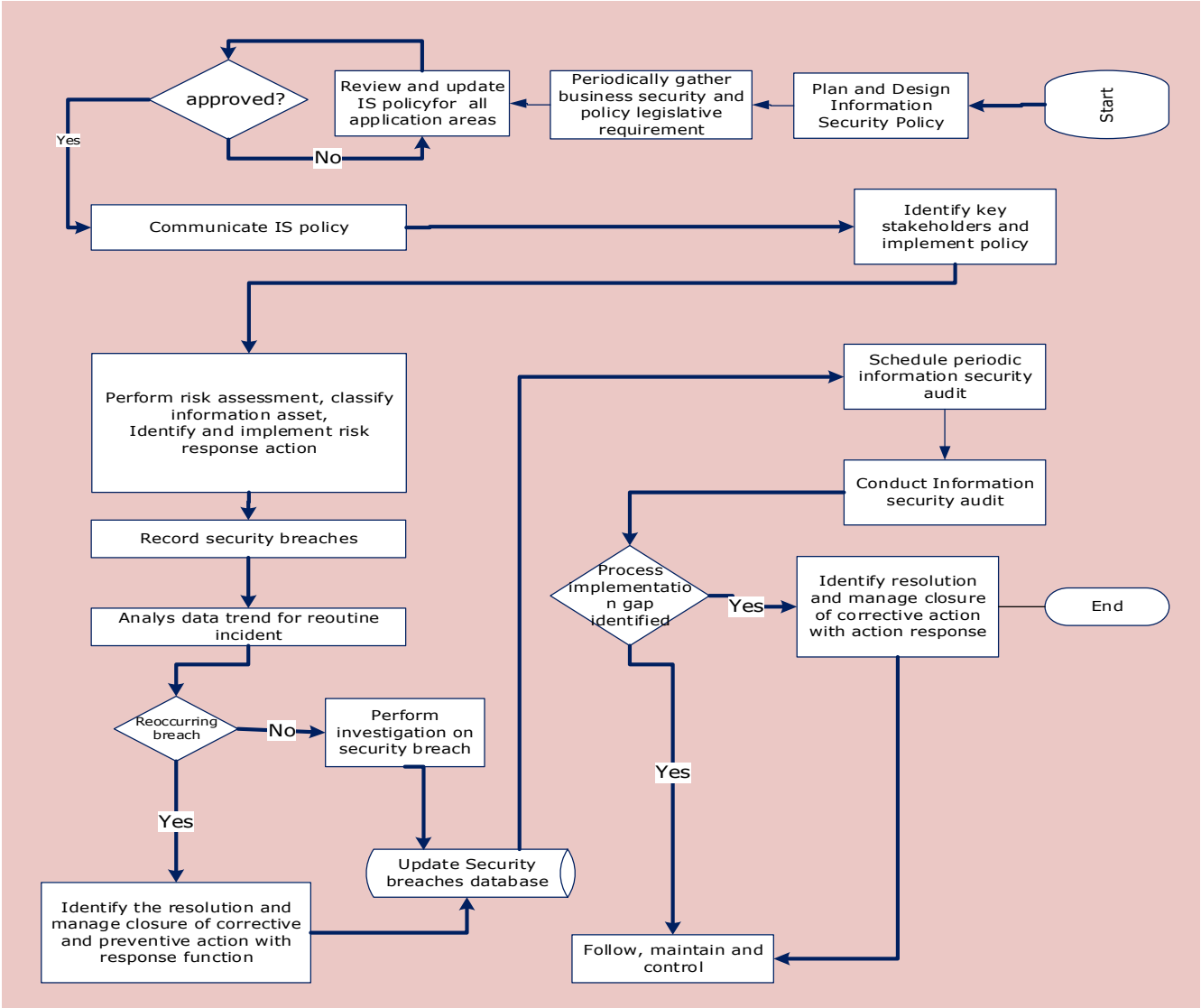

Figure 5-3 Information Security Management Process flowchart

The main focus of Information Security Management is designing Information security policy. Therefore the process starts with planning and designing Information Security Policy. Since business security requirement and legislatives policies change from time to time it is needed to gather new requirements periodically. Then, security policy shall be reviewed and updated as per the newly gathered requirements. If the policy is not approved, do the review and the update until it is approved. If the policy is approved, communicate to the concerned body. After communicating the policy proceed to implementing the policy by identifying specific actions and stakeholders. Perform the risk assessment, information asset classification, prepare risk response

action to avoid security breaches and implement the risk response action. Record securities breaches, if any and also analyze the data trend before resolving incident. If the incident is reoccurring identify the root cause of the incident. If not perform investigation and then update the security breaches database. In order to ensure the proper application of the security policy, schedule periodic IT security audit and conduct the audit as per the schedule. If any gaps are identified during the audit take corrective action and manage the closure of the gap. If not, keep the follow up, maintenance and control as usual.

Key Performance Indicator for Information Security Management Process

The followings are key performance indicators for Information Security Management Process:

- Percentage decrease in security breaches reported to the service desk
- Percentage decrease in the impact of security breaches and incidents
- Percentage increase in SLA conformance to security clauses
- The number of suggested improvements to security procedures and controls
- Decrease in the number of security non-conformance detected during audits and security testing.

5.1.4. Service Catalog Management Process

The purpose of the service catalog management process is to provide and maintain a single source of consistent information on all operational IT services and those being repaired to be run operationally, and to ensure that it is widely available to those who are authorized to access it. The scope of Service Catalog includes IT services and information contained within the in CBE IT service catalog.

Major Activities in Service Catalog Management Process

- Recurring periodic reviews are used to assure Service Catalog accuracy and alignment with customer service needs.
- The information gathered for a Service Catalog entry constitutes the public declaration of the service definition and many important attributes of the service. For new services this information may be available from the program management team. For existing services

the information may be gathered from authorized sources such as the service owner and/or third party service provider.

To see how these activities are performed please look at the following diagram figure 5-4.

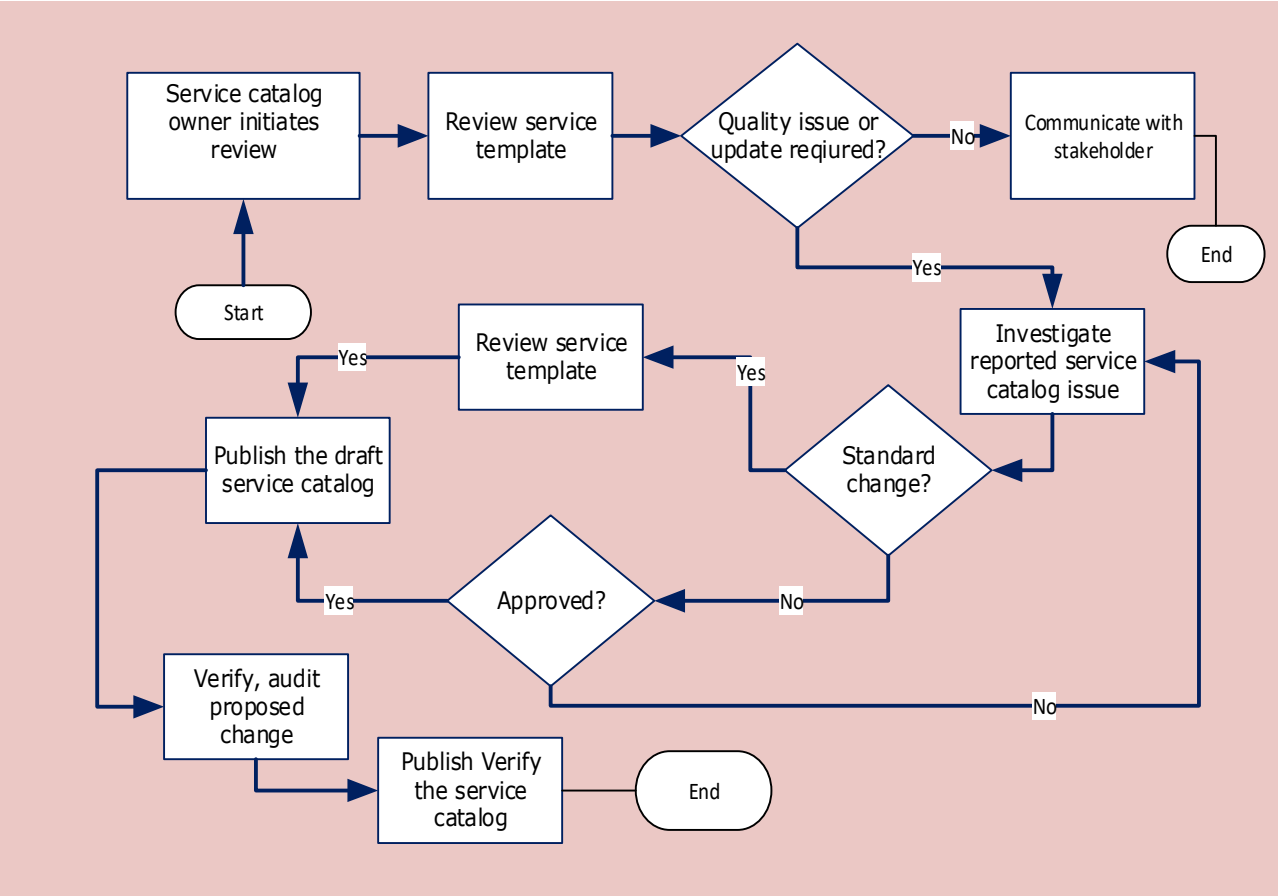

Figure 5-4 Service Catalogue Management Process flowchart

An IT service owner can initiate to review IT service catalogue both for new or existing IT service. The initiative may come from quality issue on the service delivery channel or necessity of updates on the specified service. Therefore, the deliver channel reviewed if there is any issue. Issue on the service delivery channel will be identified and investigated then if change is needed, RFC will be raised and the change type will be identified. If it is standard change the change will be applied according to standard change procedure. If the change is not a standard change i.e. normal or emergency change, the change will be applied after it is approved by the change

advisory board (CAB) or emergency change advisory board (eCAB). Finally, after verifying and auditing the success of proposed change, the updated service will be published into the service catalog.

5.1.5. Change Management Process

Change Management process is used to effectively and efficiently respond to business requirements ensuring that changes are recorded/documented, assessed, prioritized, authorized, scheduled, planned, tested, deployed and finally reviewed to check successful implementation. The objective of Change Management activities is to effectively manage and control the lifecycle of a change and enable beneficial changes to be made without disruption of IT services. The scope of this process includes all the changes executed within CBE IT environment.

Major Activities of Change Management Process

- Planning and categorize changes
- Change and release scheduling
- Measurement and control
- Change decision-making and change authorization
- Management reporting
- Understanding the impact of change
- Ensuring that remediation plans are in place

To see how these activities are performed please look at the following diagram figure 5-5.

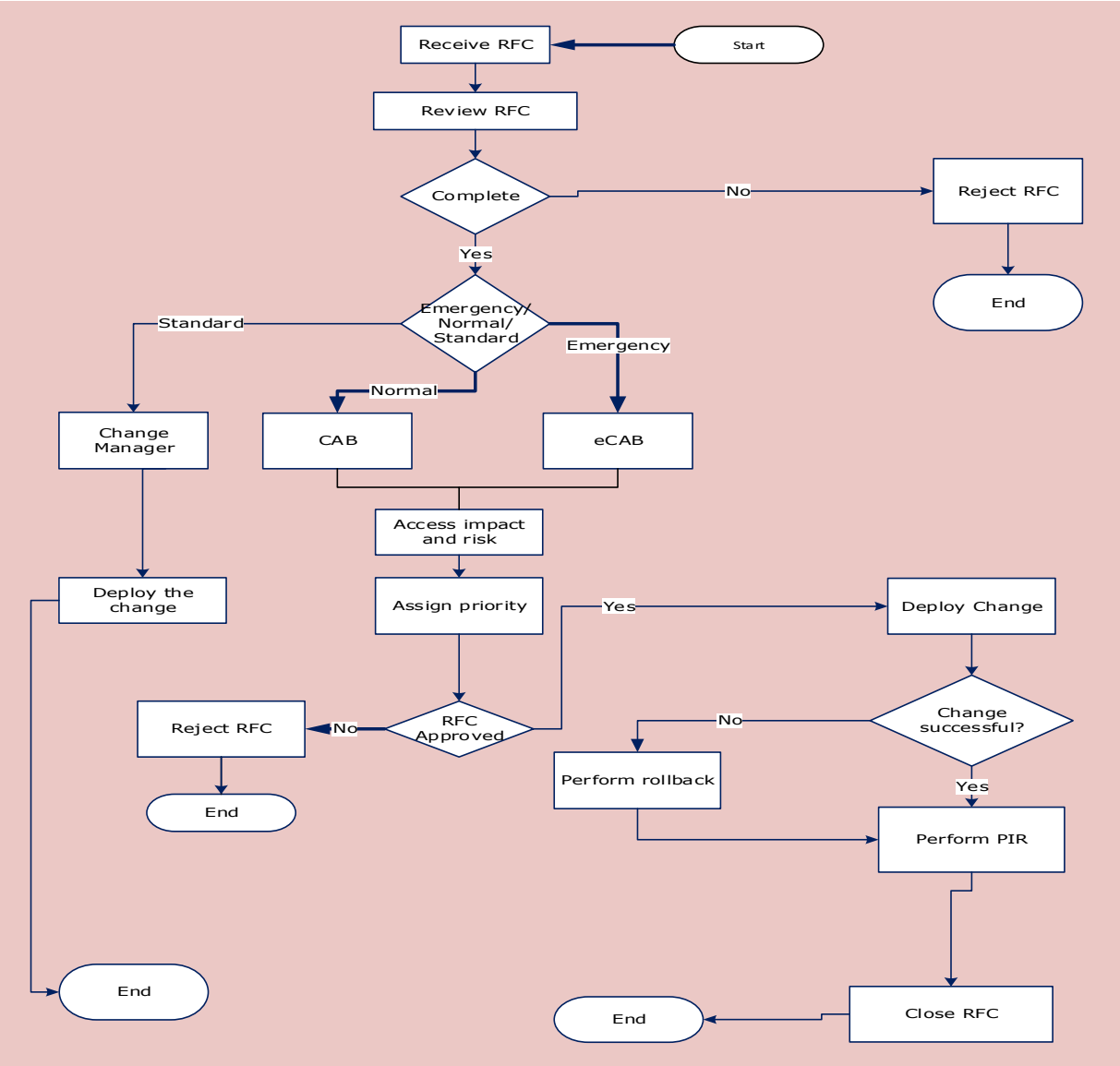

Figure 5-5 Change Management Process flowchart

Request for change can be prepared and submitted by an IT service owner to change management manager. After the RFC is received it will be checked for completeness according to RFC template. If it is not it will be rejected and required to be completed. If it is complete it will be categorized under one of the three change types. If the change is a standard change, since it is pre-approved it will be authorized for deployment by the change manager. If the change is a normal or emergency change, it needs approval by the CAB and eCAB members respectively. The only difference is between the two is, emergency changes are entertained by the eCAB members without waiting for the scheduled CAB session. In both cases the impact and risk of the changes

will be assessed and prioritized for deployment. Then, if approved, change will be deployed accordingly. If the change is successful a post implementation review (PIR) will be submitted for change management and the RFC will be closed. If the change is not successful, the change will be rolled back, post implementation review (PIR) will be submitted and the RFC will be closed.

Key Performance Indicator for Change Management Process

The following are key performance indicator for Change Management process:

- Reduction in the number of disruptions to services, defects and re-work caused by inaccurate specification, poor or incomplete impact assessment
- Reduction in the percentage of changes that are categorized as emergency changes
- Increase in change success rate (percentage of changes deemed successful at review/number of changes authorized)
- Reduction in the number of changes where remediation is invoked
- Reduction in the number of failed changes
- Reduction in the number of unauthorized changes identified
- Reduction in the number of incidents attributed to changes

5.1.6. Incident Management Process

This process act as guidance to understand how the incident process will flow within various IT teams to fix the issue from the initiation till closure of the incident. The objective of the Incident Management process is to restore normal service to operation on reported faults, errors and incidents. The scope of Incident Management covers all issues and faults raised by end users, unavailability of IT service and any violation to security policies

Major Activities of Incident Management Process

- Incident logging, categorization, and incident prioritization
- Investigation and diagnosis
- Incident escalation
- Incident closure

To see how these activities are performed please look at the following diagram figure 5-6.

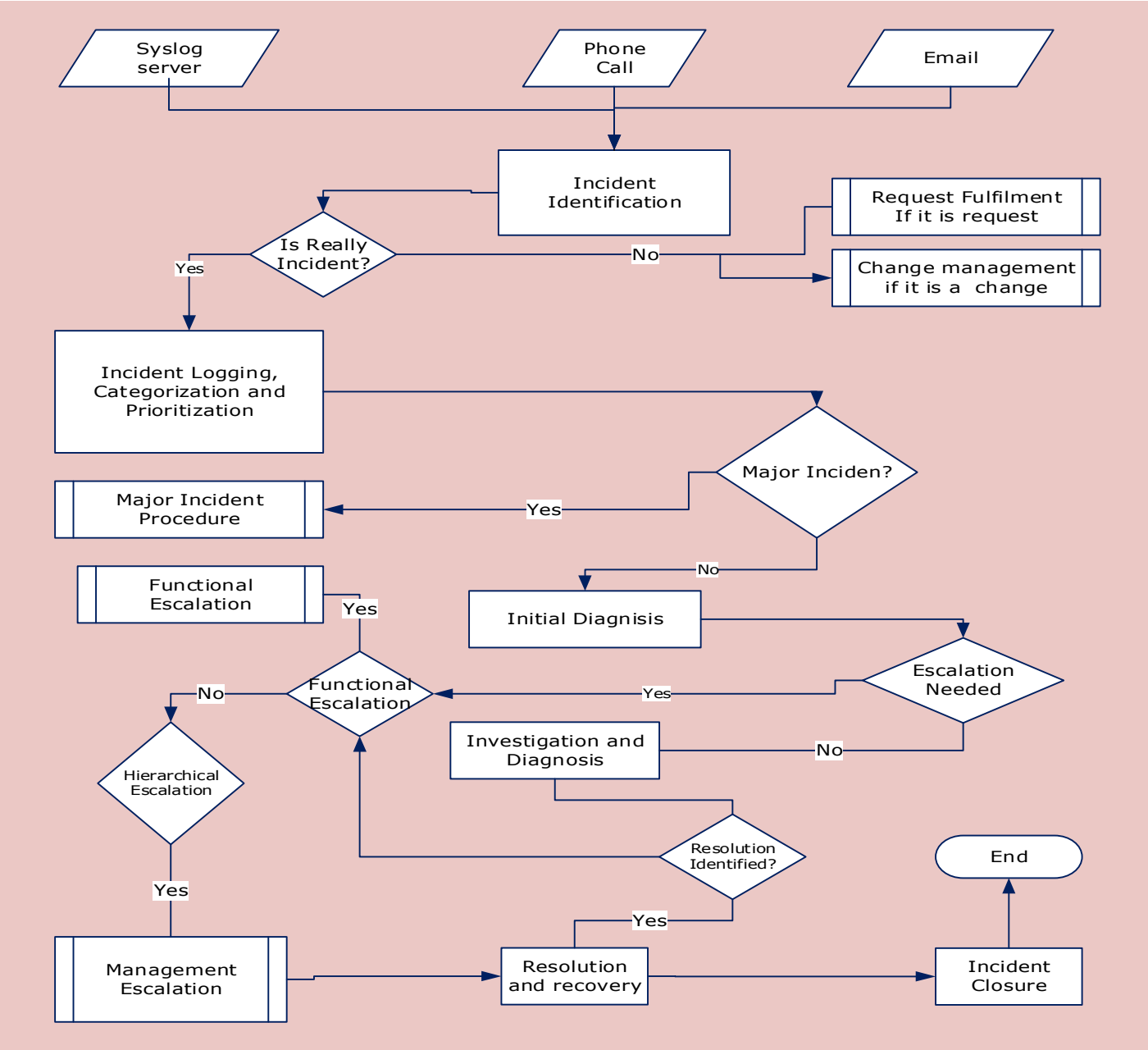

Figure 5-6 Incident Management Process flowchart

Incident can be reported manually through phone, email, or automatically from a central syslog server. A syslog server is a central repository of automatically generated system logs and events collected from various types of device. Reported incidents may or may not be an incident and must be identified before being logged as an incident. If not incident it will be routed to request fulfillment or change request processes. If identified as an incident it will be logged, categorized and prioritized. If it is a major incident it will be routed to major incident management procedure. Otherwise, an initial diagnosis will be

performed to identify whether an escalation is required. If it is not required the incident will be investigated and diagnosed thoroughly to find a resolution. If a resolution is found, the resolution will be put into action, service recovery will be done and the incident will be closed. If a resolution cannot be found, it will be routed to functional or hierarchical escalation.

Key Performance Indicator for Incident Management Process

The following are key performance indicator for Incident Management Process:

- Mean elapsed time to achieve incident resolution
- Breakdown of incidents at each stage (e.g. logged, work in progress, closed)
- Percentage of incidents closed without escalation and on site visit.
- Number of incidents resolved without impact to the business (e.g. incident was raised by event management and resolved before it could impact the business)

5.1.7. Event Management Process

This process focuses on managing events throughout their lifecycle. This lifecycle of activities to detect events, make sense of them and determine the appropriate control action is coordinated by the event management process. The objective of the Event Management process is to monitor, filter and categorize events in order to decide appropriate actions if required. The scope of this process includes all change of state in CBE IT environment.

Major Activities of Event Management Process

- Detect all change of state that have significant impact on IT service.
- Filtering and correlating the events
- Determine the appropriate control action for events and ensure these are communicated to the appropriate functions.
- Provide the means to compare actual operating performance and behavior against design standards and SLAs.

To see how these activities are performed please look at the following diagram 5-7.

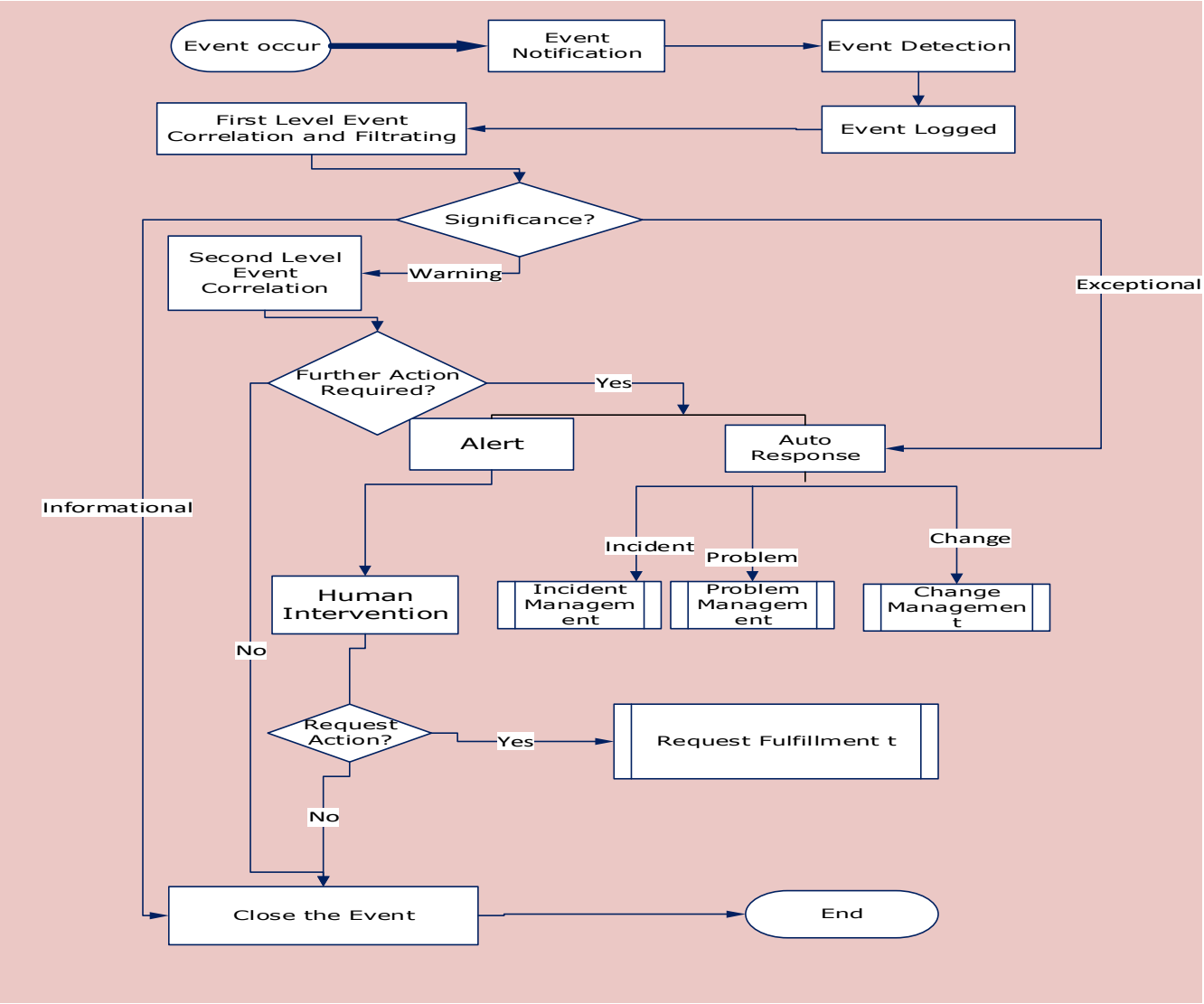

Figure 5-7 Event Management Process flowchart

Event Management process starts when an event occurs and the event notification is generated. Once event notification is generated, proceed to event detection in which the meaning of the generated event is determined. Then, the event will be logged in which a record of the event is created with any subsequent actions taken if any. First level of event correlation and filtering will be done in order to determine the significance of the event. In ITIL there are three types of events Informational, Warning and Exceptional. If it is informational the event can be closed without any further action. If it is a warning, which means any activity outside the norm, it will be routed to second level event correlation to determine if any further action is required. If further action is required there are two response actions to take. The first one is to create an alert

for human intervention. Based on human intervention the event can be routed to be handled by request fulfillment process or closed if no further action is required. The second response action available is to route the event to be handled by incident, problem or change management processes. This second response action is also the only way exceptional events can be handled.

Key Performance Indicator for Event Management Process

The following are key performance indicator for Event Management Process:

- Number and ratio of events compared with the number of incidents
- Number and percentage of each type of event per platform or application versus total number of platforms and applications underpinning live IT services
- Number and percentage of events that required human intervention and whether this was performed
- Number of incidents that occurred and percentage of these that were triggered without a corresponding event.

5.1.8. Problem Management Process

Problem Management is the process responsible for managing the lifecycle of all problems. The objective of Problem Management process is to prevent problems, eliminate recurring incidents and avoid the impact of incidents that cannot be prevented. Scope of this process includes all issues, faults and major incidents which requires root cause analysis.

Major Activities of Problem Management Process

- Problem logging, categorization and prioritization
- Investigation and diagnosis
- Root cause analysis
- Problem closure

To see how these activities are performed please look at the following diagram figure 5-8.

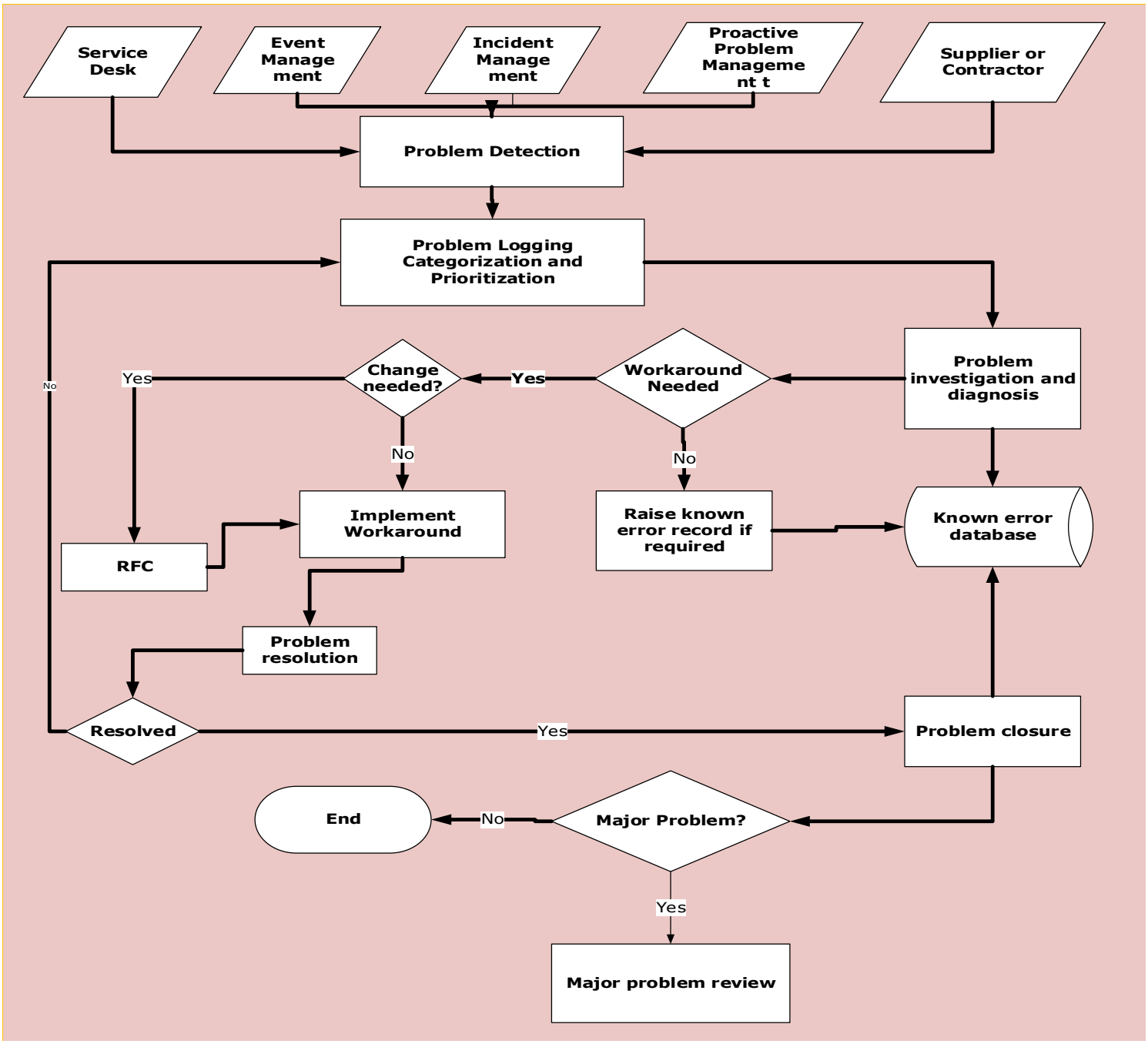

Figure 5-8 Problem Management Process flowchart

Problem management starts when a problem is routed to be handled from event management, incident management, proactive problem management, service desk or external supplier or contractor. Once the problem is detected, a record is created for the problem with a given category and priority. Then, an investigation and diagnosis is performed in order to determine

whether a workaround is needed. If not just raise a known error record in the known error database. If yes check whether a change is needed to implement the workaround. If not just implement the workaround and resolve the problem and close the problem and raise a known error record in the known error database. If the problem is a major problem, a major problem review has to be performed.

Key Performance Indicator for Problem Management Process

The following are key performance indicator for Problem Management Process:

- The number of known errors added to the KEDB
- The percentage accuracy of the KEDB (from audits of the database)
- Average incident resolution time for those incidents linked to problem records
- Total numbers of problems (as a control measure)

5.1.9. Request Fulfillment Process

This process covers the overall life cycle of Request Fulfillment from request logging to closure. The objective of the Request Fulfillment process is to maintain user and customer satisfaction through efficient and professional handling of IT service requests. The scope of this include all services, access and information requests in CBE IT environment.

Major Activities of Request Fulfillment Process

- Request logging, categorization and prioritization
- Review Requests
- Provide or Revoke access
- Escalate Requests
- Request closure

To see how these activities are performed please look at the following diagram figure 5-9.

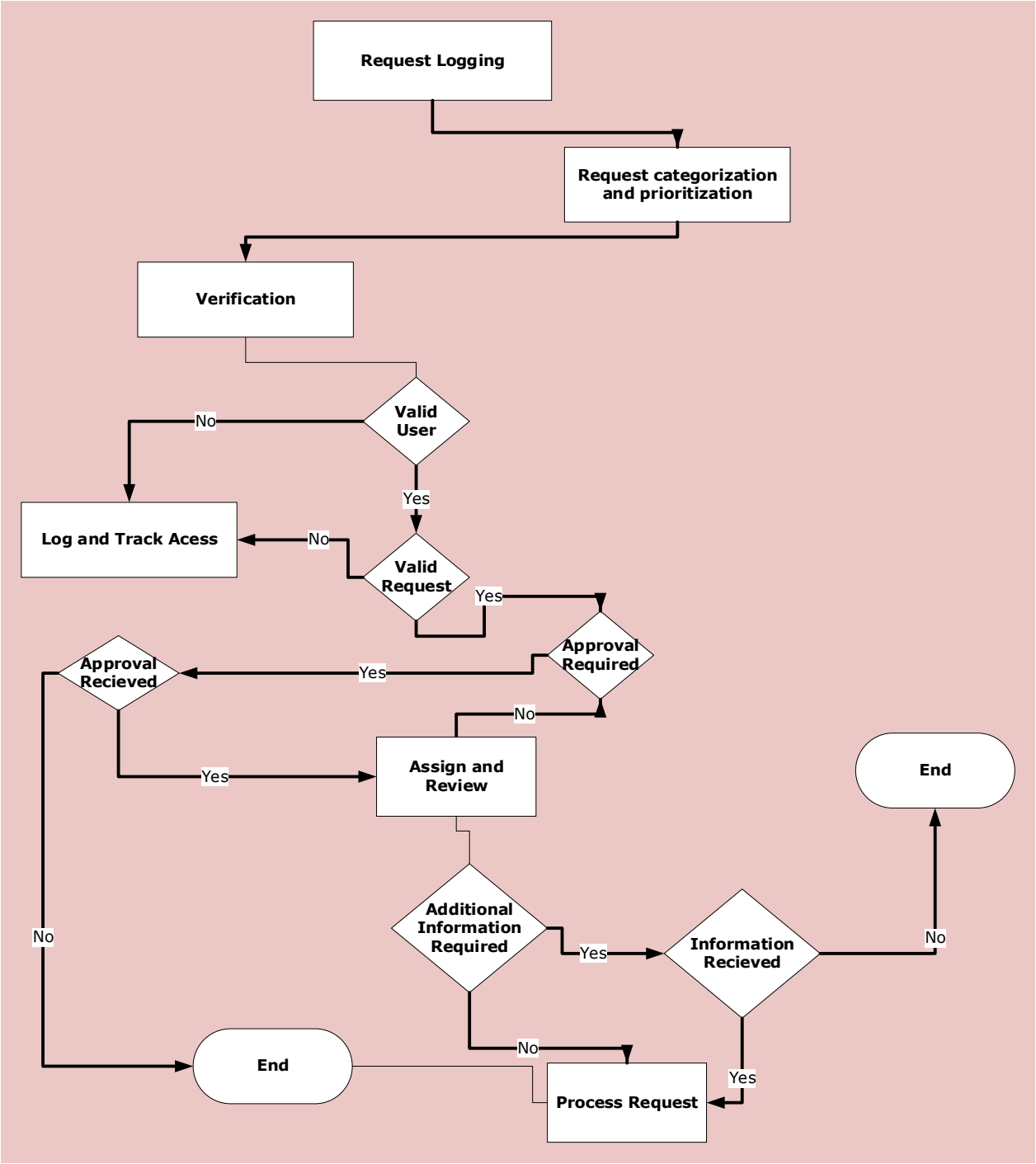

Figure 5-9 Request Fulfillment Process flowchart

Request fulfillment is started when a request is logged. Then the request is verified after it is categorized and prioritized. If the request is not submitted by the valid user the event will be logged and tracked. If the request is submitted by the valid user, the request itself will be checked for validity. If the request is not valid the event will be logged and tracked. If both the

user and the request are determined to be valid, the request will be assigned to be reviewed. If no additional information is required the request will be processed. If additional information is required, additional information will be requested and if received the request will be processed. Fulfilled.

Key Performance Indicator for Request Fulfillment Process

The following are key performance indicator for Request Fulfillment process:

- The mean elapsed time for handling each type of service request
- The number and percentage of service requests completed within agreed target times
- Percentage of service requests closed by the service desk without reference to other levels of ssupport (often referred to as 'first point of contact')
- Number and percentage of service requests resolved remotely or through automation, without the need for a visit.

5.2. Demonstration of the Proposed Implementation Guideline

This section outlines how to use the artifact to solve the challenges on implementing ITIL framework. In this section the study demonstrates how the proposed ITIL framework processes implementation guideline can be applied on a typical CBE's IT change, service request and incident management scenarios under the IS department. The study adopts the demonstration of proof of concept from PhD dissertation (Francis Njoroge, 2013). To demonstrate the proof of concept, a worked example of applying the proposed implementation guideline is provided in Table 5-1 to 5-3.

Objective of Change Management Process	Change Management Major Activities	OS upgrade change management activities	Description of Activities	Remark	Objective of adopting implementation guideline
Effectively manage and control the lifecycle of change. Enable beneficial change with minimum destruction.	Planning and categorize changes	Initiate RFC	Received RFC	Types of change: Standard Normal Emergency	Change is planned and categorized
		Identify Change Type	Normal		
		Review RFC	Action Plan attached?-Yes		
			Configuration Items impacted listed?-Yes		
	Change and release scheduling	Schedule	Date and time of the change stated?- Yes		Change is scheduled
			Duration of the change stated- Yes		
	Measure and control	Assess impact and risk	Medium Impact : Manageable degradation of production environment performance	Impact Scale: High Medium Low	Change is controlled
		Assign Priority	Medium – I'm fine for right now, but this may impact my ability to move forward in the near future		
	Ensure that remediation plans are in place	Remediation plan	Does the change require Down time?-Yes		Change include roll back and remedy
			Test result attached?- Yes		
			Fall Back Plan attached?- Yes		
	Change decision making and change authorization	Identify authorizing method	Change type is Normal – CAB need to authorize the change	Change Authorizers: Change Manager CAB Higher officials	Change is authorized by the concerned party
	Management reporting	CAB Meeting	Change approved for deployment by CAB.		Change is informed
	Understanding the impact of Change	Perform PIR	Change implemented in the proposed scheduled date? - Yes Change implemented in the proposed duration? - Yes Change brings the stated outcome? - Yes Any issue after the change is implemented?-Yes	Reviewed after the implementation of change	Change is reviewed
	Close RFC				The objective of the process is achieved

Table 5-1 Demonstration of Change Management Process

Objective of Request Fulfillment Process	Request Fulfillment Major Activities	Server Provision Request Activities	Description of Activities	Remark	Objective of adopting implementation guideline
Maintain user and customer satisfaction through efficient and professional handling of all service request.	Request logging, categorization and prioritization	Receive request	Record the request	Categorization: Hardware Software Access All	Request is logged and categorized
		Categorize the request	Categorized to all category		
	Verify the Request	Request verification	Is the requester valid? - Yes Is the request approved by respective supervisor? - yes		Request is authorized
	Review Requests	Revision of request	Is the compute resource sizing stated? - yes Is the OS type to be installed stated? - yes Is the version of additional software to be installed stated?- yes Is the required user access listed? - yes		Request is reviewed
	Provide or Revoke access	Fulfill the request	Provide the server as per the request		Request is provided
	Log and Track Access	Monitor the server	Install monitoring agent and review logs and alerts.		Request is monitored
	Close Request				The objective of the process is achieved

Table 5-2 Demonstration of Request Fulfillment Process

Objective of Incident Process	Incident Management Major Activities	Activities to solve an incident "could not log in to server"	Description of Activities	Remark	Objective of adopting implementation guideline
To restore normal service to operation on reported faults, errors and incidents	Incident logging, categorization and prioritization	Receive incident		Categorization: Application Infrastructure Priority Scale: High Medium Low	Incident is logged, categorized and priority is identified
		Incident Logging	What is the operating system of the server? – Linux What protocol is the user using? - SSH What is the IP address/Hostname of the server? What is the exact error? – Permission Denied Did the user use the correct user name? – yes Did the user use the correct password? - yes Is it the first time the user is logging? –No What is the username used? – userx Did the user try to log in more than three times? - yes		
		Incident Categorization and prioritizing	Incident Category - Infrastructure/Server management		
			Incident Priority – Medium		
	Investigation and diagnosis	Initial Diagnosis	Is the server up and running? – yes Is the SSH protocol enabled? – yes Escalation required? No		Incident id investigated
		Investigation and Diagnosis	**Investigation** Does the username specified exist on the server? –yes Did the user use the username before? – yes Is the user account locked? No Is the login failed count greater than three?- yes **Diagnosis** The user repeatedly used a wrong password and login count is greater than three. According to the OS security policy the user is disabled temporarily		
	Resolution	Reset the password	Using a privileged account Reset the login failed count Reset the password		Incident is resolved
	Incident Closure	Incident Closure	Communicate the new password Require the user to change the password at their first login. Confirm if the incident is resolved. Mark the incident as resolved and close the incident.		Incident is closed
	Close Incident				The objective of the process is achieved

Table 5-3 Demonstration of Incident Management Process

5.3. Evaluation of the Proposed ITIL Framework processes Implementation Guideline

In addition to the demonstration of proof of concepts this study conducted an evaluation of the proposed ITIL framework processes implementation guideline. Even though the proposed implementation guideline is not rigorously evaluated and tested, the evaluation consists of two phases.

Evaluation involves observing and measuring how well the artifact supports a solution to the problem. This activity involves comparing the objective of a solution to actual observed results from use of the artifact in the demonstration. As can be seen from the logical proof of the demonstration, following the major tasks in the flow chart can achieve to gain the objective of the given process.

Moreover, in this study, expert validation was used in addition to the observation and measuring of artifact which is stated by the adopted DSRM. The experts selected for the evaluation of the implementation guideline are of two types. The first kinds of experts are ITIL experts working in CBE in managerial and non- managerial positions. The second types of experts are IT managers working in CBE in various senior technical positions. Majority of both ITIL and IT technical experts have sufficient years of working experience in CBE. The ITIL framework expertise along with technical IT expertise and their managerial skill is believed to be the appropriate and crucial resources to gain valuable inputs. It is also believed that the experts' experience in CBE is very helpful to evaluate the proposed guideline whether it fits to the bank or not.

The first round of expert validation was a focus group discussion with the selected ITIL and IT technical experts. The objective of the focus group discussion was to discuss the proposed implementation guideline with respect to its consistency, correctness, completeness, clarity, applicability and identify possible improvement opportunities (Tadele, 2015). The objective of the study, evaluation and the focus group discussion were described to the participants. Subsequently, focus group discussions had been conducted with the experts to have detailed discussion and gather additional feedbacks. Appendix G describes the participants and setup of the focus group discussion.

With respect to consistency and correctness, the experts has stated that they appreciate the way the research followed to identify the existing and desired state of ITSM practice of CBE against ITIL framework. The identification ensures the consistency of proposed guideline to the context of CBE and correctness of those processes which were categorized into highly prioritized ITIL processes for CBE context, i.e. contextualization. Moreover, the adoption of ITIL framework literatures for conceptual foundation ensures the proposed guideline consistency and correctness with ITIL template.

With respect to completeness and clarity, the experts has confirmed that the well done explanation of the processes objectives and scope, particularly the major activities and the flowchart representation of the processes under the proposed guidelines are the indication of the completeness, comprehensiveness and clarity of the proposed implementation guideline. However the experts presented two feedbacks that needs to be included in the study to fulfill the completeness of the guideline. The first one is that defining the key performance indicators or metrics. Key Performance Indicator (KPI's) were not included in the study and these are very important in measuring the processes achievement and making the continual service improvement. The experts explained that ITIL implementation couldn't be successful without having this metric defined properly. The second suggestion is to create a mapping between processes and process stakeholders using RACI (Responsible, Accountable, Consulted and Informed) matrix. The matrix will be beneficial in enabling decisions to be made with pace and confidence.

On the other hand, the experts has observed, the proof of concept method of demonstration used and the worked examples on CBE IT department provided proves the applicability of the proposed guideline for the context of CBE. In addition, they gave their feedback on some of the processes activities on the flow chart in order to improve the applicability of the processes under the guideline. In the Service Level Agreement process flow chart, they suggested to include operational level agreement (OLA) and underpinning contracts (UC) if there is any need for negotiation. In Availability management, they noted to communicate down time if there is any. In Change Management, they commented to include roll back if change is not successful. In Information Security Management, they commented to include the activities related to schedule periodic security audit.

According to DSRM guidelines, at the end of the evaluation the decision was made in this study to make a single iteration back to design and development phase. Based on the experts' feedbacks, the proposed implementation guideline was revised to improve its completeness, clarity and applicability. In the revision, the key performance indicators were included in the implementation guideline and some of the flowcharts redesigned according to the feedbacks of the experts. However, the study couldn't define the role and responsibility using RACI model, due to time constraint and the necessity of detail CBE's work flows, policy and procedures in order to define it through RACI matrix. Therefore, defining the role and responsibility using RACI model with further improvement is left for further study.

Finally, the proposed guideline was presented for the experts as a second-round validation in order to ensure the proper implementation of their feedback on the proposed guideline. Consequently, the experts checked the inclusion of their feedback in the reviewed implementation guideline. Eventually, they agreed on the consistency, completeness, correctness, clarity and applicability of the implementation guideline for CBE.

5.4. Discussion of the Result

This chapter described the proposed ITIL framework processes implementation guideline design, demonstration and evaluation part. The design includes the objective, scope, major activities, flowchart representation of processes and key performance indicator of the selected ITIL framework processes. Accordingly, a worked example of applying the proposed ITIL framework implementation guideline is provided on three CBE's IT change, service request and incident management scenarios under the IS department. Expert validation conducted through focus group discussion is used to evaluate the proposed implementation guideline.

Based on the above analysis, it can be inferred that the proposed ITIL framework processes implementation guideline provides a valuable input that enables implementers to mitigate the challenges of the implementation. Moreover, the comprehensiveness of the framework along with the need of contextualization for each organization can be considered as an improvement area to further develop the guideline so that it can serve its intended goal. In the next chapter, conclusion and recommendation of this study are discussed.

Chapter 6

6. Conclusion and Recommendations

This chapter presents conclusions drawn from the study and recommendations based on the evidences found during the course of the study. The recommendation includes implementation suggestion for practice and also for future research.

6.1. Conclusion

It has become increasingly apparent that information technology is significantly influencing business processes in the banking industry. Currently, various frameworks have been developed to manage and control IT services. ITIL is one of such frameworks and it is also the most popular and de facto framework. ITIL is created with the goal of reducing costs and to better manage IT service delivery. However, implementing ITIL is not easy and it is common that ITIL implementations end in failure. Furthermore, ITIL documentation explains all the processes but it doesn't specify how that implementation should be made. There is no guideline offered within the ITIL literature that help to adopt or implement ITIL, proven to result in specific, measurable benefits. Therefore, this study has proposed an ITIL framework processes implementation guideline according to the priorities of case study organization (CBE).

Before the development of the implementation guideline, ITIL processes maturity assessment has been done to identify the existing and desired ITSM practice of CBE according to the ITIL framework. The result of the maturity level assessment indicated that out of twenty six ITIL processes in scope, twenty four (92% of ITIL processes) was rated between Level 0 (Non-Existent) and Level 1 (Initial) stages and the rest two processes achieved a maturity level between Level 1 (initial) and Level 2 (Repeatable) stage which is also very low or Initial process stage. It is observed that ITIL processes hardly exist in CBE. On the other hand, the result of perceived importance indicated that from the overall ITIL processes in scope nine processes has been categorized as “Very Important” or highly prioritized processes for CBE’s context. These highly prioritized processes are Service Level Management, Availability Management, IT Security Management, Service Catalog Management, Change Management, Incident Management, Event Management, Problem Management and Request Fulfillment Management.

The researcher has successfully analyzed the existing and desired maturity level of ITIL processes in CBE and proposed an implementation guideline for those highly prioritized ITIL processes.

The proposed implementation guideline helps the bank in order to achieve the desired maturity level state and the benefits of ITIL. The artifact is demonstrated through proof of concept. Evaluation is also performed through comparing the objective of a solution to actual observed results from the use of the artifact in the demonstration and using expert validation through focus group discussion. Consequently, the guideline is redesigned using the expert's feedback. Absence of detailed workflows policies and procedures was a major challenge. The study concludes by presenting a recommendation for practice and future study.

6.2. Recommendation

The proposed implementation guideline offer numerous benefits for both practitioners and academics. Based on the findings of this study and the conclusions are drawn, the following recommendations are forwarded for practice and knowledge (further research).

6.2.1. Recommendation for Practice

The result of this study is believed to provide guidance to IT professionals, IT managers, executive managers and end-users of CBE's IT services. The guideline is supposed to provide insight into the possible solutions to mitigate the challenges of ITIL framework implementation. Moreover, the guideline will help the bank to comply with international standard like ISO 20000 and to deliver the required minimum of qualified IT services to customers. Consequently, these achievements help the bank in the accomplishment of the five year corporate strategy as well as the vision to be world-class bank by the year 2025.

Moreover, in order to make the implementation more simple, sequence of implementation is suggested for processes under the artifact according to literature. (Lemma, Calvo-Manzano, Colomo-Palacios, & Magdalena, 2015) suggested that Incident management, Service Level Management and Service Catalog processes are suggested as the first process to be implemented. Marrone, Kießling, & Kolbe (2011) and Bovim, Johnston, Kabanda, Tanner, & Stander (2014) also agreed with the suggestion of the first processes to be implemented, while suggesting

Change Management, Availability Management and Request Fulfillment Management processes to be implemented in the second phase. Information Security Management, Problem Management and Event Management are suggested to be implemented as part of third phase implementation.

The following recommendations are forwarded:

- To achieve the desired level of ITIL processes maturity CBE is recommended to implement the proposed guideline
- Explore the concept of cloud computing in relation to ITIL.
- The proposed ITIL processes major tasks and the activities represented on the flowchart should be followed rigorously in order to achieve the benefits of ITIL framework, to improve the existing ITSM practice and to mitigate the challenges of implementation.
- The achievement of processes under the implementation guideline should be measured through the presented key performance indicators.
- IT executive has to take the driving seat to implement the proposed guideline in collaboration with IT staff and end-users.
- The proposed guideline would enable other banks or financial institutions in Ethiopia to benefit for the assessment of their ITSM practice and the way of implementing ITIL processes with modification.

6.2.2. Recommendation for Future work

Besides the contribution of the existing literature gap regarding ITIL, there are further avenues open for research. For future work, researchers recommended the following future studies.

- Define the role and responsibility of the proposed ITIL framework processes implementation guideline using RACI matrix.
- Propose an implementation guideline for the rest of ITIL processes.
- A formal workflow, policy and procedure based on the implementation guideline is needed for the service desk and other IT functions in order to successfully execute the guideline.

- Explore the impact of ITIL framework implementation in organizations and design performance measurement metrics or framework.
- Develop more comprehensive implementation guideline for Ethiopian commercial banks or financial institutions.

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APPENDICES

Appendix A: Requirement Identification Survey Questionnaire

Preamble: This questionnaire is intended to collect IT department and IT service management basic information, such as, Core IT Services, Tools, Structures, Existing practice, Strategy plans, Policies and Procedures.

Questionnaire Element: The questionnaire consists of open and optional questions. You may state your own opinion regarding open questions.

Confidential Declare: I hereby promise that I will comply with Standard protocol to keep all questionnaire feedback absolutely confidential. The feedback can and can only be used for the purpose of investigating ITSM Practices in Banking Industry to be used as Preliminary Survey for future study.

1. What core IT services currently your department provided?

Probe: Let the interviewee tell me the list of core IT services.

2. Do you have policies and procedures that support ITSM?

Probe: If yes, what key contents are included?

3. How well are you currently meeting your ITSM objectives?

Probe: Let the interviewee tell me about the current trends of ITSM.

4. Is there any challenge on the achievement of ITSM objectives and IT service delivery?

Probe: If yes, what are the challenges?

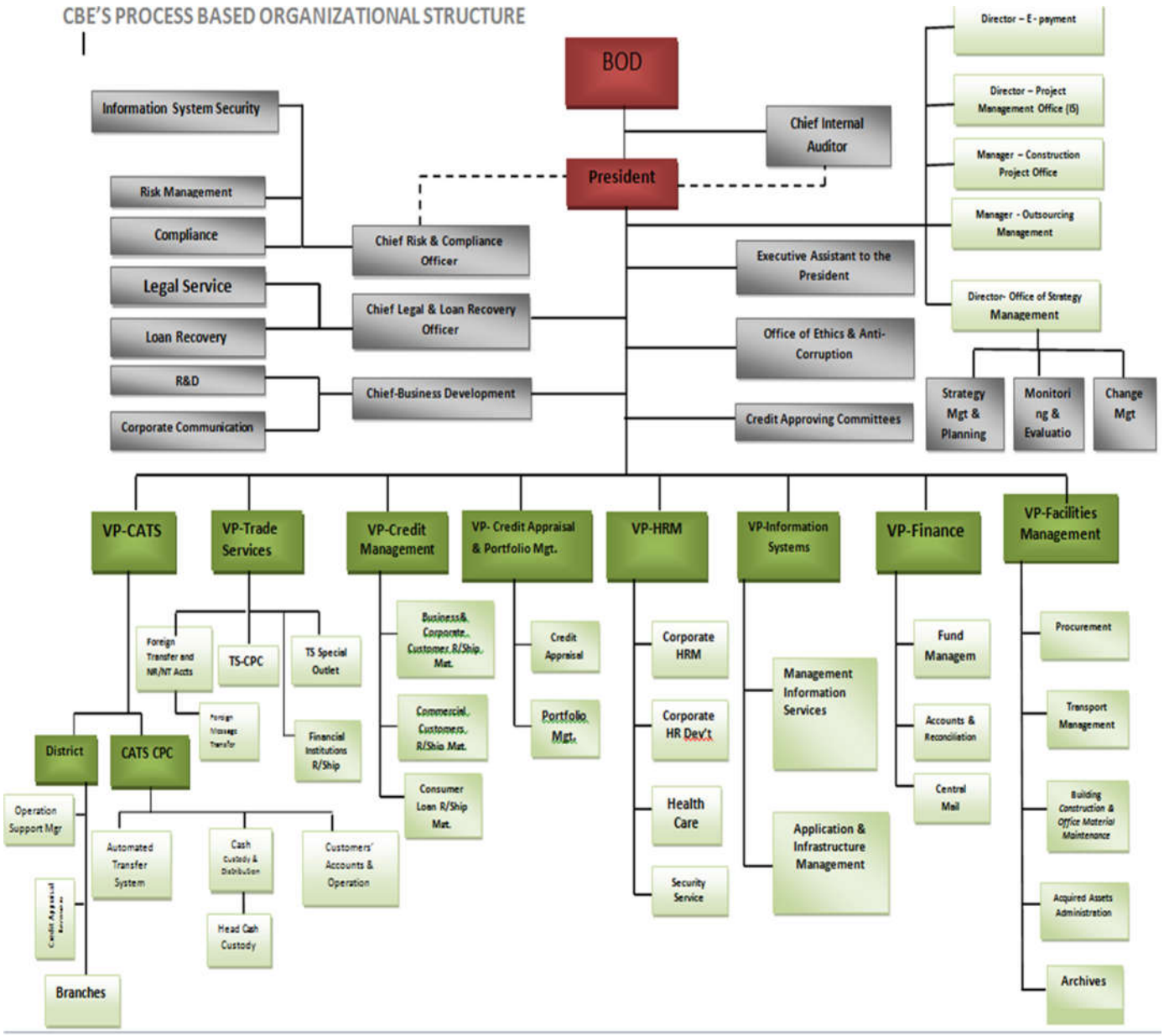
5. Do you think that there is a need for ITSM framework in order to meet the needs of your customer?

Probe: If yes, what are the changes you feel needed to occur?

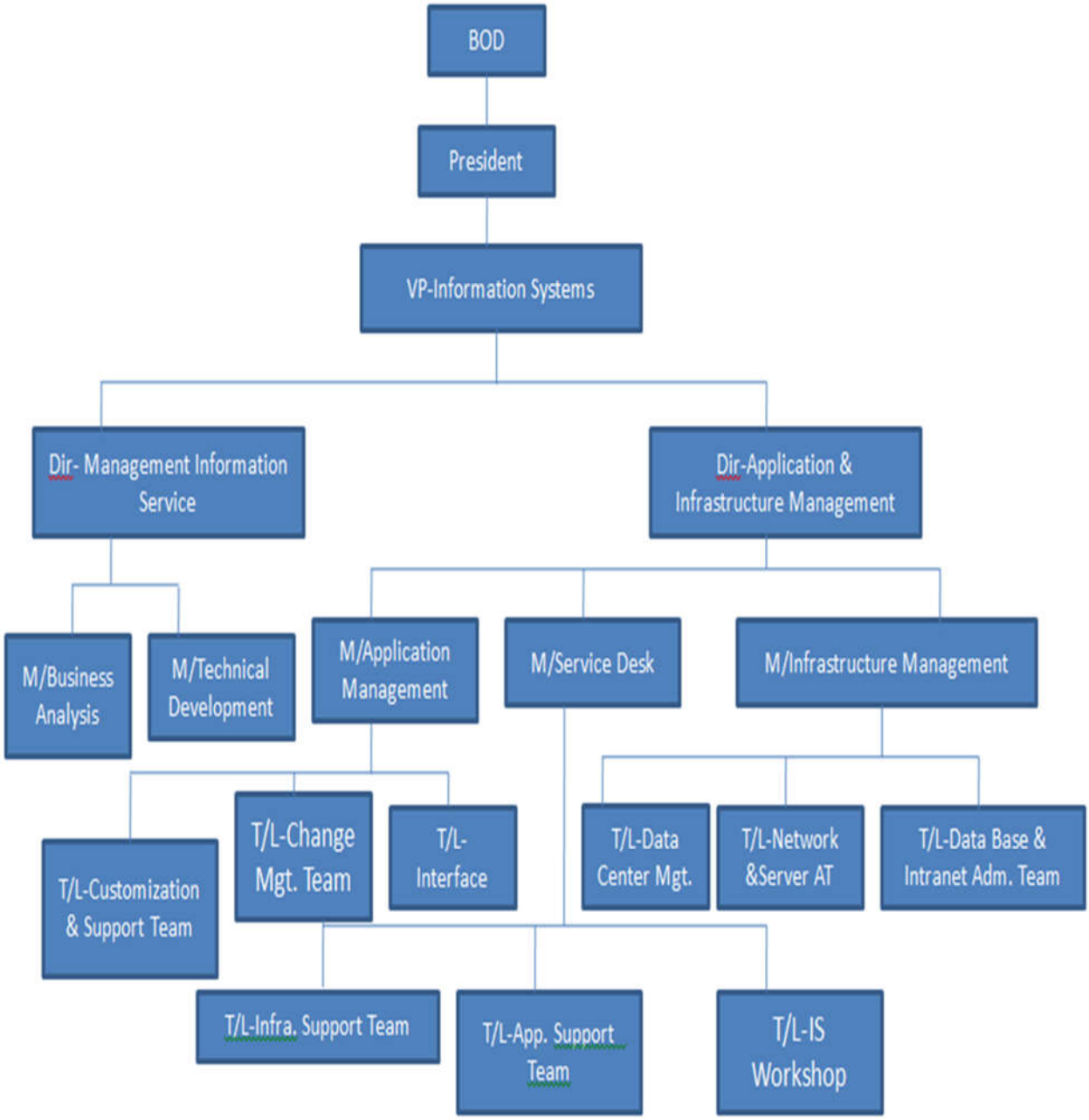
6. Is there any strategy plan regarding IT services or governance?

Probe: Let the interviewee tell me the strategic plan about IT services.

Appendix B: CBE Organizational Structure



Appendix C: CBE IS Structure



Appendix D: Questionnaire

Dear Sir or Madam:

I would like to thank you in advance for your willingness to fill this survey questionnaire.

I am prospective postgraduate under the program of Information Science which is offered by Addis Ababa University. Currently I am carrying out a research under the topic "**ITIL Framework Implementation Guideline:** The case of Commercial Bank of Ethiopia" as a requirement for degree of master in Information Science. The objective of the study is to propose ITIL framework implementation guideline using the result of the assessment as a benchmark input. Therefore, the study identify the maturity level of the existing and desired IT service management practices of CBE according to ITIL Framework.

This research is believed to produce results that can mitigate the challenges of ITIL framework implementation in CBE and other banks. Your honest responses to each question and statement are extremely valuable to the outcome of this research. The results of the survey will be used for the purpose of academic research only. Hence, all responses will be kept in strict confidentiality and hence would not affect any one in any case.

NB: NO NEED OF WRITING YOUR NAME.

Thank you again!

Selam Tesfaye

Section I: **ITIL Processes Maturity Assessment and Perceived Importance of ITIL Processes for CBE context.**

Each question has two column, first column asks about the maturity level and second column asks about the participant's perceived importance for the given process.

First Column: Is about the maturity level assessment of each ITIL process using CMMI-SVC process maturity model. CMMI describes five evolutionary stages (levels) in which an organization manages its processes through maturity. The scale is 0(Zero) being the lowest score, "Non-Existent" and 5 (Five) the highest score, "Optimized".

The five levels (1-5) of process maturity are:

Maturity Levels	Description
0. Non-Existent	process is not applied at all
1. Initial / ad hoc	Process is unpredictable, poorly controlled, and reactive
2. Repeatable	Process is characterized for projects and is often Reactive
3. Defined	Process is characterized for the organization and is proactive
4. Managed	Process is measured and controlled
5. Optimized	Focus is on continuous quantitative improvement

Second Column: Is about the assessment of the level of importance of each ITIL process using the below Likert scale. Knowing the level of importance for each process is used to prioritized the processes and propose an ITIL framework implementation guideline according to the priority. Process with a low perceived importance may be an indicator that the given process is not important for CBE and process with high importance indicate the process is very important for CBE. The Scale is 0(Zero) is being the lowest score, "Not Very important to CBE" and 5(Five) the highest score, "Very Important to CBE".

In order to prioritized the process according to the level of their importance for CBE context.

0 - Not Applicable: Process is not applicable

1 - Not important: Process is not needed

2 - Somewhat Important: Process is not clear to apply

3 - Fairly important: Process is fairly needed

4 - Important: Process is needed

5 - Very important: Process is highly needed

No.	List of ITIL Processes	Process Description	Is the Process exists as a standard and repeatable process in CBE?						How important is this process to CBE?					
			Non Existent	Initial	Repeatable	Defined	Managed	Optimized	Not Applicable	Not Important	Somewhat Important	Fairly important	Important	Very important
			0	1	2	3	4	5	0	1	2	3	4	5
Service Strategy														
1.	Strategy Management for IT Services	Is the Strategy for IT Services process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
2.	Service Portfolio Management	Is the Service Portfolio Management process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
3.	Demand Management (DM)	Is the DM for IT Services process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
4.	Financial Management for IT Service (FM for IT Services)	Is the FM for IT Services process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined as well as is budgeting carried out?												

No.	List of ITIL Processes	Process Description	Is the Process exists as a standard and repeatable process in CBE?						How important is this process to CBE?					
			Non Existent	Initial	Repeatable	Defined	Managed	Optimized	Not Applicable	Not Important	Somewhat Important	Fairly important	Important	Very important
			0	1	2	3	4	5	0	1	2	3	4	5
5.	Business Relationship Management (BRM)	Is the BRM process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
Service Design														
6.	Design Coordination	Is the design Coordination process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
7.	Service Level Management (SLM)	Is the SLM process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
8.	Availability Management (AM)	Is the Availability Management process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												

No.	List of ITIL Processes	Process Description	Is the Process exists as a standard and repeatable process in CBE?						How important is this process to CBE?					
			Non Existent	Initial	Repeatable	Defined	Managed	Optimized	Not Applicable	Not Important	Somewhat Important	Fairly important	Important	Very important
			0	1	2	3	4	5	0	1	2	3	4	5
9.	Capacity Management	Is the Capacity Management process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
10.	Supplier Management	Is the Supplier Management process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
11.	Information Security Management	Is the Information Security Management process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
12.	Service Catalog Management	Does the Service Catalog set and achieved which includes Service Pipeline and Retired Services along with a change proposal?												

No.	List of ITIL Processes	Process Description	Is the Process exists as a standard and repeatable process in CBE?						How important is this process to CBE?					
			Non Existent	Initial	Repeatable	Defined	Managed	Optimized	Not Applicable	Not Important	Somewhat Important	Fairly important	Important	Very important
			0	1	2	3	4	5	0	1	2	3	4	5
13.	IT Service Continuity Management	Is the IT Service Continuity Management process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
Service Transition														
14.	Change Management	Is the Change Management process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
15.	Release and Deployment Management (RDM)	Is the RDM process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
16.	Knowledge Management	Is the Knowledge Management process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												

No.	List of ITIL Processes	Process Description	Is the Process exists as a standard and repeatable process in CBE?						How important is this process to CBE?					
			Non Existent	Initial	Repeatable	Defined	Managed	Optimized	Not Applicable	Not Important	Somewhat Important	Fairly important	Important	Very important
			0	1	2	3	4	5	0	1	2	3	4	5
17.	Transition Planning and Support	Is the Transition Planning & Support process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
18.	Change Evaluation	Is the Change Evaluation process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
19.	Service Validation and Testing	Is the Service Validation & Testing process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												
20.	Service Asset and Configuration Management (SACM)	Is the SACM process achieved, so that process steps, interfaces to other processes and functions inside the organization, roles and responsibilities are defined?												

No.	List of ITIL Processes	Process Description	Is the Process exists as a standard and repeatable process in CBE?						How important is this process to CBE?					
			Non Existent	Initial	Repeatable	Defined	Managed	Optimized	Not Applicable	Not Important	Somewhat Important	Fairly important	Important	Very important
			0	1	2	3	4	5	0	1	2	3	4	5
Service Operation														
21.	Incident Management	Is the Incident Management process achieved, so that process steps, interfaces to open incidents and to escalate them to problem management, roles and responsibilities are defined?												
22.	Event Management	Is the Event Management process achieved, so that process steps, sources of events and roles and responsibilities are defined?												
23.	Problem Management	Is the Problem Management process achieved, so that process steps, interfaces to incident and change management, roles and responsibilities are defined?												
24.	Access Management	Is the Access Management process achieved, so that process steps, interfaces to incident and change management, roles and responsibilities are defined?												

No.	List of ITIL Processes	Process Description	Is the Process exists as a standard and repeatable process in CBE?						How important is this process to CBE?					
			Non Existent	Initial	Repeatable	Defined	Managed	Optimized	Not Applicable	Not Important	Somewhat Important	Fairly important	Important	Very important
			0	1	2	3	4	5	0	1	2	3	4	5
25.	Request Fulfillment Management	Is the Request Fulfillment process achieved, so that process steps, interfaces to other processes, roles and responsibilities are defined?												
26	Service Improvement	Is the Service Improvement process achieved, so that process steps, interfaces to incident and change management, roles and responsibilities are defined?												

If you have any comment or suggestion, please:

_____

_____

_____

_____

_____

_____

Appendix E: Interview Guide

1. Is the following ITIL processes which are under Service Strategy phase achieved, so that processes steps, interfaces to other processes and functions inside the organization, role and responsibilities are defined?
    - ✓ Strategy Management for IT Services
    - ✓ Service Portfolio Management
    - ✓ Demand Management
    - ✓ Financial Management for IT Service
    - ✓ Business Relationship Management
2. How important is the above listed Service Strategy processes to CBE?
3. Is the following ITIL processes which are under Service Design phase achieved, so that processes steps, interfaces to other processes and functions inside the organization, role and responsibilities are defined?
    - ✓ Design Coordination
    - ✓ Service Level Management
    - ✓ Availability Management
    - ✓ Capacity Management
    - ✓ Supplier Management
    - ✓ Information Security Management
    - ✓ Service Catalog Management
    - ✓ IT Service Continuity Management
4. How important is the above listed Service Design processes to CBE?
5. Is the following ITIL processes which are under Service Transition phase achieved, so that processes steps, interfaces to other processes and functions inside the organization, role and responsibilities are defined?
    - ✓ Change Management
    - ✓ Release and Deployment Management(RDM)
    - ✓ Knowledge Management
    - ✓ Transition Planning and Support
    - ✓ Change Evaluation
    - ✓ Service Validation and Testing

- ✓ Service Asset and Configuration Management(SACM)

6. How important is the above listed Service Transition processes to CBE?
7. Is the following ITIL processes which are under Service Operation phase achieved, so that processes steps, interfaces to other processes and functions inside the organization, role and responsibilities are defined?
   - ✓ Incident Management
   - ✓ Event Management
   - ✓ Problem Management
   - ✓ Access Management
   - ✓ Request Fulfillment Management
8. How important is the above listed Service Transition processes to CBE?
9. Is the Service Improvement process which is under Continual Service Improvement phase achieved, so that processes steps, interfaces to other processes and functions inside the organization, role and responsibilities are defined?
10. How important is Service Improvement process to CBE?

Appendix F: Target Population and Sampling Method

$$n_0 = \frac{(Z_{\alpha/2})^2 \, pq}{e^2}$$

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

Where, N = Target Population (N= 534)

n0 = Sample size (n_0=384)

n = Calculated/Actual sample size

e = the desired level of precision (taken confidence level = 90% where by α = 0.1)

P = is estimated proportion of an attribute in the population (taken as 0.5 and q = 1-P = 0.5; for conservative estimate)

Z = normal curve that cuts an area α (the value read from statistical table)

IT Staffs Categorization and Sample Size Determination			
Main IT Departments	**Number of Users**	**Percentage of strata from the total target population size**	**Proportional sample size of the strata**
AIM	272	51%	31
E-payment	79	15%	9
PMO	114	21%	13
MIS	35	7%	4
ISM	23	4%	2
IT Audit	11	2%	1
Total	**534**	**100%**	**60**

Appendix G: Expert Validation Focus Group Discussion

Wednesday April 13, 2019, 04:30 – 06:45 P.M.

Organizer: Selam Tesfaye

Participants:

- IT Managers at Commercial Bank of Ethiopia (five persons)
- Core ITIL implementation team members from PMO (Three persons)

Focus group discussion setup

- The objective of the focus group discussion was to evaluate the proposed ITIL framework implementation guideline with respect to its consistency, correctness, completeness, clarity and applicability. Moreover, the purpose was to gather improvement areas emanated from the discussion.

Agenda

- 04:30 P.M. Opening
- 04:35 P.M Presentation on the problem statement, objective, and research design of the study
- 04:40 P.M. Presentation on the result of the maturity assessment of CBE's existing and desired ITSM practice against ITIL
- 04:50 P.M. Presentation on the proposed ITIL framework processes implementation guideline
- 05: 00 P.M. Discussion on the contents of the proposed implementation guideline with the participants comments
- 06:55 P.M. Closure