



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

**IT SERVICE MANAGEMENT FRAMEWORK FOR
ETHIO TELECOM BASED ON ITIL BEST PRACTICES**

By

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SEPTEMBER 2020

ADDIS ABABA, ETHIOPIA



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

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September 2020

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DECLARATION

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

I declare that the thesis is a result of my 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.

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

Advisor's Signature: _____

Dereje Teferi (Ph.D.)

DEDICATION

This research work is dedicated to my late grandmother, **Yeshi Tesfagabr (Teway)**, the vacuum that your loss has left behind can never be filled but your spirit shall remain with me forever. I will be forever indebted to you for all the sacrifices you made in raising and supporting me. I know you are in the best of hands and I pray that may God grant your soul eternal peace.

ACKNOWLEDGMENTS

First and foremost, I would like to praise and thank almighty God, who has granted abundant blessings, wisdom, strength, opportunity, and courage to carry out my research work successfully.

I would like to thank my deep and sincere gratitude to my research advisor **Dr. Dereje Teferi**, for allowing me to do research and providing invaluable guidance throughout this research. He has taught me the methodology to carry out the research and to present the research works as clearly as possible. It was a great privilege and honor to work and study under his guidance. I am extremely grateful for what he has offered me. I would also like to thank him for his friendship, empathy, and great sense of humor.

Besides my advisor, I would also like to extend my earnest thanks to **Dr. Workshet Lamenuw**, for his valuable comments, advice, and suggestions throughout the research work and study time.

I gave a very sincere thanks to Ethio telecom staff, specially ISD management and employees, who participated in the interview, framework demonstration, and expert validation sessions. This thesis would never have been possible without your valuable inputs, insights, and support.

Words fail me to express my appreciation to the school of Information Science staff for their unreserved guidance, and support during my study time. I am very glad to be part of the research seminar session you have conducted. You are an exemplary staff and please keep it up!

I would never forget my all family members without them, this work is not easily possible for me and they gave me spiritual and moral support. No words would be enough to express my feelings to thank my mother, **Tsige Massa**, for her unlimited love, support, sacrifice, and inspiration throughout my entire life.

Finally, my deepest gratitude goes to my colleagues, classmates, and friends who helped me to finish my research work

ABSTRACT

Telecom service providers are engaged exhaustively in providing different kinds of IT services for their customers. These IT services should be customer-oriented, and quality based to be favorable in the market. As a result, organizations should manage their IT services effectively and efficiently by introducing various IT service management mechanisms. However, improving or developing different ITSM mechanisms is a subject of great concern that needs further investigation academically. Hence, proposing an improved and customized ITSM framework to manage the various IT services that are delivered by the IT service provider is prominent.

However, to the best of the researcher's knowledge, little or no research work has been conducted to design and develop ITSM frameworks for telecom sectors of Ethiopia. Previous studies focused on the implementation, adoption, tailoring, and system or model development for selected ITSM processes within the Ethiopian context. Ethio telecom, the sole telecom service provider of Ethiopia, has a gap in the existing ITSM practices. Hence, this research study intends to investigate the current ITSM practice of Ethio telecom and then proposes an ITSM framework based on ITIL best practices that will ensure the quality of IT services and improve customer satisfaction.

Design science research methodology was employed to design and develop the ITSM framework. Furthermore, a qualitative research approach was followed to gather and analyze the data. Semi-structured interviews, observation, and document analysis were employed to collect different kinds of data. Also, thematic analysis was used to analyze the data that was collected from the respondents. A triangulation technique was applied to keep the validity and reliability of the research study. Accordingly, the final framework was demonstrated and communicated to selected respondents after passing through rigorous design, development, and evaluation stages. The proposed framework was evaluated by various IT staff through validated evaluation models.

The findings of the research study revealed that the existing ITSM practice did not address the needs of the organization. Thus, the proposed ITSM framework was designed and developed by incorporating the needs of the organization and improvement areas. Consequently, the evaluation result disclosed that the proposed framework can help to improve the current ITSM practice of the company by maximizing the quality of IT services and customer satisfaction.

Keywords: ITSM, ITIL, ITSM framework, ITSM framework based on ITIL, ITIL-based ITSM framework, Service components, Continuous incremental improvement, Ethio telecom

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LIST OF ACRONYMS

BSC	Balanced Scorecard
BS	British Standard
COBIT	Control Objectives for Information Technology
CIO	Chief Information Officer
CCTA	Central Computer and Telecommunication Agency
CSI	Continual Service improvement
DSR	Design Science Research
DSRM	Design Science Research Methodology
ET	Ethio telecom
eTOM	Enhanced Telecom Operations Map
HP	Hewlett Packard
IBM	International Business Machines
IoDSA	The Institute of Directors in Southern Africa
IS	Information System
ISD	Information System Division
ISACA	International Systems Audit and Control Association
ISO	International Standard Organization
ISM	Information Systems Management
ISMA	Information Systems Management Architecture
IT	Information Technology
ITGI	Information Technology Governance Institute
ITIL	Information Technology Infrastructure Library
ITIM	Information Technology Infrastructure Management
ITSM	Information Technology Service Management
ITSM-MS	Information Technology Service Management Measurement System
KPI	Key Performance Indicator
KISMET	Keys to IT Service Management Excellence Technique

MOF	Microsoft Operations Framework
OGC	Office of Government Commerce
OLA	Operation Level Agreement
PDCA	Plan, Do, Check, Act
PDSA	Plan, Do, Study, Act
RACI	Responsible, Accountable, Consult, Inform
RCA	Root Cause Analysis
PMF	Process Maturity Framework
ROI	Return on Investment
RQ	Research Question
SDLC	Software Development Lifecycle
SLA	Service Level Agreement
SLM	Service Level Management
SMFs	Service Management Functions
SVS	Service Value System
TTM	Time to Market

CHAPTER ONE

INTRODUCTION

1.1. Background

Information Technology (IT) is playing a substantial role in different organizations. In past times, a lot of IT organizations concentrated on technical activities but nowadays they are shifting towards providing high-quality services, (Talla & Valverde, 2013). As per the findings of (Mangalaraj, Singh, & Taneja, 2014; Spremić, 2009), IT has been shifted from supporting the business to adding a competitive advantage. (IT Governance Institute (ITGI), 2003) stated that IT is necessary to manage transactions, information, and knowledge that are mandatory to maintain social and economic tasks. IT has many opportunities for organizations and these are having a competitive advantage, higher productivity, and performance. (Chan, 2000) strengthens this fact that IT was acting as a supporting tool of the business but nowadays this concept has changed.

Nowadays most organizations exhaustively depend on IT to meet their vision, objectives, and business strategy, (Mourad & Johari, 2014). One of the IT organizations that use IT as their key asset for their business transaction is the telecom sector. IT has created an enormous opportunity for telecom sectors in achieving their business goals and objectives. Through the advancement of IT, the business needs of telecom sectors have been increased enormously and due to that, they strive to have a supporting framework to manage their IT services. According to (Jäntti & Cater-Steel, 2017) most IT service provider organizations are engaged in improving their IT support processes by introducing IT management frameworks.

IT Service Management (ITSM) is part of the service science discipline that focuses on IT operations, (S. D. Galup, Dattero, Quan, & Conger, 2009). It is the sum of processes and services required to manage and support IT services. ITSM is also defined as a discipline for managing IT systems, which gives prior emphasis to customer satisfaction focusing on the contribution of IT to the business, (Tanovic & Orucevic, 2010). Additionally, ITSM is concerned with the delivery and support of IT services intended to improve the quality of IT services that are provided to customers in a cost-efficient and effective manner, (Tayfour A Mohammed, 2008).

To effectively manage several IT services organizations tried to adopt and implement well-known or customized ITSM frameworks. Some of the well-known frameworks are Information Technology Infrastructure Library (ITIL), Control Objectives for Information and Related Technology (COBIT), Enhanced Telecom Operations Map (eTOM), and Microsoft Operations Framework (MOF). In addition to the ITSM frameworks, several standards are used for process quality management, improvement, assessment, and service management. Some of them are the International Standards Organization (ISO) 9000, ITIL Process Maturity Framework (PMF), and ISO 20000 which is derived from British Standard (BS) 15000. On the contrary, the findings of (Marrone & Kolbe, 2011b) showed that the usage of IT best practices is becoming a common habit. Moreover, (Tayfour Abdalla Mohammed, 2018) indicated that ITSM is usually implemented through a collection of 'best practice' in IT service provision.

As a sole telecom service operator, Ethio telecom (ET) is providing various services and products. By the means of advanced IT, the company is trying its best effort to deliver several products and services to its customers. However, due to weak management of IT and lack of skilled human power, the company is experiencing different kinds of challenges, (Daniel, 2015). According to ITWeb Africa¹; the officials of the company accepted the fact that there is still customer dissatisfaction due to poor quality of service and capacity issues in the company. Addressing those quality issues will play an important role in achieving its objectives. (Yisak, 2016) implied that the quality of service has a positive impact on customer satisfaction and thus, the company (ET) should give special attention to improving its various services and systems. Additionally (Fasihi, 2015) elaborated that an organization cannot succeed without giving concern to customers since the world is more quality-oriented and customer-centric.

Therefore, the company should focus on the effective and efficient management of its IT services. One of the methods that help to manage the IT services is, by introducing various ITSM mechanisms. (Jäntti & Cater-Steel, 2017) indicated that IT service providers should introduce the ITSM method since customers need a systematic service management approach otherwise, failure to implement ITSM will result in loss of business opportunity and customer credibility. In addition to this, (Zhu, Song, & Song, 2009) informed that the introduction of ITSM in telecom operators is

¹ <http://www.itwebafrica.com/telecommunications/926-ethiopia/244765-ethio-telecom-responds-to-pressure-on-network> Accessed on Aug 20,2019

useful to manage IT infrastructures effectively since it is the center of customer satisfaction and service quality.

Among the previously mentioned ITSM frameworks, ET has tried to implement ITIL best practices. However, several limitations were witnessed during the implementation phase, (Alemeye, 2015). Furthermore, there is no potential justification that indicates the level of ITIL utilization within the company. Thus, further study should be conducted to investigate the current ITSM practice of the organization and propose an improved framework to enhance the existing ITSM issues of the organization. In line with the above statement, customized frameworks will be helpful to heighten the IT service management of the company to the maximum level. Consequently, special focus should be given to a context-based ITSM framework since adopting or implementing frameworks as a whole or partially; without examining the company's business needs will create a big failure and chaos, Figuerola (2012)².

1.2. Statement of the Problem

According to (Irfandhi et al., 2016), the success of a given business depends on the effective utilization of IT infrastructures, and thus, IT service providers should manage their IT service to be more efficient enough to their customers. (Fasihi, 2015) explained that one of the key concerns for organizations is the effective and efficient management of IT for business success and survival. (Talla & Valverde, 2013) strengthen that IT organizations are concentrated on providing a high quality of services. Therefore, various IT organizations tend to focus on managing their IT services since it is the focal point for their success and failure.

As per (Iden & Eikebrokk, 2013) findings, there are limited works on this area and most of the empirical works are concentrated on the implementation or adoption of the ITIL framework in some selected regions and countries. Furthermore, (S. Galup, Dattero, Quan, & Conger, 2007) asserted that even though there is a remarkable growth of ITSM practice in the industry, there are few research works in the domain. Thus, this indicated that the domain area of ITSM more still needs further research studies in international settings.

² <https://docplayer.es/2295631-Itil-v3-por-donde-empezar.html> Accessed on Sep 15, 2019

In Ethiopia, even though the IT service is emerging dramatically but there are little research works. Among these, some of the research works focused on measuring and assessing user perception in relation to the IT services that are provided by the IT service provider, specifically Ethio telecom. (Tesfaye, 2013; Yeshewas, 2017) suggested that the company should assure all its services are quality based and customer-oriented. (Daniel, 2015) added that due to poor IT service management and lack of skilled human power; the company is struggling to provide continuous and high quality IT services to its customers. Those research studies only showed how the service quality can impact customer satisfaction and what kind of activities the organization should do to provide a better IT service to its customers.

However, concerning the ITSM domain, there are few studies in this area. A study that was conducted by Alemeye (2015) assessed the factors that are responsible for the success and failure of ITIL implementation in ET. The author empirically studied the critical success factors that are determinants while implementing the ITIL framework. According to the study, the company has faced different barriers while implementing the framework. Some of the unique company-specific barriers that are identified by the study are; difficulty in process governance and management, process misalignment, weaknesses in organizational change management, rigid organizational structure, and complexity of integrating ITIL to the existing system. Thus, to get rid of those barriers, the company should focus on its specific issues and introduce an improved method.

(Melikte, 2016) designed and developed an ITIL based service desk system that assigns tasks to technicians automatically with the intent to improve the ITSM practice of Ethiopian Airlines. The developed system aligned with the ITIL standard and it helps to solve the issues that were observed while providing various solutions to internal customers of the company.

(Tadesse, 2017) introduced a tailored ITSM framework based on ITIL best practices for Bunna International Bank. The study assessed the existing ITSM practices of the organization and proposed a tailored ITSM framework. However, the study only focused on tailoring the ITIL processes and gives more emphasis on processes rather than including the remaining ITIL functions.

Overall, this indicates that the domain area is still open for further research works since the aforementioned studies only focused on the implementation, adoption, tailoring, and system or model development for selected ITSM processes within the Ethiopian context. Moreover, to

address poor service quality and customer discontent, IT organizations should work on their internal needs and capability while designing, developing, and improving their ITSM frameworks.

The sole telecom service provider of Ethiopia, Ethio telecom, has undergone various organizational changes since 2018/19 which resulted in the establishment of new divisions, departments, and sections. The organizational change is aimed at creating an agile and responsive structure that serves the business need and customer expectations. To this end, a new strategic plan was introduced in order to make the company a competitive business firm. As a result, the strategic plan is expected to improve the IT service quality, address changing customer demand, enhance network availability, and fortify infrastructure management.

Among the company's organizational structure, there is a dedicated division that is responsible for IT service management which is called Information System Division (ISD). ISD is one of the main division that is responsible for managing and delivering various IT services of the company. As part of the organizational change, the division has been part of this vast transformation. Consequently, the division has modified its previous structure because different sections have been merged, vanished, and created. Besides the structural change, the division has also modified the working hours for some critical sections. Even though the company is undertaking various measurements to improve its IT services, it is facing difficulties to provide quality services and satisfy customer demand. Furthermore, the researcher's preliminary investigation indicated that there are repetitive service interruptions, continuous customer complaints on the service quality and demand, reactive service handling, vendor dependency, inadequate service planning, and scarcity of service management methods.

This entails that a mechanism should be brought in to address the existing ITSM issues of the organization by taking the organizational changes, and strategic plan into consideration. Therefore, proposing a framework can be taken as a prominent endeavor in this regard. However, to the best of the researcher's knowledge, little or no research work has been conducted to design and develop ITSM frameworks for telecom sectors of Ethiopia. This proposed research tries to fill the gap that has been seen in the telecom sectors of Ethiopia since telecom sectors are exhaustively engaged in providing various IT services to their customers. More specifically, the study attempts to find a solution after examining the current ITSM practice of ET and proposes an improved ITSM

framework based on the ITIL best practices. In order to address the supra research problems that are discussed thoroughly, the researcher has formulated the following research questions.

- 1) What is the current status of ITSM practice in Ethio telecom?
- 2) What ITSM Framework can best fit Ethio telecom based on the ITIL best practices?

1.3. Objectives of the Study

1.3.1. General Objective

The main objective of this study is to propose an ITSM framework based on ITIL best practices for Ethio Telecom that will ensure the quality of IT services and improve customer satisfaction.

1.3.2. Specific Objectives

In order to meet the general objective of the study, the following activities will be done throughout the study.

- Examine the current ITSM practices of the company.
- Review various ITSM frameworks and more specifically ITIL-based ITSM frameworks.
- Propose an ITSM framework based on ITIL best practices that best fit ET's specific context.
- Evaluate the applicability of the proposed framework.

1.4. Scope and Limitation of the Study

ITSM is a wide and broad concept. It includes designing, adopting, implementing, tailoring, and developing various ITSM frameworks, models, standards, systems, and best practices. As the title entails the study is focused only on proposing an ITSM framework. More specifically, the study examines and investigates the current ITSM practices of the company and then proposed an ITSM framework based on the third updated version (V3) of ITIL to address the existing issues.

The study employed the ITIL V3 as a reference framework to capture issues of the existing ITSM practices. The study is focused on one specific telecom sector of Ethiopia, specifically Ethio telecom, a telecom service provider, which is exhaustively engaged in providing various IT services.

1.5. Significance of the Study

The proposed study is expected to benefit both the researchers and practitioners. The study will contribute additional knowledge for telecom companies by providing the know-how of designing and developing a context-based ITSM framework academically. Moreover, the study can indicate how to mitigate the existing issues of ITSM by introducing an improved framework as a solution. In today's competitive telecom environment, telecom service providers are expected to address the organization's needs, changing customer demands, and technological advancements. Hence, a framework that will manage the IT services to address those listed areas is mandatory and crucial. As a result, the proposed study attempts to include the components that are substantial to a given telecom service provider. By doing this, the organization can sustain quality IT service delivery, satisfy customer needs, and keep up with the dynamic telecom industry.

On the other hand, the results of the proposed study are expected to assist practitioners of Ethio telecom and other related service providers. Consequently, the output of the research study can be taken as a guiding framework to manage, control, deliver, and support various IT services of the organization. Finally, the results of this study could be used as an input for related research works in the domain.

1.6. Organization of the Thesis

The research document is organized into six chapters. The first chapter aims to familiarize the reader with the rest of the thesis; it includes the background of the study, a statement of the problem with the potential research questions that the research is intended to answer, the objective of the study, as well as significance, scope, and limitation of the study.

The second chapter, the literature review, provides a brief description of the most important concepts of IT governance, ITSM, ITSM frameworks, and ITIL. Consequently, it attempts to develop a theoretical and conceptual understanding of the subject matter. In this chapter, among the different ITSM frameworks, ITIL has been studied in-depth by listing its pros and cons. Moreover, selected ITIL-based ITSM frameworks have been discussed briefly. Then, it indicated an overview of ITSM in developing countries. Lastly, it presented the research gaps of prior research works in relation to the proposed study.

The third chapter deals with the research design and methodology. It describes the research approach, methods, and techniques that are used to conduct the empirical study, with detailed reasoning. The study follows a well-known design science research methodology and the research processes are interrelated and cyclic. Furthermore, it applied the ITSM assessment model to investigate and assess the current ITSM practice of the company. The chapter also shows how the data will be analyzed, and the way of handling the reliability and validity of the study.

The fourth chapter describes the data analysis, findings, and discussion. In this chapter, the qualitative data is presented and then analyzed in accordance with the literature findings. After rigorous data analysis, each concept is discussed and revealed based on the prior literature.

The fifth chapter deals with artifact design and development based on the findings from chapter four. The ITSM framework is designed and developed based on empirical findings. Furthermore, the designed framework is evaluated by various IT staff through well-known evaluation models. In this chapter, the design, development, and evaluation phases are performed continuously and rigorously.

The last chapter, chapter six, presented a conclusion and recommendations. It discussed the results of the research findings in relation to the research questions. Moreover, it describes the contribution of the study and future work based on the limitations that the study did not address.

CHAPTER TWO

LITERATURE REVIEW

2.1. Overview

The goal of this chapter is to review relevant literature in the domain of ITSM with a particular focus on ITIL to provide context for the study and clarifies the relationship between this study and previous works in the field. With this goal, in this chapter, a review of different pieces of literature that are related to ITSM with implications to ITIL are discussed. This chapter is organized into three main categories to have a logical flow of ideas and concepts in intention to put the whole research into perspective. Hence, the first category strives to bring a general understanding of the basic concepts of IT governance, and IT governance frameworks. Then, the second section of the literature review is designed and presented to give in-depth information about IT services, and ITSM. Thirdly, various kinds of ITSM frameworks are discussed, and more specifically ITIL is examined in detail. Lastly, a review of related works is conducted to present the distinction between this work and previous works.

2.2. Process of the Literature Review

The literature review process follows (Bieser & Hilty, 2018; Snyder, 2019) literature review steps. The study follows a semi-systematic literature review as an approach. According to Snyder (2019), a semi-systematic literature review method is used when the topic is studied by various scholars and it has been framed differently. Besides this, the review method will identify articles that have better significance to the area and will be synthesized through meta-narratives rather than measuring the effect size.

The researcher started by identifying the key terms that are related to the study area and based on the research questions. These are IT Governance, IT Service Management, ITSM frameworks, ITIL, ITSM Frameworks based on ITIL best practices, and Process assessment. In order to get additional literature, the researcher derived alternative names to the original key terms. Then the researcher applies Boolean operators to combine the original key terms with their alternative names.

Key Terms	Alternative Terms
IT Governance	Information Technology governance, IT governance frameworks, Elements of IT governance
IT Service Management	ITSM, Information Technology Service Management, components of ITSM, ITSM processes, IT management, service management, service, IT service
ITSM Frameworks	IT Service Management Frameworks, ITSM Models, ITSM reference models
ITIL	Information Technology Infrastructure Library, ITIL, ITIL framework, best practices, ITIL implementation, ITIL adoption, ITIL perspectives, ITIL processes, ITIL functions
ITSM Frameworks based on ITIL best practices	ITSM Frameworks based on ITIL, ITIL-based ITSM Frameworks, Incident Management* based on ITIL frameworks

*based on the ITSM/ITIL process; the keywords are subjects to change

Table 2.1. Key and alternative terms for the literature search

The researcher has used various scientific repositories, institutional repositories, and search engines in order to find the literature based on the previously mentioned terms. Those are IEEE Xplore, Semantic Scholar, ScienceDirect, ACM, CiteSeerX, AIS eLibrary, Google Scholar, ResearchGate, SAGE journals, SpringerLink, several institutional repositories, and Google. Finally, the pieces of literature are categorized into five main categories as it was presented in *Table 2.1.*

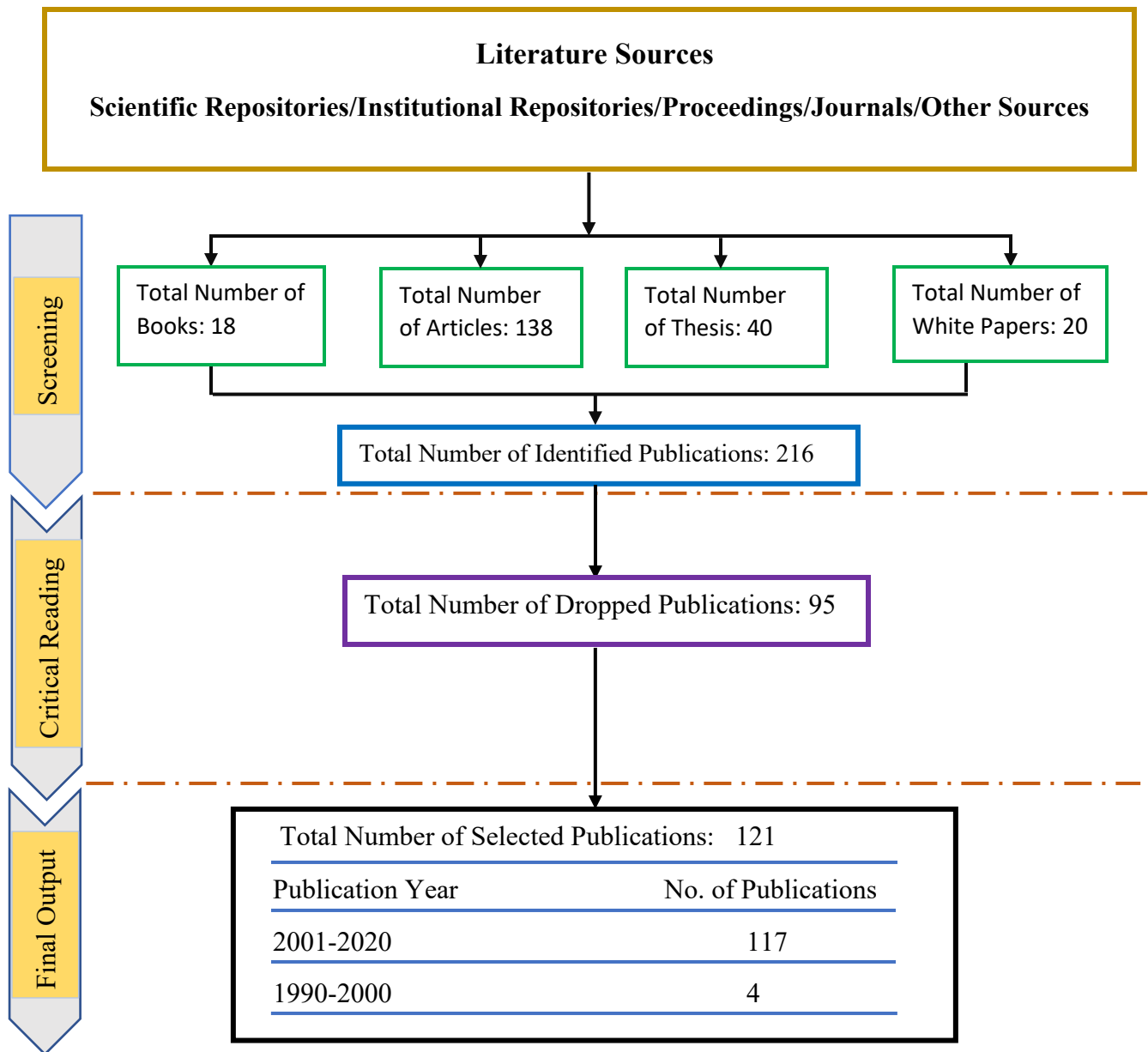


Figure 2.1. Process of publication selection and screening for the study area

2.3. Overview of IT Governance

According to (Selig, 2016) Governance in IT is defined as “*Governance is a collection of management, planning, and performance reporting and review processes with associated decision rights, which establish controls and performance metrics over key IT investments, delivery services and new or change authorizations and compliance with regulations, laws and organizational policies*”. It also describes various policies, procedures, and management that are involved in managing IT functions.

IT has become dominant since the 1990s and this makes IT solutions to be adopted by many organizations in order to achieve their business goals and improve performance, (Ako-Nai & Singh, 2019). According to (Weill & Ross, 2004; Chorafas, 2009; Batyashe & Iyamu, 2016) IT is one of the organization's key assets that must be governed to create value. Due to this; IT as one of a valuable asset should have a governance policy in order to help organizations to achieve their objectives, (Amoroso & Bogale, 2015). As per the findings of the (ITGI, 2011), almost 94% of 834 respondents said that IT is important to the delivery of the business strategy and mission of the organization. Based on (Ako-Nai & Singh, 2019) findings organizations use IT in three ways and these are listed as follows:

- Strategically to gain a competitive advantage
- Operationally to increase operational efficiency and
- As a service to supply added value to customers

IT has an ultimate role in organizations and (Batyashe & Iyamu, 2016) strengthen that Information is a significant, valuable, and determining factor in decision making in order to select, implement and manage an IT governance framework. IT governance is an emerging discipline and a new concept, (ITGI, 2005). IT governance is holistic in governing an organization and specifically, it focuses on improving the management and control of IT, (ITGI, 2005). (Batyashe & Iyamu, 2016) strengthen this idea that IT governance cannot be studied solely without considering a given organization. (Devos, Landeghem, & Deschoolmeester, 2012) emphasized that due to Information Technology's important role, IT governance must be adopted in order to achieve business objectives and handle risks. As per (Ghildyal & Chang, 2017) IT governance describes the use of IT strategy with various processes of the organization intending to achieve business objectives. It helps organizations by balancing the risks they will get due to that the organizations will have a better return on investment. In general, (The Institute of Directors in Southern Africa (IoDSA) [White Paper], 2009) has put the definition of IT governance precisely and shortly as "*IT governance is the effective and efficient management of IT resources to facilitate the achievement of corporate objectives*". (Weill & Ross, 2004, pp. 5–6) stated through their framework that; Information and IT assets are governed by different IT governance mechanisms and those assets are interlinked with corporate governance of an organization through the strategies that will be

formulated and managed by senior management teams. Then, the board will control and manage the subordinate staff (senior management teams) in order to achieve the organization's goal.

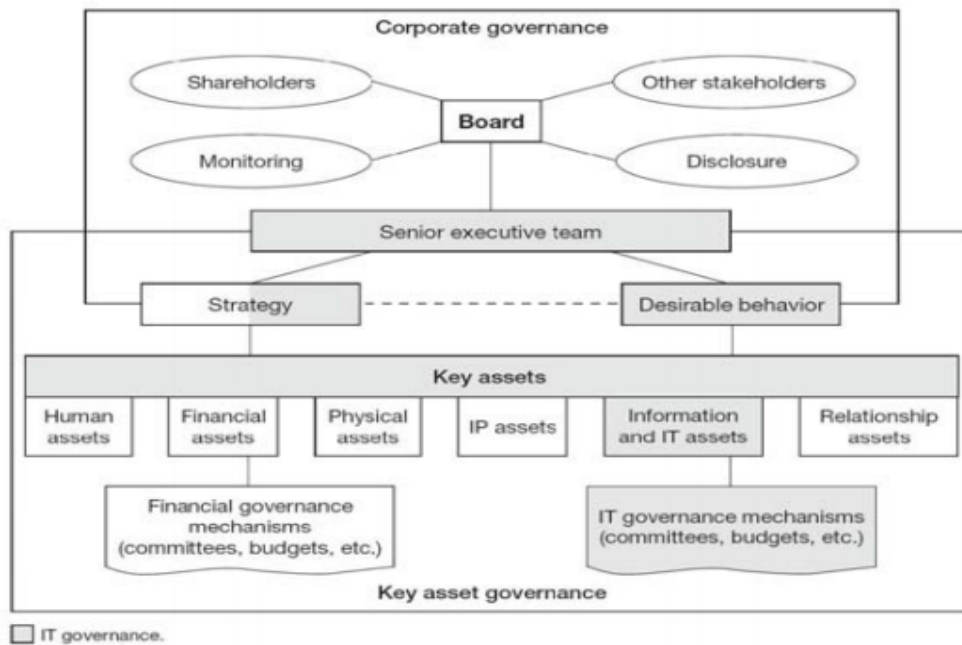


Figure 2.2. Corporate and key asset governance adopted from (Weill & Ross, 2004, p. 5)

IT governance focuses on alignment, value delivery, risk management, resource management, and performance measurement, (ITGI, 2005). However (Selig, 2016) visualizes IT governance in a different context and as per the author's finding IT governance, comprises program and project management, process management, resource management, IT service management, strategic sourcing and vendor management, and performance management.

In general, the objective of IT governance is “to *understand the issues and the strategic importance of IT, so that the enterprise can sustain its operations and implement the strategies required to extend its activities into the future*”, (ITGI, 2003).

2.3.1. Evolution of IT Governance

According to (Sallé, 2004) IT organizations typically follow a three-stage approach. These are IT Infrastructure Management (ITIM), IT Service Management (ITSM), and IT Governance.

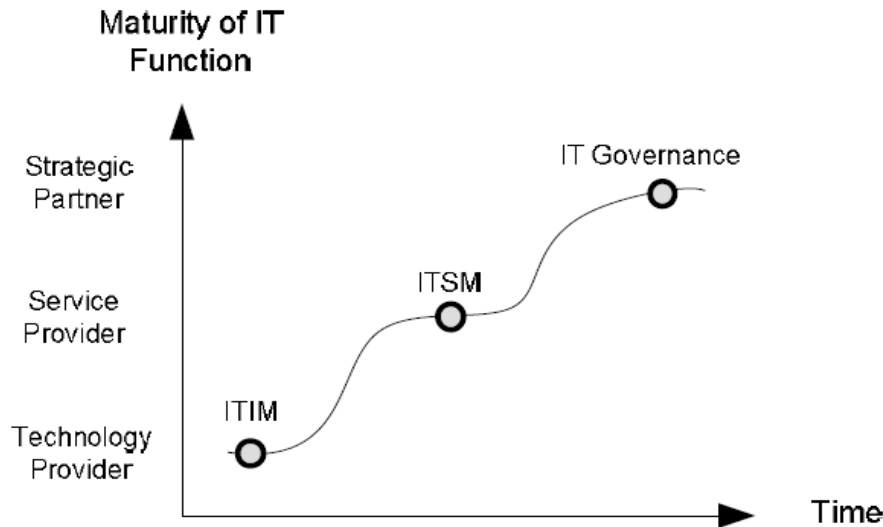


Figure 2.3. Evolution of IT functions within organizations adopted from (Sallé, 2004, p. 1)

As per (Sallé, 2004) during the first stage (ITIM), the IT organizations focus on improving the management of the enterprise infrastructures. In this stage, the enterprises will maximize their return on computing assets and control those devices and the data that are generated through them. In the next stage, which is ITSM, the IT organization will exhaustively identify the services based on the customer needs, and it will give more focus on planning and delivering those services to meet availability, performance, and security requirements. Moreover, to achieve quality and cost issues, IT manages service level agreements both internally and externally. In the last stage, IT Governance, in other words, is called IT business value management, IT organizations will transform into true business partners which enable new business opportunities. In addition to these IT processes, are integrated with the corresponding business processes that improve service quality and business agility. Venkatraman, N. (as cited in Sallé, 2004) summed up this third stage shortly in the following table. The author shows the contribution of IT by the business during the transformation from a service provider to a strategic partner.

Service Provider	Strategic Partner
<ul style="list-style-type: none"> • IT is for efficiency • Budgets are driven by external benchmarks • IT is separable from the business • IT is seen as an expense to control • IT managers are technical experts 	<ul style="list-style-type: none"> • IT for business growth • Budgets are driven by business strategy • IT is inseparable from the business • IT is seen as an investment to manage • IT managers are business problem solvers

Figure 2.4. IT as a service provider or as a strategic partner adopted from Venkatraman, N. (as cited in Sallé, 2004, p. 2)

2.3.2. Pillars of IT Governance

Effective and successful good IT governance is built on various pillars, (Selig, 2016). If an enterprise fails to follow or exert much focus on those pillars, the IT governance will not be effective. The failure of the pillars is discussed as follows:

- **Leadership, organization and decision rights:** define the organization structure, roles and responsibilities, decision rights, a shared vision, and integration touchpoints
- **Flexible and scalable processes & controls:** process implementation and improvement are the focal points of the IT governance model
- **Enabling technology:** the use of advanced tools and technologies that support the major IT governance components

2.3.3. Benefits of IT Governance

As stated by (Mangalaraj et al., 2014) IT governance is derived from corporate governance objectives and manifests the alignment of IT strategy with organizational strategy. (Ghildyal & Chang, 2017) added that the IT governance of an enterprise has a goal of developing, directing, and controlling IT strategy and resources in order to achieve enterprise goals and objectives. The authors argued that IT governance not only add value to organizations but also balance the risk and return values with IT investments.

(Weill & Ross, 2004, pp. 14–18) grouped the importance of IT governance into five basic categories and these are:

- **Good IT Governance pays off:** Firms with superior IT governance have more than 20% higher profits (return on assets) than firms with poor governance having the same strategic objectives.
- **IT is Expensive:** Many enterprises spend more than 4.2% of their annual revenue, which exceeds 50 % of their annual total capital investment. To solve this issue, many enterprises are creating or adjusting IT structures to focus on selected IT strategies.
- **IT is Pervasive:** Nowadays IT expenses not only come from IT groups but also from anywhere from the enterprises. This trend arises from the shift from centrally managed IT

to the decentralized scheme. Thus, a well-designed IT governance arrangement distributes IT decision making to those responsible for outcomes.

- **New Information Technologies Bombard Enterprises with New Business Opportunities:** The advancement of new technologies has created both strategic threats and opportunities. In order to handle these issues, an enterprise should be ambitious in crafting a formalized governance processes for harmonizing desirable behaviors and IT principles.
- **IT governance is Critical to Organizational Learning About IT Value:** Enterprises have struggled to understand the value of IT-related ventures. However effective governance creates the chance through which enterprises can consider the potential value and formalize their learning.
- **IT Value Depends on More Than Good Technology:** Throughout the year most IT projects failed not merely from technical faults but from the inability of organizations to adopt new processes that apply new technologies effectively. Successful firms have better IT decision-making processes besides making better IT decisions. In order to make better IT decisions, firms should have the right and knowledgeable people. These people who are involved to make better IT decisions will produce better implementations.
- **Senior Management Has Limited Bandwidth:** Carefully designed IT governance provides a clear, transparent IT decision-making process that leads to consistent behaviors of senior management. Senior management will be free from unnecessary IT decision processes and thus, they will be engaged in empowering people's creativity.
- **Leading Enterprises Govern IT Differently:** Top-performing firms have the governance patterns that make them unique to the corresponding firms who follow a normal governance approach. Those firms had governance models that harmonize centralized and decentralized decision making.

As per (Selig, 2016) view IT governance has the following additional benefits to the organization, and these are listed as follows:

- Aligns IT investments and priorities more closely with the business

- Manages, evaluates, prioritizes, funds, measures, and monitors requests for IT services and the resulting work and deliverables, in a more consistent and repeatable manner that optimizes returns to the business
- Responsible and efficient utilization of resources and assets
- Ensures that IT delivers on its plans, budgets, and commitments
- Establishes and clarifies accountability and decision rights (clearly defines roles and authority)
- Manages risks, change and contingencies proactively
- Improves IT organizational performance, compliance, maturity, and staff development
- Improves customer service and overall responsiveness

As per the findings of the (ITGI, 2005), good IT governance has the following benefits, and these are:

- **Transparency and Accountability:** It includes transparency of IT costs, IT process, IT portfolio (projects and services), and being accountable while making decisions.
- **Return on Investment (ROI)/Stakeholder Value:** It includes an understanding of IT costs and their corresponding ROI. In addition to these stakeholders are allowed to see IT risks/returns and others.
- **Opportunities and Partnerships:** It includes facilitating joint ventures with other stakeholders, improves responsiveness to market challenges and opportunities. Moreover, it enables IT participation in business strategy, and it includes other related factors.
- **Performance Improvement:** it includes an increased ability to benchmark, avoidance of unnecessary expenses, and others.
- **External Compliance:** it includes an integrated approach to meeting external legal requirements.

2.3.4. Focus Areas of IT Governance

According to the (ITGI, 2003, 2005), the main focus areas of IT governance are categorized into five major topics. Among these value delivery and risk management are outcomes. The remaining three which are strategic alignment, resource management, and performance measurement are drivers. The IT governance will circulate on those continuously focus areas and it is not a one-time

activity, so it needs close follow-up, monitoring, and support from high-level management to achieve the organizational objective concerning the dynamic IT environment.

- **Alignment:** ensures that the business strategy is harmonized with the corresponding IT strategy of the organization
- **Value Delivery:** ascertain a quality IT delivery within time and budget that fulfills the business objectives.
- **Risk Management:** Makes sure that processes are in place to ensure that risks have been adequately managed.
- **Resource Management:** concerned with an optimized allocation of IT investment, use, and allocation of IT services besides knowledge and infrastructure.
- **Performance Measurement:** affirm strategic compliance, track project delivery, and monitor IT services.

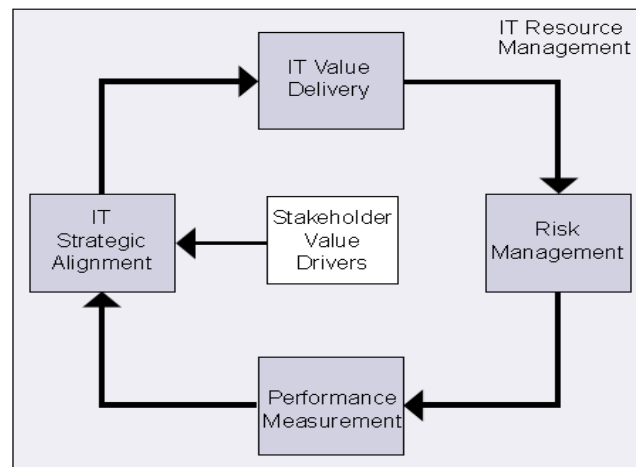


Figure 2.5. Focus areas of IT Governance adopted from (ITGI, 2003, p. 20)

2.3.5. IT Governance Frameworks

According to ITGI (2003), the IT governance framework involves setting objectives, providing direction, IT activities, performance measurement, and comparison.

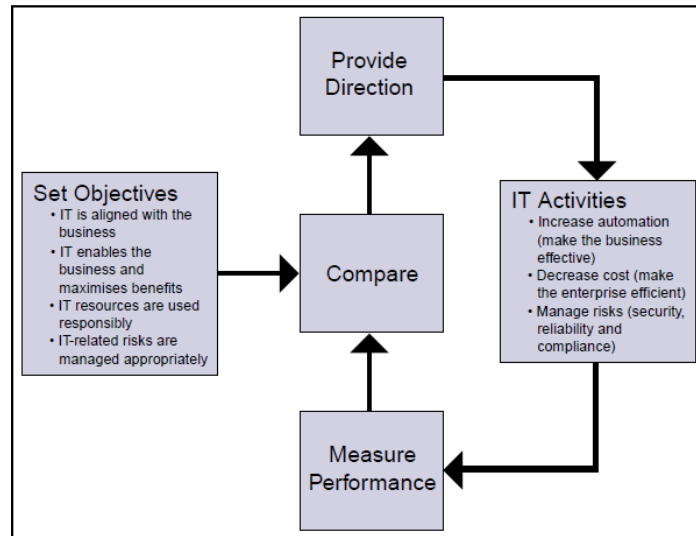


Figure 2.6. IT Governance framework adopted from (ITGI, 2003, p. 12)

Various organizations try to craft their own IT governance framework based on the focus areas of IT governance. However, the main aim of this study is to focus on widely accepted and validated IT governance frameworks. Before going strictly to discuss the different types of IT governance frameworks, the researcher aims to gather and present what the IT governance framework by itself will hold as its core element?

2.3.6. Elements of IT Governance Framework

As per the findings of prior research works of other scholars, (De Haes & Van Grembergen, 2005) deduce that the IT governance framework is a mixture of three basic elements: structure, processes, and relational mechanisms.

- **Structures:** It is responsible for defining roles and responsibilities. It also formulates the IT organization structure that includes Chief Information Officer (CIO) on Board, IT strategy committee, and IT steering committee(s).
- **Processes:** it includes strategic information systems planning, service level agreements, balanced scorecards, alignment maturity models, and information economics.
- **Relational Mechanisms:** it includes Active participation and collaboration between principle stakeholders, Partnership rewards and incentives, Business/IT co-location, Cross-functional business/IT training, and rotation.

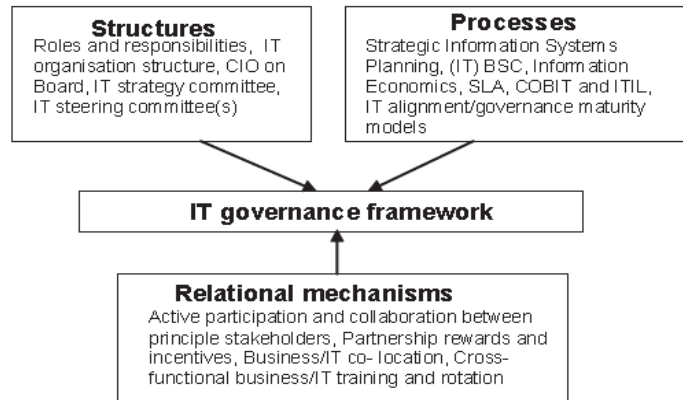


Figure 2.7. Elements of IT Governance framework adopted from (De Haes & Van Grembergen, 2005, p. 1)

According to Spoden, C. (2017)³ standards are mandatory actions or rules that give formal policies and direction. On the other hand, policies are formal statements crafted by senior management whereas procedures are detailed step by step instructions to achieve a common goal. Guidelines are recommendations to users when standards do not apply. Verbrugge, B. (2016)⁴ quoting ISO's definition added that a standard is a document that provides requirements, specifications, guidelines, or characteristics that can be used consistently to ensure that materials, products, processes, and services are fit for their purpose. Whereas guidelines or guidance is a recommended practice that allows some discretion or leeway in its interpretation, implementation, or use. As per the author's definition framework is or contains a structure or system for the realization of a defined goal. On the other hand, best practice is the description of the best way of working based on the situation at hand. Zitek, N. (2015)⁵ summarized the definition of a standard, framework, and best practices as follows "*Standards are sets of clearly defined and measurable rules and requirements that have to be met in order to consider something compliant with the standard in question. Frameworks, or best practices, offer the only guideline on the subject at hand: "what to do," without "how to do it," with the possibility to implement them partially, selectively or not at all*".

³ <https://frsecure.com/blog/differentiating-between-policies-standards-procedures-and-guidelines/> Accessed on Oct 20, 2019

⁴ <https://www.vanharen.net/blog/best-practice-model-framework-method-guidance-standard-towards-consistent-use-terminology/> Accessed on Oct 20, 2019

⁵ <https://advisera.com/20000academy/knowledgebase/itsm-standards-and-frameworks/> Accessed on Oct 20, 2019

IT governance frameworks and standards help organizations in achieving their business objectives through effective utilization and management of IT services. A number of IT governance frameworks have been developed to increase IT efficiency, control over IT investments, and reduce unnecessary expenses, (Ghildyal & Chang, 2017). Even though there are a number of IT governance frameworks; those cannot be simple, complete, off the shelf and best-fit frameworks. So, organizations should customize them based on their internal business needs and objectives.

2.3.7. IT Governance and IT Management

As per the definition of (International Systems Audit and Control Association (ISACA), 2012) governance “ensures that stakeholder needs, conditions, and options are evaluated to determine balanced, agreed-on enterprise objectives to be achieved; setting direction through prioritization and decision making; and monitoring performance and compliance against agreed-on direction and objectives” whereas management “plans, builds, runs and monitors activities in alignment with the direction set by the governance body to achieve the enterprise objectives”.

IT governance and IT management are always a subject of confusion. However, (Peterson, 2004; De Haes & Van Grembergen, 2005) argued that IT management focuses on the effective and efficient supply of IT services, products, and management of IT operations and it is more influenced by internal factors (business needs) in a given time. Whereas IT governance goes beyond IT management and mainly focuses on the present and future business needs of an organization based on the IT advancements that will be achieved through a given time and it is influenced by both an internal (business needs) and external factor (customer needs).

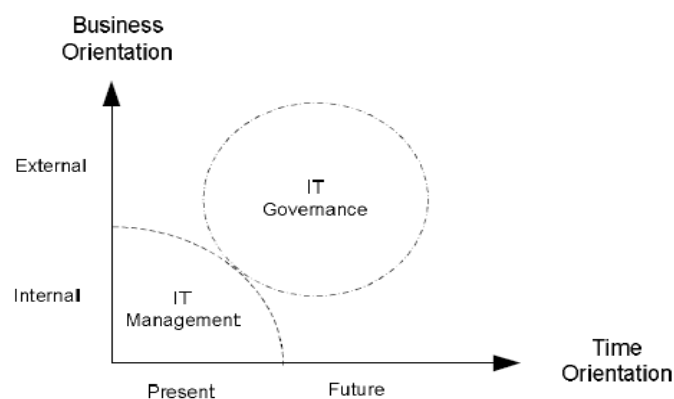


Figure 2.8. IT Governance versus IT Management adopted from Peterson, R (as cited in Van Grembergen, 2003, p. 5)

(Sallé, 2004) visualized the linkage and relationship between IT governance and IT management. The conceptual framework added that how ITSM maps with IT governance in order to manage and control IT assets and these are IT services, and infrastructures.

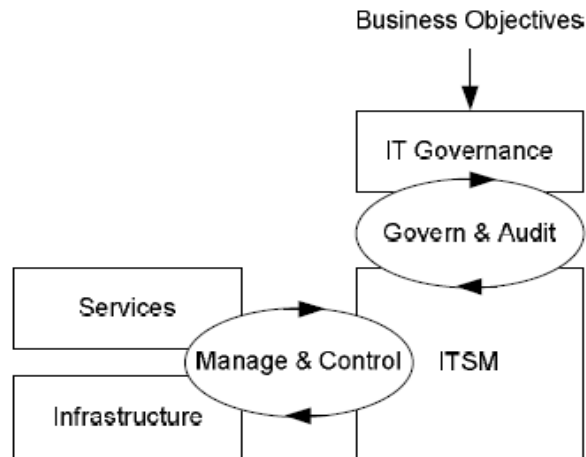


Figure 2.9. The relational model between IT Governance, ITSM, and IT operations and services adopted from (Sallé, 2004, p. 3)

2.4. IT Service Management (ITSM)

The concept of services and service management emerged after the increasing advancement of IT systems and IT management maturity, (Winniford, Conger, & Erickson-Harris, 2009). During the 1980s the practice of service management grew depending on the business needs of an organization. This was aggravated by IT organizations that are engaged in providing services trying to adopt and implement service management in order to manage and control their IT applications, infrastructure, and processes. In the late 1980s and early 1990s, ITIL has been introduced in the United Kingdom and it familiarized the term called ‘service management’ within the series of books that aimed at providing an approach to handle the ITSM. In order to meet the business needs of organizations, IT service approaches have been modified, then later the concept of ‘IT help desk’ has been introduced to provide solutions for the repetitive issues encountered by those firms who are trying to utilize the IT services.

According to the definition of (Cartlidge, Rudd, Smith, Wigzel, Rance, Shaw, & Wright, 2012, p. 4), the term ‘service’ has been stated as “*A means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks*”. Purchasing or using the service is the rationale for the customer to achieve outcomes. So, the value of the

service has a direct relationship with the customer's needs and depends on how it eases the outcomes. The concept of 'service management' has been defined as "*A set of specialized organizational capabilities for providing value to customers in the form of services*", (Cartlidge et al., 2012, p. 5). The 'specialized organizational capabilities' means processes, methods, functions, roles, and activities that are used to provide service to customers by the service provider. Service management is not only about delivering a quality of service to customers, but it is a continuous life cycle that secures effective service starting from business strategy up to continual service improvement.

The other essential term called 'IT service' has been defined by (Irfandhi et al., 2016) as '*a service which is provided by the IT service provider and a combination of information technology, human resources, and processes*'. The IT service focuses on the value of the service rather than on the development of the product. However the field of service management is not well known and there are only a few publications, so further researches should be done in order to clear the confusion and add knowledge on the domain, (Winniford et al., 2009).

2.4.1. Types of IT Services

The IT services have been classified into four major categories, (Peppard, 2003. P. 470) and these are:

- **Application Services:** are services that are delivered through software applications. IT includes formation processing services, information sharing services, information storage services, and information access services Application services that have a direct impact on the performance of the business processes with process designs or components of processes embedded in software applications.
- **Operational Services:** are services related to assembling and operating the core IT environment. It comprises services such as the installation of hardware and software, maintaining the communications network and servers, upgrading software, configuration management, change management, troubleshooting hardware, and software problems, and running the data center.
- **Value-Enabling Services:** are services that are delivered to enhance the value of information assets or identify opportunities provided by IT to better manage information.

It includes services such as IS strategy development, systems analysis, systems design, requirements gathering, infrastructure architecture, network design, user support (including helpdesk), purchasing, vendor management, and consulting.

- **Infrastructure Services:** are services that are derived directly from the infrastructure investment, essentially the technology itself. They are also labeled as technical capabilities and these technical capabilities are provided by the hardware, software, and communications infrastructure of the company. It also includes capacity (bandwidth and storage), connectivity, scalability, flexibility, and security.

Based on those previously discussed IS/IT Services (Peppard, 2003) formulated a framework that shows the interconnection and relationship of the services with regard to the organization's business strategy.

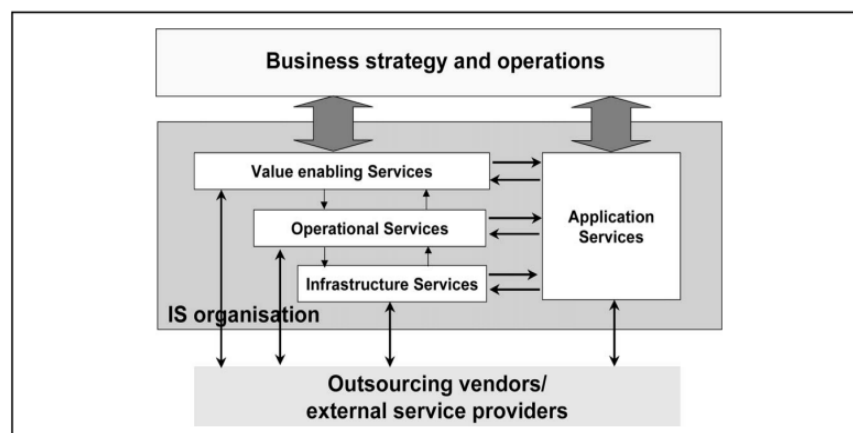


Figure 2.10. Relationships between the four IS/IT service categories and business strategy and operations adopted from (Peppard, 2003, p. 471)

According to AXELOS definition, ITSM is a concept that enables an organization to maximize business value through the use of Information Technology (IT). However (Grewal, 2006); Jain, Wali, Raveendra Saradhi, & Saradhi, 2018) indicated that ITSM and IT governance are two different domains but their mission is to transform IT from a technological to a strategic (service) perspective. (Hoerbst, Hackl, Blomer, & Ammenwerth, 2011) elaborated that ITSM is no longer technology-oriented but consider IT as a service from a business perspective. Hence, the focus of ITSM is on the management of IT services rather than on the development of applications, (Marrone & Kolbe, 2011a). As per (Conger, Winniford, & Erickson-Harris, 2008), ITSM is a broad concept that comprises customer-defined, process-oriented, and IT management in IT

operations. It also includes IT planning, delivery, support, and security that helps to achieve the business objectives and customer needs. (S. D. Galup et al., 2009) emphasized that ITSM manages IT operations as a service in a process-oriented manner and the objective of ITSM is to meet the business needs and manage the IT infrastructure by aligning IT with the organizational objectives. The following Fig.6. clearly shows the difference and benefit of ITSM and the traditional IT management mechanism.

Traditional I/T	<i>becomes</i>	ITSM Process
Technology focus	→	Process focus
"Fire-fighting"	→	Preventative
Reactive	→	Proactive
Users	→	Customers
Centralized, done in-house	→	Distributed, sourced
Isolated, silos	→	Integrated, enterprise-wide
"One off", adhoc	→	Repeatable, accountable
Informal processes	→	Formal best practices
IT internal perspective	→	Business perspective
Operational specific	→	Service orientation

Figure 2.11. How traditional IT transforms into ITSM processes adopted from (Leopoldi, 2003)⁶

2.4.2. Components of IT Service Management (ITSM)

As per the findings of (Farmand, 2013; Park, Kim, Choi, & Jun, 2008) ITSM is composed of four major components and these are people, processes, organization, and technology. However, Leopoldi added integration as another element of ITSM. (Hoerbst et al., 2011) indicated that process, people and IT are basic to the business process. Besides, (Sallé, 2004) implied that people, processes, and technologies control the IT services and infrastructures based on the objectives of the governance.

- **People:** this means having sufficient skilled manpower and the ability to provide optimum IT services.
- **Process:** it is one of the most valuable items that is used to build the ITSM system. it also comprises IT and organization-specific practices, procedures, and guidelines.
- **Organization:** it is a platform that is managed by skilled people in order to provide effective and efficient IT services. It also comprises business factors that affect IT, the way

⁶ <http://www.itsm.info/ITSM.htm> Accessed Oct 21, 2019

of integrating IT and organization interface, specifies the organization's corporate culture, defines the organization's direction, and how it affects the IT.

- **Technology & Security:** it is the collection of various logical and physical infrastructure that is used to automate the IT processes in order to provide effective IT service. It also contains security aiming to enhance and control the ITSM system.
- **Integration:** it integrates the IT services with the business, defines the type of IT services and the medium to provide those IT services, and clarifies the way how best practices are employed within IT.

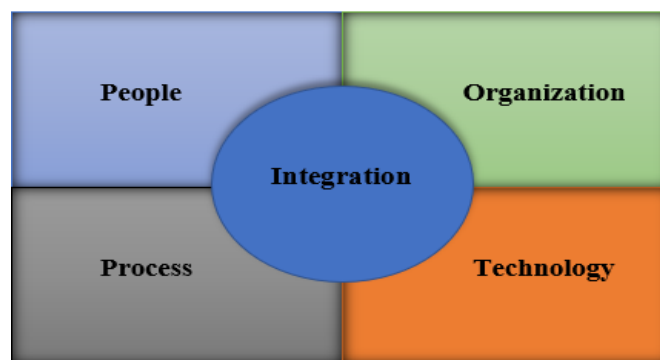


Figure 2.12. Components of ITSM adapted from (Alqahtani, 2017, p. 23)

2.4.3. IT Service Management Frameworks

There are different kinds of research works that show the interconnection between IT governance and service management within IT operations. The model of Ratcliffe, D. (as cited in Suryawan & Veronica, 2018) shows that IT operations are comprised of service management, application development, IT security, project management, IT planning, and quality system. For managing those IT operations, frameworks, and standards are needed and have been developed throughout the year. Therefore, those listed IT operations have their frameworks and standards in order to control and manage various IT services, products, processes, infrastructures, and including the people.

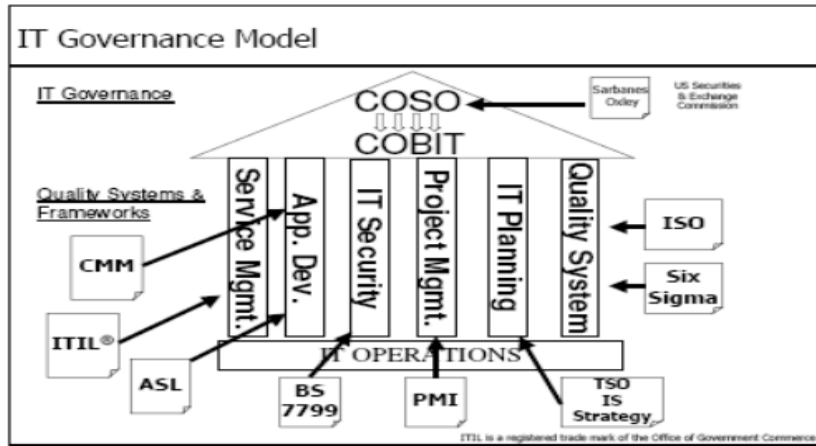


Figure 2.13. IT Governance model adopted from Ratcliffe, D. (as cited in Suryawan & Veronica, 2018, p. 224)

(Peppard, 2003), produced an IS/IT service management framework that shows the relationship between value, performance, organization, and investment or cost. The investment that will be invested by the organization on its human and IT assets will produce knowledge and skills, then those items will be deployed through effective resource allocation in the organizational process. Through the support of IT, the processes will design various service delivery systems together with the role of service user and provider, and the availability of the service. Finally, the processes will create value from the service.

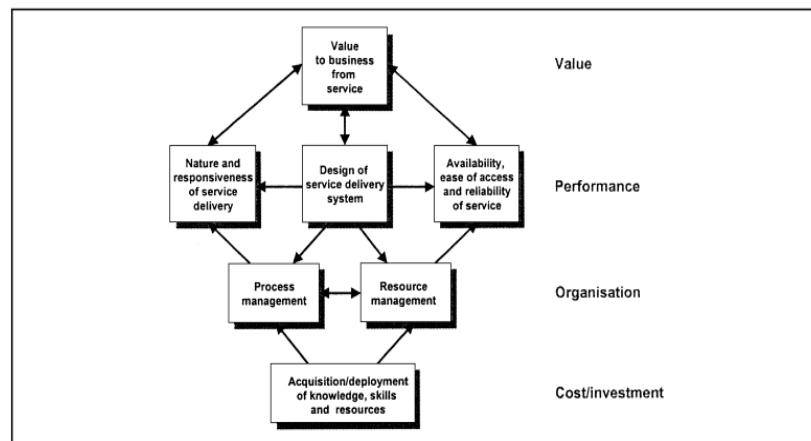


Figure 2.14. IT/IS service management framework adopted from (Peppard, 2003, p. 482)

There are various kinds of ITSM frameworks and standards and some of them are ITIL, COBIT, eTOM, MOF, and ISO/IEC as is mentioned in chapter one. According to the survey which is conducted by (ITGI, 2008), ITIL is the popular framework among the other ITSM frameworks.

Based on Forbes Insight Report (2017)⁷ called “*Delivering Value to Today’s Digital Enterprise: The State of IT Service Management*” which was conducted around the world based on a survey method among 261 senior-level executives (IT leaders) in large companies. As per the findings of the report, ITIL is the first well-known framework among others, and next to that COBIT takes the second rank, and then eTOM proceeds. The ITIL framework is considered as the de-facto ITSM framework since it comprises every ITSM process and its wide acceptance in the whole world, (Marrone & Kolbe, 2011a). However, the main aim of this empirical study is to develop the ITSM framework based on the ITIL best practices and the company’s business needs; so, the researcher focuses on the most notable and popular ITIL framework.

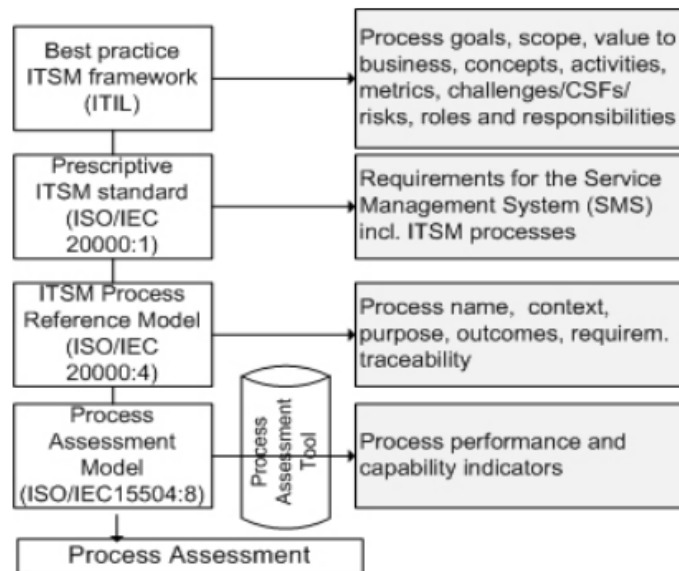


Figure 2.15. ITSM frameworks and standards adopted from (Jäntti, Rout, Wen, Heikkinen, & Cater-Steel, 2013, p. 177)

2.5. Information Technology Infrastructure Library (ITIL)

ITIL framework is the most widely accepted framework, (Axelos, 2019). It advocates that IT services must be aligned with business objectives. Furthermore, IT aims at providing quality IT services taking customers and businesses into consideration, (Hoerbst, Hackl, Blomer, & Ammenwerth, 2011). It offers best practice guidance that will be implemented to all types of organizations that provide services to businesses. The ITIL is termed as a framework of best

⁷ <https://www.forbes.com/sites/forbesinsights/2017/03/16/how-it-service-management-delivers-value-to-the-digital-enterprise/#6cd3fa3a732e> Accessed on Oct 22, 2019

practices aimed at alleviating high service quality at affordable cost, (S. D. Galup et al., 2009). (Hoerbst et al., 2011) strengthen this argument that ITIL is engaged in the implementation of the ITSM approach by providing a framework that is based on several best practices. (Iden & Eikebrokk, 2013) ascertain that best practices help IT functions to have a quality of services and acquire a competitive advantage. In order to create an effective and efficient service management system, the service provider can adopt best practices,(Cartlidge et al., 2012, p. 5).

(Talla & Valverde, 2013) stated that ITIL is not about hardware or software, but it is a mechanism to manage the technology and communication. Furthermore, the ITIL is a set of guidelines for the IT service support process rather than a set of rules that should be followed. (Meziani & Saleh, 2010) indicated ITIL with relation to ITSM as the former defines and documents the best practices whereas ITSM employs the best practices to meet customer requirements and priorities.

(Francis & Kirit Vaitha, 2016) argued that even though many organizations are moving towards adopting or making use of the ITIL framework, but the question will be *'do they follow the intended guideline?'* in order to realize their business objective. Thus, organizations should follow the exact guideline while adopting or implementing the ITIL framework since the framework answers the question of *'how to overcome the challenge'* using a set of supportive guidelines. According to (Mourad & Johari, 2014), ITIL involves a transformational change program since there is a dramatic move from ITSM to service management, from knowledge-centric to process-centric, and from a functional organization to a process organization. On the other hand, (Marrone & Kolbe, 2011b) further clarify that IT organizations that have already implemented ITIL as one of their best practices should have two focus areas. Thus, IT organizations not only focus on operational level benefits but should concentrate on their strategic level welfare that will make it; to be proactive in solving and providing customer, market, or business needs.

2.5.1. Evolution of ITIL Framework

The ITIL concept emerged in early 1972 when IBM started research on quality service delivery called Information Systems Management Architecture (ISMA) and published this in Volume I of the IBM Management series titled *"A Management System for the Information Business"*. In 1989, the United Kingdom's Central Computer and Telecommunication Agency (CCTA), now called the Office of Government Commerce (OGC) developed the first version of ITIL to unite IT

systems efficiently and cost-effectively. Its best-practice processes are supported by the British Standards Institute's (BS 15000 Standard) for IT Service Management. Then later in 2000, the second version of ITIL has been released and it becomes the global standard for IT best practice. It contains two functions called service delivery and service support together with ten processes. During this time Microsoft used ITIL to develop its framework called Microsoft Operations Framework. Besides, MOF, HP has released version 3.0 of its ITSM reference model based on ITIL best practices.

The third version of ITIL has been released in 2007, which comprises 26 processes confined within five functions and these functions are service strategy, service design, service transition, service operation, and continual service improvement (CSI). In 2011, the third version of ITIL has been updated due to the feedback gained from the user and training community that aimed at resolving the criticism. However, the version just only clarifies unclear issues and did not have major amendments, (Jääntti, Rout, Wen, Heikkinen, & Cater-Steel, 2013). The fourth version of ITIL has been announced in February 2019 and it focuses on core principles, practical guidance, and implementation with Agile, development, and operations (DevOps), and Lean methods. The previous three versions are process-oriented and especially the latter two versions follow a service life cycle approach. However, the newly introduced framework which is the fourth version is value-centric. The ITIL framework is owned and managed by the AXELOS company.

2.5.2. Characteristics of ITIL Framework

The ITIL framework has its unique characteristics and these are defined as follows:

- **Non-proprietary (Vendor Neutral):** the framework can be applied in any organization without commercial ownership issues.
- **Non-prescriptive:** the framework provides robust, mature, and time-tested practices that apply to all types of service organizations.
- **Best practice:** the framework shows a learning experience and leadership in the environment of service providers.
- **Good practice:** not every practice in ITIL cannot be considered as 'best practices' since the practice should advance itself with the emerging technology and organization needs.

2.5.3. Perspectives of ITIL Framework

(McNaughton, Ray, & Lewis, 2010) stated that there are four basic perspectives of the ITIL framework that helps to evaluate the ITIL in order to achieve a better ITSM performance within an organization.

- **Management Perspective:** those are the higher or senior-level executive management within the organization that is included to confirm the effect on areas such as financial, and business impact and collective user experience are correctly represented in the evaluation.
- **Technology Perspective:** includes IS/IT management and the IT department as a whole. It affirms the effect on areas such as technological efficiency, IT personnel and resource efficiency, and specific IT-related costs, and budgets are considered in the evaluation.
- **IT Users Perspective:** includes the users who utilize and need the IT systems, technology, equipment, products, and services of the IT department daily to support the business processes. Thus, it ascertains the effect on areas such as IT service quality, expectations, and perceptions that are properly considered in the evaluation.
- **IT Employees Perspective:** includes personnel, such as operational staff within the IT department that will be affected by the ITIL related change. Those operational staffs can be first and second level support staff, network administrators, security personnel, database administrators, and application owners. This perspective serves as a check to the validity of the IT user perspective and vice versa.

2.5.4. Comparison of ITIL Versions

The following Table 2.2. shows the difference between ITIL V2, ITIL V3, ITIL 2011 (the third updated version), and ITIL V4. The second version of ITIL is more process-oriented (collection of integrated processes) whereas the third both versions are service-oriented (lifecycle approach to service management). The fourth version focuses on practices aiming to create value together with customers to customers. The number of processes and practices increased from time to time in each of the versions.

ITIL V2 has two phases, service delivery, and service support. It holds ten distinct processes within those two phases and besides, it has one independent function which is called the service desk. ITIL V3 has 26 processes within five phases. Those phases are service strategy, service design,

service transition, service operation, and continual service improvement. It also includes five independent functions, and these are service desk, technical management, IT operations management, and application management. The updated third version (ITIL 2011) contains the same number of processes as that of the former version, however, the difference is that the continual service improvement phase has been adjusted to include an improvement guideline through a seven-step stage. Besides, some processes have been adjusted and modified. The fourth version of ITIL has 34 practices within three basic dimensions. The dimensions are general management practices, service management practices, and technical management practices. The ITIL V4 is based on a service value system (SVS) which elaborates on how all the components and the activities should work together as a system to create value for an organization.

ITIL V2	ITIL V3	ITIL 2011	ITIL V4
<p>Service Delivery</p> <ol style="list-style-type: none"> 1. Service level management 2. Service continuity management 3. Financial management 4. Capacity management 5. Availability management <p>Service Support</p> <ol style="list-style-type: none"> 6. Incident management 7. Problem management 8. Change management 9. Release management 10. Configuration management <p>Functions</p> <p>Service desk</p>	<p>Service Strategy</p> <ol style="list-style-type: none"> 1. Strategy Generation 2. Financial Management 3. Service Portfolio Management 4. Demand Management <p>Service Design</p> <ol style="list-style-type: none"> 5. Service Catalogue Management 6. Service Level Management 7. Capacity Management 8. Availability Management 9. IT Service Continuity Management 10. Information Security Management 11. Supplier Management <p>Service Transition</p> <ol style="list-style-type: none"> 12. Transition Planning and Support 13. Change Management 14. Service Asset & Configuration management 	<p>Service Strategy</p> <ol style="list-style-type: none"> 1. Strategy management for IT services 2. Service portfolio management 3. Financial management for IT services 4. Demand management 5. Business relationship management <p>Service Design</p> <ol style="list-style-type: none"> 6. Design coordination 7. Service catalogue management 8. Service level management 9. Availability management 10. Capacity management 11. IT service continuity management 12. Information security management 13. Supplier management <p>Service Transition</p> <ol style="list-style-type: none"> 14. Transition planning and support 15. Change management 	<p>General Management Practices</p> <ol style="list-style-type: none"> 1. Architecture Management 2. Continual Improvement 3. Information Security Management 4. Knowledge Management 5. Measurement and Reporting 6. Organizational Change Management 7. Portfolio Management 8. Project Management 9. Relationship Management 10. Risk Management 11. Service Financial Management 12. Strategy Management 13. Supplier Management 14. Workforce and Talent Management <p>Service Management Practices</p> <ol style="list-style-type: none"> 15. Availability Management 16. Business Analysis 17. Capacity and Performance Management 18. Change Control 19. Incident Management 20. IT Asset Management 21. Monitoring and Event Management

	15. Release and Deployment Management 16. Service Validation and Testing 17. Evaluation 18. Knowledge Management Service Operation 19. Event Management 20. Incident Management 21. Request Fulfilment 22. Problem Management 23. Access Management Continual Service Improvement 24. 7-Step Improvement Process 25. Service Measurement 26. Service Reporting Functions Service desk Technical management IT operations management Application management	16. Service asset and configuration management 17. Release and deployment management 18. Service validation and testing 19. Change evaluation 20. Knowledge management Service Operation 21. Event management 22. Incident management 23. Request management 24. Problem management 25. Access management Continual Service Improvement 26. Seven-step improvement process Functions Service desk Technical management IT operations management Application management	22. Problem Management 23. Release Management 24. Service Catalog Management 25. Service Configuration Management 26. Service Continuity Management 27. Service Design 28. Service Desk 29. Service Level Management 30. Service Request Management 31. Service Validation and Testing Technical Management Practices 32. Deployment Management 33. Infrastructure and Platform Management 34. Software Development and Management
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Table 2.2. ITIL framework version, process, and function

The focus area of this study is on ITIL 2011 as stated earlier in chapter one, so having this in mind the researcher presents key points of this framework.

Later in July 2011, the 2011 edition of ITIL V3 was released and it is also called ‘ITIL 2011’. The framework follows a complete service life cycle that enables IT organizations to provide services to customers and continuously make sure that the IT organizations are meeting their business goals and delivering benefits, (Mourad & Johari, 2014). ITIL 2011 is composed of five service life cycle stages: service strategy, service design, service transition, service operation, and continual service improvement and 26 processes.

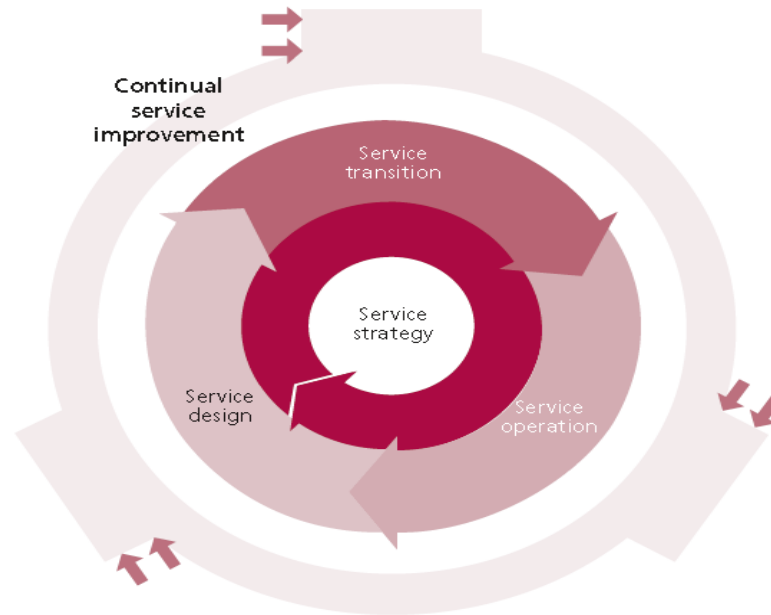


Figure 2.16. ITIL 2011 framework adopted from (Cartlidge et al., 2012, p. 7)

Two basic terms within the ITIL 2011 framework spins through the life cycle, (Cartlidge et al., 2012, pp. 9–10) and these are:

- **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. processes have the following characteristics: they are measurable and performance-driven, they have specific rules, they deliver to customers, and they respond to a specific event. (Cater-Steel, Toleman, & Tan, 2006, Introduction, section) stated that processes can be mapped to the organization’s strategy, internal business environment, and IT strategy to enhance service quality.
- **Function:** A team or group of people and the tools or other resources they use to carry out one or more processes or activities. Functions have their own body of knowledge which accumulates from experience and they provide structure and stability to the organizations.

2.5.5. Phases of ITIL Framework (2011 Version)

The 2011 ITIL framework has five stages and these are service strategy, service design, service transition, service operation, and continual service improvement. Moreover, the functions comprise 26 processes in total and four basic independent functions.

- **Service Strategy:** it is regarded as the core of the ITIL life cycle. In this phase, service management is designed, developed, and implemented as a strategic asset. It guides strategic analysis, planning, positioning, and implementation for service management capabilities. It contains five basic processes, and these are strategy management for IT services, service portfolio management, financial management, demand management, and business relationship management. In this phase, the organization's mission will be mapped into the vision, and together they set the strategic goals, (Cater-Steel et al., 2006, Introduction, section).
- **Service Design:** it turns the requirements of the service strategy into a design to realize business objectives and customer needs. It provides guidance to design and develop service and service management practices. Furthermore, it provides design principles and methods for converting strategic objectives into a portfolio of services and service assets. It comprises eight basic processes and these are design coordination, service catalog management, service level management, availability management, capacity management, IT service continuity management, information security management, and supplier management.
- **Service Transition:** this phase focuses on implementation. It ensures that the new and modified services meet the expectations of the business and customer needs as expressed in the service strategy and design phase. It is composed of seven stages and these are Transition planning and support, change management, service asset and configuration management, release and deployment management, service validation and testing, change evaluation, and knowledge management.
- **Service Operation:** it delivers the services to the customers and manages the infrastructure, application, and provision that supports the delivery of the services within the agreed boundaries. It is during this phase that the services deliver value to the business. According to the service life cycle, service strategy defines the value, service design designs the services to deliver that value, service transition takes the design makes it a live service, then finally service operation brings & manages the service and deliver the value to the customers. There is a high-level user attachment within this phase and it also the only phase that has functions defined within it. These functions are service desk, technical management, IT operations management, and application management. it also comprises

four basic processes and these are event management, incident management, request management, problem management, and access management.

- **Continual Service Improvement:** it provides guidance, continual evaluation, and improvement mechanisms to maintain the value that is delivered to the customers. It combines and undergoes a seven-step process to assure the quality of the value and these are identifying the strategy for improvement, defining what will be measured, gathering the data, processing the data, analyzing the information and data, presenting and use the information, and finally implementing the improvement. Each of these steps is guided by the strategic, tactical, and operational goals that are defined during the service strategy and design phase.

2.6. Importance of IT Service Management (ITSM/ITIL)

Different scholars have done various empirical research in order to justify the benefit of ITSM/ITIL on the organization. According to (IBM, 2016) report, ITSM/ITIL has the following benefits:

- **Drive efficiencies in business processes and asset utilization:** ITSM facilitates a platform to better utilize the resources and services.
- **Increase delivery velocity and quality of new business services:** ITSM controls and manages the performance and checks whether they meet the business objectives.
- **Enhanced integration:** ITSM allows for integrated systems and the sharing of information across solutions.
- **Resolve problems faster for increased quality of service and reduced costs:** ITSM provides a means to understand issues before they affect customers and provide a quick resolution.
- **Predict & prevent issues before they impact end-users:** ITSM provides a proactive mechanism to solve issues before it affects customers and the organization.

In addition to (IBM, 2016) report various scholars confirmed the benefits of ITSM/ITIL empirically and theoretically, (Cartlidge et al., 2012; Hoerbst et al., 2011; Marrone & Kolbe, 2011a & 2011b; Addy, 2007; Iden & Eikebrokk, 2013; Marrone, Gacenga, Cater-Steel, & Kolbe, 2014) and they have reasoned out some of the basic ITSM/ITIL benefits. Those benefits are categorized based on the ITSM building blocks and presented as follows:

Benefits	References
<ul style="list-style-type: none"> • Measurable performance indicators and benchmarks • Increase in productivity & efficiency • Improved focus on ITSM • Access to accurate real-time data enables more effective management decision making • Improve compliance and demonstrate corporate governance • Improve the effectiveness of internal IT operations • Justification of cost with service quality • Greater technology efficiency and quality IT service delivery • Improved service availability and stability • Seamless end-to-end service • Standardized and improved processes • Elimination of unnecessary/inefficient process steps • Support staff that are more aware of business processes and business impact • Improved use of skills and experience • Reassigning under-utilized resources (equipment and personnel) • Leveraging unused capability (equipment and personnel) • Improved responsiveness to customer/user requests • Increased customer satisfaction 	<p>(Carlidge et al., 2012; Hoerbst et al., 2011; Marrone & Kolbe, 2011a & 2011b; Addy, 2007; Iden & Eikebrokk, 2013; Marrone et al., 2014)</p>

Table 2.3. The benefit of IT service management (ITSM/ITIL)

2.7. Challenges of IT Service Management (ITSM/ITIL)

Even though the ITSM/ITIL framework has an enormous amount of benefits, several challenges are faced while implementing or adopting the framework. Those challenges have been proved by several scholars, (Marrone & Kolbe, 2011a & 2011b; Hoerbst et al., 2011; Mourad & Johari, 2014; Alemeye, 2015; Müller & de Lichtenberg, 2018) and are presented as follows:

Challenges	References
<ul style="list-style-type: none"> • Lack of executive sponsorship or motivation • Uncertainty about which process to implement first • Fear of ITIL • The anonymity of process managers • Business understanding ITIL objectives • Lack of resources (time, people & budget) • Lack of internal skills/knowledge relating to ITIL • Traditional mindset of IT staff • Lack of funding/Cost of adoption • Organizational/Cultural resistance to change • Maintaining momentum/Progress stagnates • Lack of ITIL training • Lack of appropriate measurement and evaluation mechanism to measure the benefits of ITIL • Process misalignment • Inappropriate process management tools 	<p>(Marrone & Kolbe, 2011a & 2011b; Hoerbst et al., 2011; Mourad & Johari, 2014; Alemeye, 2015; Müller & de Lichtenberg, 2018)</p>

Table 2.4. The challenges of IT service management (ITSM/ITIL)

2.8. IT Service Management Frameworks Based on ITIL

Due to the importance of the ITIL framework, many organizations have urged to adopt, implement, and customize the framework based on their business objectives. However, some well-known companies have succeeded in crafting and developing their ITSM framework based on the

principles of the ITIL framework. HP, IBM, and Microsoft companies are some of the best examples of this case, (Marrone & Kolbe, 2011a; Lubambo, 2009). This indicates that organizations can develop their ITSM frameworks and tools based on well-known frameworks or best practices, Lubambo (2009).

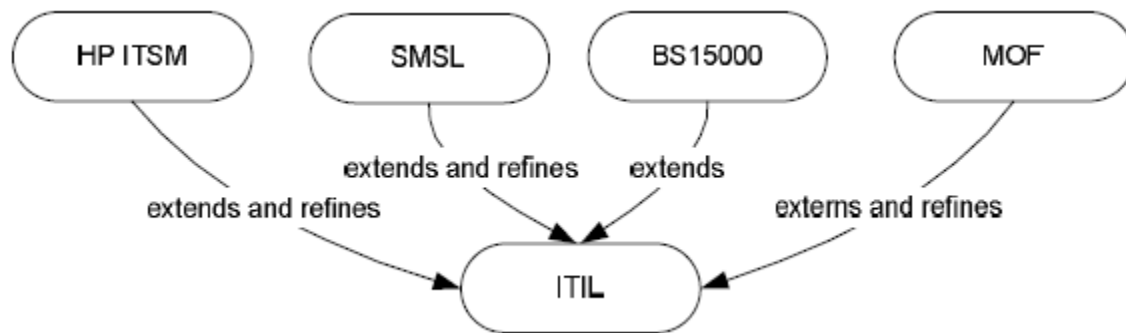


Figure 2.17. The relationship between ITIL-based ITSM frameworks adopted from (Sallé, 2004, p. 19)

2.8.1. HP IT Service Management Reference Model

It is a high-level model that provides a high-level representation of IT processes. The first model was released in 1970. Then later in 2000, it was updated based on the ITIL best practices. Afterward, the third version was introduced in 2003. The model contains five main groups, (Sallé, 2004) and these are:

- **Business-IT alignment:** Provides IT strategies and defines service portfolios to increase the value IT brings to the business.
- **Service design and management:** Provides detailed services specifications to balance service quality with the service cost.
- **Service delivery assurance:** Provides service agreements, information, and coordination to execute against service commitments.
- **Service development and deployment:** Provides project-based, tested service releases to minimize service activation risks, and reduce implementation costs.
- **Service Operations:** Provides daily monitored services and handles.

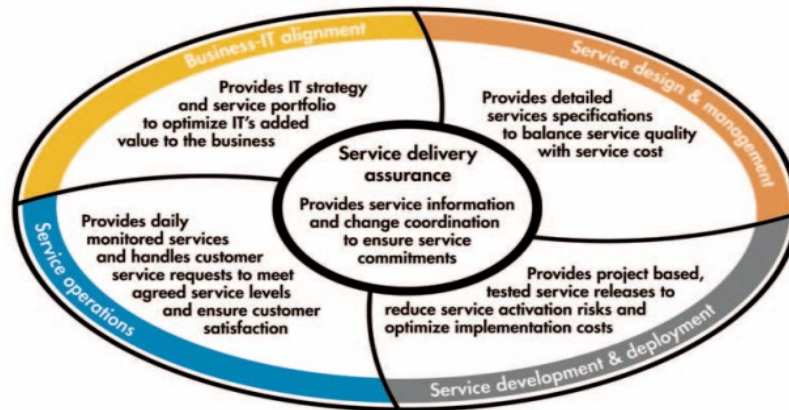


Figure 2.18. HP ITSM reference model 3.0 adopted from (HP, 2004, p. 4)

2.8.2. Microsoft Operations Framework (MOF)

The framework was first released in 1999, then later Microsoft has published three frameworks and now MOF 4.0 is the current version. It is a structured approach aimed at operation excellence through the whole life cycle, (Microsoft Corporation, 2009). It facilitates to secure the availability, reliability, availability, supportability, and manageability of the IT functions that the organization will use to achieve its business objectives and customer needs, (Sallé, 2004). The framework is based on Service Management Functions (SMFs), each of SMFs has a set of processes and each process contains several activities. The framework follows three basic phases in its entire lifecycle and one foundational layer that operates throughout all of the other phases:

- **Plan phase:** it plans and optimizes an IT service strategy to support the business objective.
- **Deliver phase:** ensures that the IT services are developed, delivered, and ready for operations.
- **Operate phase:** ensures that the IT services are operated, maintained, and supported based on the business and customer needs.
- **Manage layer:** the foundation of the IT service lifecycle.



Figure 2.19. MOF 4.0 IT service lifecycle adopted from (Microsoft Corporation, 2009, p. 2)

2.8.3. IBM ITSM Reference Architecture

IBM starts its research by publishing ISMA (Information Systems Management Architecture) in 1972. The IBM ITSM provides a high-level consulting road map and it helps to effectively manage complex and hybrid environments. It contains all of the ITIL basic phases together with eTOM, and COBIT frameworks. It contains nine basic elements, (IBM, 2016) and these are:

- **IT resources:** include multi-vendor, heterogeneous networks, servers, and applications that are managed using several ITSM capabilities.
- **Performance management:** provides the ability to manage the performance and availability of the applications and infrastructures.
- **IT operations management:** provides a mechanism or tool to manage the daily operational activities.
- **Service desk:** provides a single, unified, and central platform to manage multiple service management based on ITIL best practices.
- **Workload automation:** helps to manage workload efficiently in a hybrid environment.
- **Configuration management system:** contains a set of tools and databases that contain authoritative information about configurations in your environment.

- **IT operational analytics and dashboards:** helps to predict problems, search operation data sources quickly, and optimize the IT, application infrastructure to meet the business needs.
- **Integrations:** create holistic end to end solutions to manage the IT services by integrating several IT solutions.
- **ITIL:** It is the core of the ITSM processes which comprises all of the five lifecycle phases.

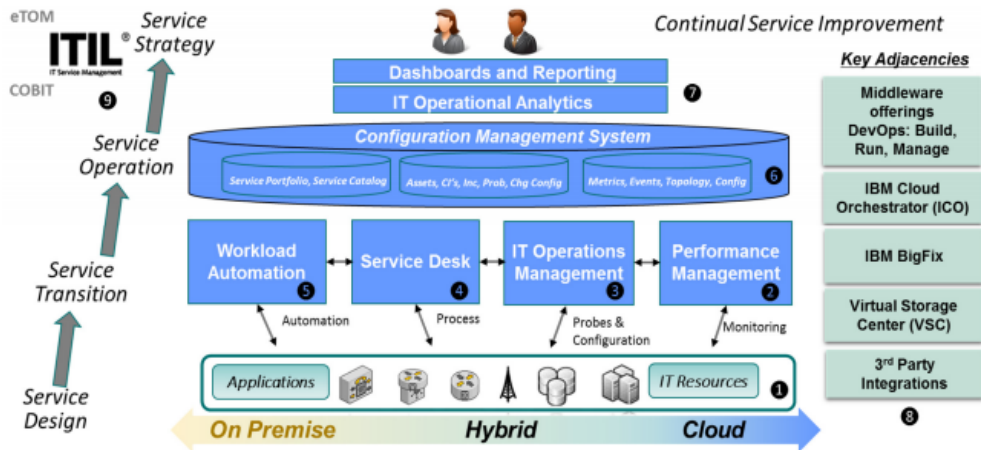


Figure 2.20. IBM ITSM reference architecture adopted from (IBM, 2016, p. 10)

2.9. Comparison of ITIL-Based ITSM Frameworks

HP ITSM is built on HP's experience in service management and processes, ITIL, and industry best practices. It is used to guide customers as they refocus their efforts on service management instead of technology management, and customers instead of users, and the integration of processes, people, and technology. It has its process assessment and improvement mechanisms. The framework is organized into five basic process groups and each focusing on a different key aspect of the service lifecycle. It answers the question "When" and "Where". The framework is a flexible, detailed lifecycle approach and helps to transform an unstructured, imprecise business need into a structured agile effective ITSM solution.

MOF uses the concept of SMFs instead of processes and functions. ITIL uses the term process for many components that are processes and functions. Lifecycle models in MOF are managed through several management reviews (MRs). The framework answers the question "What" and has a rigid structure.

IBM ITSM Reference Architecture introduces a new paradigm to manage cloud services and big data analytics. It incorporates workload automation that aims at the economical usage of human power. It integrates dashboards that are supported by data analytics techniques to solve issues proactively. It constitutes an ITSM solution to create a holistic ITSM mechanism.

All of those three well-known frameworks have extended and refined ITIL. The frameworks have been developed by improving ITIL frameworks, adding their business needs, and incorporating unique solutions. The frameworks are updated continuously to compete with the dynamic IT environment.

2.10. ITIL/ITSM Frameworks in Developing Countries

Due to the remarkable benefits of the ITSM frameworks and ITIL in particular, a lot of developed countries have utilized the framework. However, most of the academic research work focused on the adoption, implementation, and maturity levels of the ITIL framework. In addition to this (Jain et al., 2018), argued that most of the empirical studies focus on countries like North America and Europe, and thus, studies should be conducted in other countries since the area needs further research. According to (Francis & Kirit Vaitha, 2016), even though the Tanzanian banks adopt the ITIL framework but there is a gap while exercising it and they need awareness and a mixed approach (co-implementation of various ITSM frameworks) to overcome the issue. They added another paradigm of knowledge on using mixed ITSM frameworks for organizations and (Marrone & Hammerle, 2017) found that the concept ‘co-implementation’ is another area of study that needs to be explored further. As per the findings of (Lubambo, 2009), there is the same implementation holes in South African higher education institutions and recommended that organizations should develop their ITSM frameworks based on the best practices.

(Alemeye, 2015) empirically justified the critical success factors’ influence while implementing the ITIL framework in ET and recommended that the organization should work on those barriers that hinder the successful implementation of the framework adding that further studies should extend and improve the ITSM practices in Ethiopia. Even though there are some research works on the implementation (challenges and successes), adoption, and maturity of ITSM, but the area still needs plenty of investigation with regard to developing and designing ITSM frameworks based on selected best practices. (Iden & Eikebrokk, 2013) encourages scholars to engage in

current research areas noting the scarce research works in the field. In general, even if there are some research works, the area of ITSM is still in its infant stage, (Marrone & Kolbe, 2011b; Yazici, Mishra, & Kontogiorgis, 2015). Moreover, in developing countries particularly in the African continent, the area still needs further investigation and continuous research.

2.11. Related Work

Despite the vast number of ITSM related publications and reports, there are only a few research works that focus on ITIL-Based ITSM frameworks or models. This implies that the area still needs further investigation in order to contribute an additional body of knowledge on the domain. The researcher has identified various works of literature that are directly related to the subject area and are presented as follows.

(Zhu et al., 2009) introduced an ITIL-based ITSM into the operation and maintenance of telecom business systems. They provided a method or workflows to handle issues that raises from incident and change management processes with the intent to increase the quality of maintenance. The authors selected those processes since those selected domains have strong process uniformity and can dramatically affect a change. However, the authors did not provide a model or framework rather they only focused on designing a management method or workflow for two selected processes.

(Z. Wang & Zhang, 2007) suggested three different models that help the Chinese universities to overcome the problem they have faced while providing services and these are organizational, process, and process models. The authors argued that in order to have a successful ITSM model the platform of the Chinese universities should work on their internal needs since companies differ not only in their cultural setup but also in their information usage (informatization). The authors motivated to develop an ITIL-based ITSM model by taking examples of other companies that succeeded in developing their own ITIL models. As per their finding the organizational structure mainly, the IT department should be shaped to acquire the ITSM change, the organization strategy should be mapped with the ITSM process, and the technology model should be inclusive to handle all technological advancements. The process model comprises three basic steps. The first step is concentrated on formulating the informationization strategy. Then in the second step, the service management strategy is formulated according to the informationization strategy and finally, in the

third step, the IT service system is improved and constructed under the guidance of the ITIL approach. The technology model includes five levels which are bounded by security and standard. The first level contains the operating environment (computer rooms and service counters), the second level comprises hardware, including network equipment, computers, and their peripheral equipment and backup equipment. The third level contains operation systems, including Unix, Linux, Windows, and others. The fourth level includes platform software, including software systems like data bank servers, application servers, and web servers. Finally, the fifth level comprises application software which is designed for the university's specific work. Even though the designed models have made an incredible significance on the university's activities, but the authors did not show provide a unified model or framework.

(Asgari, Tabatabaeian, Taghva, & Abolhassani, 2017) investigated the factors that affect ITIL-Based ITSM in health sectors. The authors analyzed the various IT services (maturity models of health sectors) that are implemented in health organizations with regard to the ITIL framework. Then they classified the IT services or models into two groups based on the ITIL framework as IT service providing and supporting. The first group engaged in finding the customer's expectation about the services that the service providers offer and the other group ensure that the customers are getting adequate support for the services. Based on their findings configuration management process took the lead this indicates that the ITSM needs infrastructure empowerment and improvement. However, the authors did not formulate a model or framework that will solve the problem they have identified rather they just test the ITSM practices which the health organizations provide based on the ITIL framework.

(Vengoechea & Vidal, 2018) designed an incident management model based on ITIL for higher education institutions. The authors first analyzed the existing incident management of the higher education institutions then based on their assessment (empirical investigation) and the ITIL incident management process mechanism, they designed a localized and contextual incident management model. The model can also be considered as a system since it comprises specific subsystems and functions. It has four subsystems, and these are operating, subjects, tools, and order and balance subsystems. They have described in detail each of the components of the incident management process based on the higher education institution needs and the designed process is reactive that accommodates organizational changes.

(Alshamy, Elfakharany, & ElAziem, 2012) designed an implementation methodology based on the ITIL framework in three companies. The authors followed Process Maturity Framework (PMF) in order to assess the ITIL processes and it comprises five steps; initial, repeatable, defined, managed, optimizing levels. They have selected three processes for this study incident, problem, and change management processes. After that, they categorized the processes into four major categories:

- A needed process
- A current process which needs to be improved
- A current process which needs to be radically redesigned
- A current process which is sufficient for business and does not need any improvement

However, they intended to focus on the first three points then based on empirical investigation and combining various methodologies and techniques, they have designed an implementation methodology. Then later they created process evaluation metrics that help to measure the functions and processes. Finally, they tested the implementation methodology in the previously mentioned three companies and have got a positive result. Even though the authors have added a new dimension to the ITSM domain, but they only focused on crafting an ITSM implementation methodology within only three selected processes of the ITIL framework.

(Lahtela, Jäntti, & Kaukola, 2010) develop an ITIL-based ITSM measurement system (ITSM-MS). They only focused on support processes and these are incident management, problem management, change management, configuration management, and release management. The developed system acts as a real-time measurement tool that is connected to every IT service support process. The systems also help the higher management teams to monitor the performance of IT service management. Even if the system solves the current issues by improving the processes and services, however, the authors only focused on developing an ITIL-based measurement system for a selected process in the case organization.

(Meziani & Saleh, 2010) assessed a practice of ITSM based on the ITIL framework for a specific organization that has implemented e-government service. They investigated the organization agency services based on all processes that are enclosed within the two functions of service delivery and service support. They analyzed the organizational gap of ITSM practices assuming to

align the government agency's organizational goals with its IT Service Management based on the ITIL framework then adding empirical data. The authors evaluate the level of service of the government agency to find out how well it is performing compared to ITIL best practice. In addition to this, the authors have evaluated the maturity levels of those ITSM practices. Finally, they proposed a "*TO-BE processes*" which will be used by the government agency as a basis to develop and implement these processes based on ITIL best practices. These are classified into three basic categories as follows:

- **Processes that are not available:** which need to be developed from scratch
- **Processes that are functional and partially available:** they are not following any ITIL best practices
- **Processes that are implemented and available:** still lack ITIL best practices

The authors have successfully examined the level of ITSM practices of the government agency based on the ITIL framework however they did not provide a model or framework.

(Tadesse, 2017) develop a tailored ITSM framework based on ITIL best practices for the Ethiopian banking industry mainly Bunna International bank. The author investigated the current organizational structure and workflows of the IT department then examined the type of IT services that will be managed by the IT department. He examined the current ITSM practices of the bank through a well-known process assessment model than adding empirical findings the author proposed a tailored ITSM framework based on ITIL best practices. However, the author did not incorporate the ITIL functions rather gives more focus to processes.

(H. Wang, Sun, Huang, & Cheng, 2008) developed an ITIL-based ITSM system for a specific garment enterprise. They focused on five service support ITSM processes incident management, configuration management, problem management, release management, and service level management. After assessing the business need and current practices of the ITSM practices based on the ITIL framework the authors develop an IT support system. The organization implemented the IT support system and have got better results from it. However, the authors did not provide a mechanism to handle a holistic framework or model that will facilitate IT services.

(Yao & Wang, 2010) investigated the practical processes to implement the ITSM based on ITIL best practices in a steel manufacturing enterprise. Even if the processes that will be implemented has four phases, but the authors only took the service strategy. The selected function has five processes; event management, resource management, change management, and release management. They examined the business-IT alignment of the organization in relation to the COBIT and ITIL frameworks. The authors developed an evaluation metric for each of the selected processes hoping to measure the level of the ITIL implementation and to know the improvement areas of IT procedures and IT processes. Even though the authors assessed ITIL-based ITSM practical practices in the steel manufacturing enterprise however they did not focus on developing a model or framework that helps to map the ITSM processes.

(Suhonen, Heikkinen, Kurenniemi, & Jäntti, 2013) aimed at improving the organization's efficiency by implementing the ITIL-based service level management (SLM) process. They adopted the Keys to IT Service Management Excellence Technique (KISMET) model in order to implement the ITIL-based SLM processes in the organization's Information System Management (ISM) unit. The case unit mainly the service desk follows incident management and service request management processes. The model has six basic steps: create a process improvement infrastructure, perform a process assessment, plan process improvement actions, improve/implement the process based on the IT service management practices, deploy and introduce the process, evaluate the improvement of the process, and design continual process/service improvement actions. The data for the research study was collected from documents and archival records, participatory observation, and physical artifacts. They used the ITIL-based seven-step improvement process in order to collect the data from the previously mentioned documents. Then, they analyzed the data through a pattern matching technique & evaluated their result by the triangulation method. However, they focused on service level agreement (SLA) and operation level agreement (OLA) activities within that organization. In addition to this, the study provides recommendations to the organization rather than developing or designing a model or framework.

2.11.1. Summary of Related Work

The following table shows the summary of related works that have been discussed in the above section

Author (Year)	Title	Objective	Method	Findings	Limitation
(Zhu et al., 2009)	ITIL-based IT Service Management Applied in Telecom Business Operation and Maintenance System	To design a management method which accommodates telecom services operation and maintenance to improve the efficiency and quality of management to meet changing business needs and ensures systems' stable operation	Literature Review	Methods or workflows were designed and have improved the quality of maintenance in the organization	It only focused on the incident management process
(Z. Wang & Zhang, 2007)	An ITIL-based IT Service Management Model for Chinese Universities	To design an IT service model suitable for Chinese universities based on the ITIL framework	A case study using a qualitative approach	The organization model, the process model, and the technology model of campus were developed based on the ITIL theory and	The study just proposed separate models and those models should be integrated into a single unified model

				business needs of the university	
(Asgari et al., 2017)	Affecting Factors on ITIL-Based Health IT Service Management (Tehran University of Medical Sciences, Tehran, IR Iran)	To identify affecting factors and risk factors on IT service management in a health-oriented organization based on the ITIL framework	Descriptive research using a quantitative approach	The proposed solution showed that using systematic and periodic evaluations for improving IT parts configuration process has a greater influence on improving the reliability of health care centers	The study only listed the factors that have a higher impact on the health management system through the lens of the ITIL framework however they did not formulate a company-specific model
(Vengoechea & Vidal, 2018)	Incident management based on Information Technology Infrastructure Library (ITIL) for higher education institutions	To propose an incident management model based on the ITIL framework for university education institutions	Qualitative approach	Incident management model and system were developed based on the ITIL framework	The developed model should be evaluated in order to know its importance and issues.

(Alshamy et al., 2012)	Information Technology Service Management (ITSM) Implementation Methodology Based on Information Technology Infrastructure Library Ver.3 (ITIL V3)	To propose an ITIL-based ITSM implementation methodology	A case study using a qualitative approach	ITIL-based implementation methodology was developed for selected processes	They focused only on the implementation part and did not incorporate how to adapt and customize the ITSM processed based on the local context
(Lahtela, Jäntti, & Kaukola, 2010)	Implementing an ITIL-based IT Service Management Measurement System	To improve the measurement of IT support processes	A case study using a qualitative approach	ITSM-MS was developed for the case organization together with an ITIL based ITSM model in order to improve the IT support processes	The study did not perform a post-implementation evaluation for the deployed system and it only focused on IT support processes
(Meziani & Saleh, 2010)	E-government: ITIL-Based Service Management Case Study	To propose a model service support and service delivery processes through ITIL best practices, the agency	A case study using a quantitative approach	The proposed study categorized the processes into three groups based on their importance level in the organization, then they	The study just provided the level of those processes in accordance with the ITIL best practices however they did not provide a clear

		aspirations, and environment constraints		proposed the “To-be processes” list intending to develop and implement these processes based on ITIL best practices.	model that the organization should follow
(Tadesse, 2017)	Developing a tailor IT service management framework based on the ITIL framework for IT service management processes in Ethiopian commercial banks: the case of Bunna international bank S.C.	To identify current ITSM practices of Bunna International Bank and develop a tailored ITSM framework based on ITIL best practices by addressing shortcomings of the existing practice	Mixed approach (qualitative & quantitative)	A tailored ITSM framework was developed based on ITIL best practices	The proposed framework only focused on ITSM processes
(H. Wang et al., 2008)	An ITIL-based IT Service Management Model for Garment Enterprises	To develop an IT-Support system based on the ITIL framework	Literature review	IT support system was developed and implemented based on selected processes	The study did not consider other processes that will be important for the organization

(Yao & Wang, 2010)	An ITIL Based ITSM Practice: A Case Study of Steel Manufacturing Enterprise	To assess the implementation of ITSM practice based on the ITIL framework	Literature review	The study investigated the benefit of ITSM practice by implementing the service strategy function based on the ITIL framework	The study did not incorporate other functions of the ITIL framework
(Suhonen et al., 2013)	Implementation of the ITIL-Based Service Level Management Process to Improve an Organization's Efficiency: A Case Study	How to implement the ITIL-based SLM process to improve the organization's efficiency	A case study with action research method	The study was defined to implement the ITIL-based SLM practices by using the KISMET model to increase the organization's efficiency. They provided the lessons learned from improving SLM practices	The study focused on the implementation part of the Service Design and Continual Service Improvement (CSI) lifecycle phases.

Table 2.5. Summary of related work

2.12. Research Gap

Some of the research works are concentrated merely on the adoption and implementation of the ITIL framework. A few studies tried to propose an ITSM framework, a model, and a system based on ITIL best practices. However, those frameworks only included some of the ITSM processes or functions. Additionally, the studies aimed at tailoring the processes in order to fit their environment without performing a major change. On the contrary, there were a few industry works that succeeded in designing their ITSM frameworks based on the concept of ITIL. Adopting or implementing the whole or some parts of a given framework does not indicate that the organization has achieved what it needs.

The aforementioned literature indicated the challenges the organizations have faced while adopting or implementing various ITSM frameworks. However, the literature does not address what should be performed in order to fill the challenges to get the maximum benefit from those frameworks. Thence, this indicates that further research work should be conducted with the intent to improve and modify the ITSM practices for a specific environment. Hence, this study tried to fill the academic gaps of the domain area by investigating the subject matter empirically and then proposes an improved ITSM framework based on the ITIL best practices. Thus, the company could rely upon its ITSM framework while performing various ITSM activities and duties that would help to achieve its business objectives.

2.13. Chapter Summary

This chapter intended to build a theoretical and conceptual foundation for the research study by investigating various pieces of literature. It explored the historical background of IT governance, ITSM, and ITSM frameworks. Furtherly, it investigated the benefits, and focus areas of IT governance and then describes the components of the framework. Therefrom, described the terminologies of ITSM through a historical lens and analyzes the ITSM. Then, it clarified the differences between the various ITSM frameworks more specifically the ITIL-based ITSM frameworks. Moreover, it showed a detailed overview of the ITIL framework and investigated the benefits and challenges that are observed while implementing and adopting the framework. Thus, identifying the gaps helped to acquire additional knowledge while developing the proposed framework. Finally, related works of various scholars had been discussed and analyzed by indicating their research gaps with regard to the study area.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1. Overview

This chapter discusses the research design and methodology in detail that is intended to provide the mechanism to solve the research problem of the study. A research methodology is defined as “*the general approach the researcher takes in carrying out the research project*”, (Leedy & Ormrod, 2016 p. 8). It will consist of the research philosophy together with the research method and techniques. The choice of a suitable methodology is based on the nature of the research problem and the researcher’s philosophical orientation and assumptions. According to (Leedy & Ormrod, 2016 p. 74), research design means the strategy that helps to solve the problem and simply it means planning. In addition to this, it includes the procedures, data collection, and data analysis techniques that the study will use to conduct the research.

3.2. Research Approach

According to (Hevner, March, Park, & Ram, 2004), there are two broad research paradigms in Information Systems (IS) and these are behavioral science and design science. Behavioral science deals with the “*development and justification of theories that explain or predict phenomena related to the identified business need*” whereas design science engaged in the “*building and evaluation of artifacts designed to meet the identified business need*”. This study intended to design and develop a framework based on the prior works of literature, the organization's existing status, and business needs, so the researcher adapted the design science research methodology (DSRM) as a research approach. According to (Baskerville, Baiyere, Gregor, Hevner, & Rossi, 2018), design science research is a research approach that will solve practical and theoretical limitations in IS.

The approach provides two perspectives, and these are design artifacts and design theories. The DSRM includes the following research output: constructs, models, frameworks, architectures, design principles, methods, instantiations, and design theories, (Baskerville et al., 2018). Design science will play an important role in filling the gap by providing the mentioned outputs through design, analysis, reflection, and abstraction. DSRM contributes knowledge to the domain area and they are categorized into four dimensions or quadrants, (Gregor & Hevner, 2013).

- **Invention:** New Solutions for New Problems
- **Improvement:** New Solutions for Known Problems
- **Exaptation:** Known Solutions Extended to New Problems
- **Routine Design:** Known Solutions for Known Problems

This study could be categorized into the improvement domain since the aim of this study was to propose a better ITSM framework based on the ITIL best practices for the case company.

Several scholars proposed a DSRM process model that helps to guide the overall research flow, and this study adapts (Hevner, 2007; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007) DSRM models together. The adapted model provided a technique or road map through its principles, practices, and procedures that were helpful to conduct design science research. The process model had six basic steps that help to design and develop the artifact in this context, the framework. Moreover, it was organized into three basic categories and these are relevance, design & evaluate, and knowledge base. The model was customized to fit the research study and it is presented as follows:

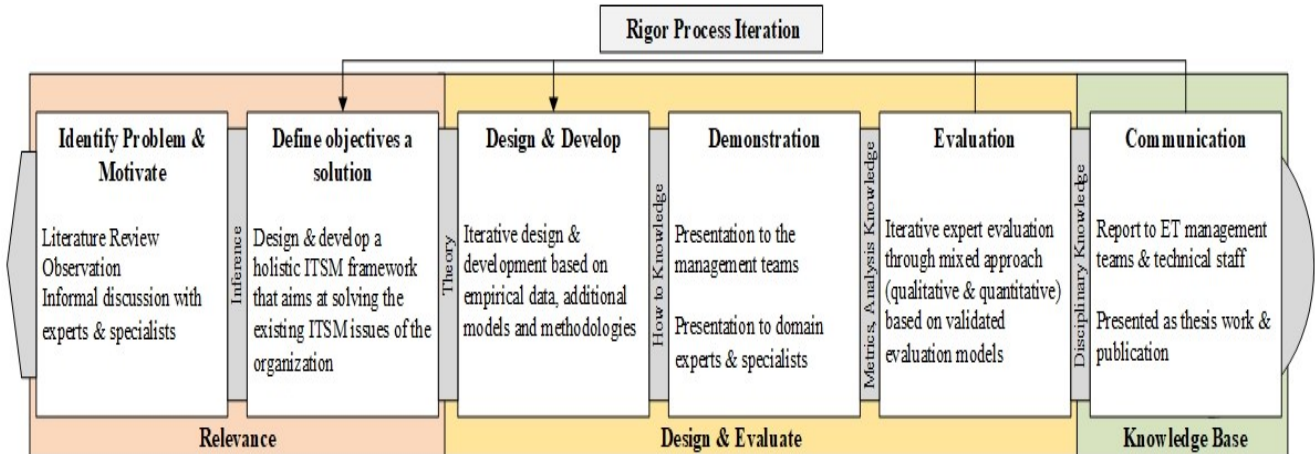


Figure 3.1. Design science research methodology (DSRM) adapted from (Hevner, 2007; Peffers et al., 2007)

3.2.1. Problem Identification and Motivation

The previous study that was conducted in the company indicated that the ITIL implementation was hindered by company-specific barriers. Thus, proposing a suitable and relevant ITSM framework for the case company could be decisive to get rid of those barriers. Having this in mind, various

pieces of literature was reviewed to grasp a firm knowledge of the areas of ITSM. Also, observation of the current practices of ITSM in the organization was supportive in order to visualize the problem in detail. Informal discussion with experts and specialists was crucial to get a better overview of the phenomenon. As a result, the researcher planned to improve the existing ITSM practice of the organization by designing and developing the ITSM framework based on the ITIL best practices.

3.2.2. Objectives of a Solution

The purpose of the research was to design and develop a framework that aims at solving the existing ITSM issues of the organization. Hence, the framework was expected to improve and maximize the IT service management of the organization.

3.2.3. Design and Development

In this phase, the actual framework came into existence through the help of different techniques and methods. Those techniques and methods were interviews, observation, document analysis, and assessment that help to investigate the current practices of ITSM within the organization. The techniques and methods were mainly adopted from prior works of literature that have similarities with the domain and they were customized in order to fit the area under study.

Thereafter the empirical data was analyzed qualitatively in a rigorous manner, and then the current issues of the company were distinguished. Lastly, by applying additional techniques and methodologies, the framework was designed and developed.

3.2.3.1. Data Collection Methods and Procedures

In this study, primary and secondary data sources were used. The primary data was collected through semi-structured interviews with selected respondents, and an observation checklist. The secondary data was collected through document analysis that was linked with the theoretical foundation, and the primary data sources. Moreover, a standard assessment model was applied to investigate and assess the maturity of the existing ITSM practice. The application and utilization of various data sources enhance the quality and increase the credibility of the research, (Patton, 1999, p. 1193).

3.2.3.1.1. Semi-structured Interview

According to (Barrett & Twycross, 2018) interviews are the characteristics of many qualitative types of research that provide direct and straightforward techniques to gather in-depth and plenteous data for a given phenomenon.

Semi-structured interviews allow the respondent to speak about what they feel in that key area, (Barrett & Twycross, 2018). The semi-structured interview method was preferable for this research since it would extract the people’s insights and knowledge in detail about the current practices of the ITSM within the organization. (Smith, Harre, & Langenhove, 1995 p. 9) added that the method helps to gain detailed knowledge of the respondent about in that particular area. The method encouraged the respondents to speak what they think about the subject area beyond the inquiry that was forwarded by the interviewer; thus, the researcher could get and capture additional fertile data.

In order to accomplish the task, the respondents were selected purposively. As per (Patton, 2014 p. 401) purposeful sampling helps to select information-rich respondents. Thus, the researcher picked staff who have a better knowledge of the subject matter within the organization. The structure of the sample cases is discussed thoroughly in the sample size sampling method subsection.

The whole interview process followed the technique called “*The Interview Protocol Refinement Framework*” which is developed by (Castillo-Montoya, 2016). The adopted interview protocol has four distinct phases that facilitate the environment to have a better and standard interview session.

Phase	Description
Phase 1: Ensuring interview questions align with research questions	To create an interview protocol matrix to map the interview questions against the research questions
Phase 2: Constructing an inquiry-based conversation	To construct an interview protocol that balances inquiry with conversation
Phase 3: Receiving feedback on the interview protocol	To obtain feedback on the interview protocol (possible activities include close reading and think-aloud activities)

Phase 4: Piloting the interview protocol	To pilot the interview protocol with a small sample
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Table 3.1. Interview protocol refinement (IPR) method adopted from (Castillo-Montoya, 2016, p. 828)

The interview questions were adapted from (Lubambo, 2009; Marrone & Kolbe, 2011a, 2011b; Tadesse, 2017; Wulf, Winkler, & Brenner, 2015) and then customized in order to fit the subject area. It was carefully designed to answer the research questions of the study by discarding orphaned interview question items. The interview questions covered important points for instance; the types of IT services the organization is offering, the objectives of the ITSM, the challenges and prospects of the current ITSM framework, types of ITSM tools, the types of processes or functions, and others.

In order to keep the consent of the respondents, the interview was conducted in their preferable environment, mainly in their office through face-to-face and a phone conversation. According to (Smith, Harre, & Langenhove, 1995 p. 16) informants will be more comfortable in an area where they are familiar. Besides this, it helped the informant to check their documents for further clearance or to support their idea. Before conducting the interview session, the respondents were informed about the objective of the subject area. All the interviews were conducted both in Amharic and English and the Amharic interview data was transcribed into English by keeping its originality.

The respondents did not wish to be recorded on a tape recorder, reveal their job title, position, and name. Hence, the interviewer was obliged to keep the consent and right of the informants. The interviewer took note while interviewing the respondents to capture the main points and obtain an accurate record. The respondents were not forced to answer every interview question and they had the right to comment on any questions which seem inconvenient to answer. As per the choice of the respondents, the first round of the interview took place between February 10 to 25, 2020. The second round of the interview session was undertaken between May 10 to 20, 2020. The interview session took from thirty minutes up to one hour based on the level of knowledge and experience of the respondents. The interviewer opted for the laddering technique⁸ with the intent to find hidden or well-unexpressed points that have connections with the study area.

⁸ <https://www.uxmatters.com/mt/archives/2009/07/laddering-a-research-interview-technique-for-uncovering-core-values.php> Accessed on Nov 20, 2019

3.2.3.1.2. Observation

In this study, the researcher's observation was employed as the second type of primary data collection technique. It was used to examine the current phenomenon within the organization. According to (Patton, 2014, p. 55) the data that is gathered from observation consists of descriptions of people's activities, behaviors, actions, interpersonal interactions, and organizational processes. Hence, the researcher documented the current practices of the ITSM within the organization through observation that are implicit and hard to gather with the aid of an interview method. The researcher acted like a complete participant while documenting the real scenario of the organization. According to (Nørskov & Rask, 2011)⁹, the complete participant technique is one way of observing the social phenomenon where the researcher takes an investigative role by becoming a member of the observed group without revealing his/her own identity. This helped to minimize the degree of influence of the researcher on the observed groups and to sustain the quality of the observed data.

3.2.3.1.3. Document Analysis

The secondary data was collected from various types of documents. According to (Paradis, O'Brien, Nimmon, Bandiera, & Martimianakis, 2016), document, textual or content analysis is used to investigate the changes of an organizational or institutional experience on a specific topic and it includes newspaper or research articles, governmental reports, organization policies and protocols, letters, records, meeting notes, checklists, and others.

The document analysis acts as supporting material to ensure the credibility of the information that is gathered during the interview and observation. For this study, the company's monthly & annual reports, circulars, policies and strategies, archival records, website-based resources, and email communications were used.

3.2.3.1.4. Assessment Model

The researcher adapted the ITSM capability model which was developed by (Wulf, Winkler, & Brenner, 2015) in order to assess the maturity level of the current ITSM practices of the company. The model had been applied to 206 companies that have deployed the ITIL framework and it was

⁹ <http://www.qualitative-research.net/index.php/fqs/article/view/1567/3225> Accessed on Nov 20, 2019

used to assess the whole ITSM processes of the IT organizations. Furthermore, the researcher customized the model aiming to include the remaining four functions.

The reason for selecting this model rather than the other assessment or evaluation models was because it gave more attention to the capabilities of a given IT service provider rather than on mere implementation maturity. Moreover, the model viewed ITSM in a resource-based perspective (such as people, knowledge, technology, tools, plans, etc.) and comprised a multi-attributive maturity scale.

3.2.3.2. Unit of Analysis

The proposed study is a case study by nature since it needs detail and in-depth investigation about the phenomenon. (Kumar, 2018) indicates that a unit of analysis includes the whole unit being researched, individuals, groups of individuals, organizations of individuals, countries, technologies, and objects that are the main concern of the study area. In this case, the unit of analysis is 'Division' which is the Information System Division. The division was selected since the IT service management duties and responsibilities rely upon it.

3.2.3.3. Sample Size and Sampling Method

In research methods, the population is the whole sum of cases from which some information can be drawn or extracted whereas sampling is a subset of the entire population, (Banerjee & Chaudhury, 2010). The population of the study included all employees of the organization who utilized ITSM in their daily activities. Furthermore, it included the respondents who participated during the ITIL implementation phase including ex-staff. Additionally, the participants who craft and monitor the processes of the organization were also incorporated. In general, based on the current structure of the organization; employees of the Information Systems Division including ex-staff, Information Security Division, and Customer Experience and Quality Management Division were incorporated as the target population of the research study.

In this study, a non-probability and purposive-sampling technique were used. Purposeful sampling is a technique widely used in qualitative research that is helpful to identify and select information-rich respondents, (Patton, 2014 p. 401). The study picked knowledgeable and experienced respondents who have better and deep knowledge of ITSM. In order to get valuable information, the researcher classified the respondents based on their job roles. The respondents are

combinations of directors, domain experts, managers, specialists, supervisors, and ex-staff. Most of them were engaged during the company's ITIL implementation and process crafting phase whereas the remaining respondents have a better knowledge of the current practices of the ITSM. Moreover, among the previously mentioned respondents, the researcher incorporated an expert who had done prior research on this domain. In addition to this, a previous staff of the company who had engaged in the ITIL the implementation phase was included. Furthermore, specialists who crafted most of the ITIL processes during the ITIL implementation phase were included. In order to keep the consent and anonymity of the respondents, pseudonyms were applied.

Major Areas (Respondent's Category)	No. of Respondents	Pseudonyms
Directors	2	Director1 Director2
Managers	4	Manager1 Manager2 Manager3 Manager4
Domain Experts	2	Expert1 Expert2
Specialists	5	Specialist1 Specialist2 Specialist3 Specialist4 Specialist5
Supervisors	1	Supervisor1
Ex-staffs	1	Ex-staff1
Total	15	

Table 3.2. Semi-structured interview distribution

Deciding the exact sample sizes is debatable and a subject of argument for most scholars. However, most of the time smaller sample sizes are used to gain useful and in-depth information in order to understand the overall environment of the phenomenon, (Gentles, Charles, Ploeg, & McKibbon, 2015). In order to manage and control the sample size in qualitative research and specifically in this study, the concept of saturation is deployed. According to (Gentles et al., 2015), the level of

informational redundancy where additional data collection contributes little or nothing new to the study. (Suri, 2011) added that data saturation is determined by the nature of the data source and the synthesis question. The data saturation could be reached soon since the study applied a purposeful data collection method and semi-structured (open-ended) interview questions.

3.2.3.4. Method of Data Analysis

According to (Cohen, Manion, & Morrison, 2017, p. 184), qualitative data analysis can be described as the technique of making sense from the research participants' views and opinions of situations, corresponding patterns, themes, categories, and regularities. In this study, a qualitative thematic analysis technique was adopted to clearly understand the themes or patterns of the phenomenon under study. (Cohen et al., 2017, p. 487) describes thematic analysis as putting together and categorizing the texts into themes. The goal of thematic analysis is to find the themes, it means that identifying the patterns that describe the research in a summarized and organized manner, (Maguire & Delahunt, 2017). For this study, the researcher followed the guide of (Braun & Clarke, 2006) and it has six basic phases. The analysis technique is not linear rather it is a recursive process, it allows the researcher to go back and forth instead of moving from one phase to another.

Phase 1: Become familiar with the data	Phase 4: Review themes
Phase 2: Generate initial codes	Phase 5: Define and name themes
Phase 3: Search for themes	Phase 6: Produce the report

Table 3.3. Phases of thematic analysis adapted from (Braun & Clarke, 2006, p. 35)

3.2.3.5. Reliability and Validity

Reliability and Validity in qualitative research are always the cause of debate for many scholars. In qualitative research, the instrument is the researcher, (Patton, 2014, p. 67) and the validity resides on the skill, competence, and rigor of the researcher that performs the research. (Brink, 1993) expressed validity in qualitative research that a valid instrument should measure what is supposed to measure whereas reliability entails the ability of the research methods to provide the same result over different phenomenon.

In order to ensure the reliability and validity of the study triangulation technique was employed. The triangulation technique involves the use of multiple data sources or methods, investigators, or theoretical perspectives, and approaches that are aimed at sustaining the trustworthiness and credibility of the study, (Brink, 1993; Bashir, Afzal, & Azeem, 2008). As per (Patton, 2014, p. 579) using various types of data collection methods like interviews, observation, and document analysis helps to increase the credibility of the study since the strength of one method fills the weakness of another method. Additionally, triangulation minimizes the researcher's bias and affirm the credibility of the findings, (Patton, 2014, p. 1020; Bashir et al., 2008). Hence, the researcher utilized multiple data collection methods to secure the validity and reliability of the study.

Furthermore, the study stuck with the respondents verbatim while analyzing and interpreting the data to increase the credibility and truthfulness of the research finding. As per (McMillan & Schumacher, 2014, p. 354) the researcher should keep the words of the respondents by obtaining literal statements and through quoting important texts from the documents.

3.2.3.5.1. Pilot Study

Besides the previously mentioned reliability and validity techniques, a pilot study was also introduced to increase the credibility of the research work. As per (van Teijlingen & Hundley, 2002) findings, a pilot study helps to know the early warnings in advance about where the research work could fail, whether the research methods or instruments are inappropriate or perplexed. Furthermore, a well-designed and well-documented pilot study helps the researcher to learn more about the research process and should be well-documented in the final research report.

The overall process of the pilot study was adopted from (Castillo-Montoya, 2016) as a continuation of the previous phases. The pilot study is conducted through a field-testing technique where the preliminary interview guide is tested with the potential study participants, (Kallio, Pietila, Johnson, & Kangasniemi, 2016). The interview questions had been discussed with two experienced respondents. The respondents were carefully selected since they are assumed to have adequate experience in the ITSM/ITIL domain. One of the respondents is an ITIL certified expert and also participated in the ITIL implementation phase. The second respondent had conducted a research study on this domain. The test-retest method had taken five days in order to gather concrete points from their point of view. They provided valuable feedback on the question items in relation to the

research objectives and research questions. Then, based on their response, the question items were amended in order to answer the research questions. Lastly, the researcher included the lesson that had been gained from the pilot study in the final interview guide.

Pilot Study Respondent’s Category	No. of Respondents	Pseudonyms
Specialist (Who was engaged in ITIL implementation phase & ITIL Certified Expert)	1	PilotStudy1
Domain Expert (Who had conducted a research study on this domain)	1	PilotStudy2
Total	2	

Table 3.4. Respondent distribution for the pilot study

3.2.3.6. Instrument Development

The semi-structured interview question items were crafted with modification and minor addition from (Lubambo, 2009; Marrone & Kolbe, 2011a, 2011b; Tadesse, 2017; Wulf et al., 2015). As was described in the pilot study subsection, the interview questions were utilized to investigate the test-retest validity and reliability of the instrument with two pilot study respondents. The comments and suggestions of the pilot study respondents were incorporated in the final version of the semi-structured interview question. Lastly, the final semi-structured interview questions were used to investigate the current ITSM practices of the company with selective and knowledgeable respondents.

3.2.4. Demonstration

In this phase, the developed artifact which is the framework was presented to the respondents of the research study and selected staff of ISD. In order to demonstrate this framework, the researcher adopted the Agile Software Development Life Cycle (SDLC) methodology. The Agile¹⁰ method focuses on process adaptability and customer satisfaction. It is the result of iterative and incremental process models.

3.2.5. Evaluation

In DSR the output of the study will be evaluated through several evaluation metrics and according to (Peffer, Rothenberger, Tuunanen, & Vaezi, 2012), the DSR evaluation methods are a logical

¹⁰ <https://www.javatpoint.com/agile-sdlc> Accessed on Dec 18, 2019

argument, expert evaluation, technical experiment, subject-based experiment, action research, prototype, case study, and illustration scenario. On the other hand, (Hevner et al., 2004) stated that DSR evaluation methods include observational, analytical, experimental, testing, and descriptive. Hence, the final output of this research study was evaluated qualitatively by specific domain experts based on ISO/IEC 25010:2011 '*quality in use*'¹¹ model through interview. In addition, the research study employed (Prat, Comyn-Wattiau, & Akoka, 2014, 2015) evaluation model to measure the proposed framework through the survey method. The evaluation survey was conducted by employing a five-point Likert scale data measurement technique. The scales are; strongly agree, agree, neutral, or neither agree nor disagree, disagree, and strongly disagree and their assigned weights are 5, 4, 3, 2, 1 respectively.

Finally, the survey was crafted on the google form tool and then distributed through the respondent's corporate email address. The implementation of iterative qualitative and quantitative evaluation methods throughout the research process helped to strengthen the research output. This argument is also in line with (Cleven, Gubler, & Hüner, 2009) perspective, they stated that a mixed evaluation approach (qualitative and quantitative) allows them to get an in-depth understanding of the quality of the artifact that is being evaluated. The final evaluation results of the study were presented through descriptive logical reasoning. (Hevner et al., 2004) indicated a descriptive informed argument used relevant research works to develop persuasive justification for the IT artifact.

3.2.6. Communication

The applicability and the usability of the framework on the subject area were finally communicated with ET management and technical staff. The report was well organized with the intent to justify the benefits that the organization will earn by applying the newly developed framework. Furthermore, as a research study, the overall research process was well documented and communicated as a thesis work. In general, the research output was expected to add new knowledge to the domain.

¹¹ <https://www.iso.org/obp/ui/#iso:std:iso-iec:25010:ed-1:v1:en> Accessed on Dec 18, 2019

3.3. Ethical Considerations

Every research faces the issues of ethical concerns. However, the nature of ethical concerns is different in qualitative research, this is since qualitative research investigates the nature of the study area in-detail, (Binti Mohd Arifin, 2018). In this study, the researcher followed the following basic points while conducting the research.

- The confidentiality and anonymity of the respondents and the company were preserved throughout the research process. The respondents' names, job titles, and levels were not revealed while conducting the research.
- The druthers of the interview environment depended on the consent of the respondents.
- All the materials that had been used in this research are properly acknowledged.
- The study focuses on manipulating the data that had been brought from primary and secondary data sources and the data only used for academic purposes.
- The researcher gave due respect for the respondents and tries to keep the originality of their ideas and responses throughout the research process.
- The researcher was obliged with the consent of the respondents noting their cultural and language barriers.
- The researcher encouraged voluntary participation of the respondents during the research process aiming to make comfort during the interview session.

3.4. Chapter Summary

This chapter presented the research design and methodology that the study adopts. It visualized the research through the lens of (Hevner, 2007; Peffers et al., 2007) DSRM. The selected methodology comprised six integrated phases and those phases were categorized into three basic categories. The justification and argument had been presented for the adoption of the selected methodology. Each of the phases had been discussed in detail by presenting different types of research approaches and techniques that help to accomplish the task. Moreover, the researcher briefly discussed the method of data collection, sampling technique, and technique of data analysis. The interview question had been retested by the pilot study to fix the upcoming issues. Lastly, the proposed framework was demonstrated by adopting the Agile SDLC methodology and evaluated qualitatively and quantitatively through the expert evaluation method.

CHAPTER FOUR

ANALYSIS, FINDINGS, AND DISCUSSION

4.1. Overview

This chapter discusses how the empirical data that is collected through primary and secondary data collection methods are being analyzed through thematic qualitative analysis techniques and then how the analyzed data is interpreted with the actual phenomenon. Furthermore, the findings of the research study are discussed in-depth to answer the research questions.

The data has been collected through the semi-structured interview from the respondents of the research study that have deep knowledge about the subject area. The researcher has picked various respondents with different job roles and profiles for the study area. As it was presented in chapter three, the respondents are directors, managers, experts, specialists, and supervisors. This entails that the research is more concrete since it accommodates and includes the perspectives of various professionals. Additionally, among the respondents, some of them are certified in IT governance and ITSM fields. The researcher interviewed 13 respondents out of 15 samples; this is because data saturation was reached. The same or no new information has been found from the selected respondents. Besides the interview, the study has used document analysis and observation as additional data collection methods to enhance and enrich the research study. The triangulation technique is also applied to ensure the trustworthiness and credibility of the research study.

Moreover, the ITSM assessment model has been applied to assess the current practices of ITSM within the division. The model assessed 26 processes along with the functions of ITSM. The empirical data together with the assessment model result is analyzed based on the thematic qualitative analysis techniques. In due course, the findings that resulted from the analysis are interpreted and discussed in relation to the current practices of ITSM within the division. The findings aimed at answering the research questions of the study and are used as inputs to design and develop the ITSM framework.

4.2. Qualitative Data Analysis and Findings

This research study followed (Braun & Clarke, 2006) thematic analysis technique as it was discussed in chapter three. The technique has six phases and it is recursive rather than a sequential activity. The analysis incorporated the research question, and specific research objectives together.

Moreover, for the sake of easy analysis, the overall analysis task had been categorized into three basic topics and these are ITSM orientation, the current status of ITSM practice, and ITSM framework consolidation.

No.	Main and Subtopics
1	ITSM orientation <ul style="list-style-type: none"> • Acquaintance with the ITSM concept • Acquaintance with the ITIL concept
2	Current status of ITSM practice (RQ1) <ul style="list-style-type: none"> • Assessment of the existing ITSM practice • Maturity of the existing ITSM practice • Issues of the existing ITSM practice
3	ITSM framework consolidation (RQ2) <ul style="list-style-type: none"> • Perspective of the proposed framework

Table 4.1. Qualitative data analysis outline

The data that was collected from 13 respondents (out of the total) had been analyzed based on the previously mentioned method, which was the thematic analysis technique. The researcher had become familiar with the data that is conducted from the respondents to get a deep understanding of the subject matter. The interviews that were transcribed by the researcher were stored in plain text as a softcopy and hard copy. Moreover, the transcribed record was prepared and organized for easy data analysis. The initial codes were generated then those codes had been categorized to form a theme. Through rigorous analysis, four basic themes had been identified from the interview transcript and these were:

- **Theme 1:** ITSM orientation
- **Theme 2:** ITIL perspectives
- **Theme 3:** Assessment of the existing ITSM practice
- **Theme 4:** Perspective of the proposed framework

Each of the themes that were identified earlier was supported by the available company's documents and the researcher's observation of the current ITSM practice of the division.

4.2.1. Theme 1: ITSM Orientation

To be on the same line the respondents were asked if they are familiar with the concept of ITSM. This helped the researcher to get the general concept of the ITSM and to shape the research. The feedback from the respondents was almost similar and the interviewees had a good understanding of the overall ITSM concept.

According to the commentary of Expert1, the concept of ITSM is narrated in connection with the gap of the company.

“It is the entirety of activities directed by policies, organized and structured in processes and supporting procedures that are performed by an organization to ensure that the appropriate mix of people, processes, and technology are in place to provide value. Ethio telecom is more or less in line with ITSM but more works should be done to satisfy the customer demand.”

Another insight from Specialist1 also stressed the above feedback.

“IT Service Management is a collection of best practices from different IT companies all over the world to efficiently serve the end-user and when we come to our company there are several issues that should be addressed since we are not following what the ITSM is talking about.....”

Specialist2 explained the objective of ITSM in-depth with respect to the company’s service quality problem.

“The objective of ITSM is to design, deliver, manage, control, and improve IT services to meet the needs and expectations of customers and it is aligned with the objectives of the organization... However, the company has a lot of quality service issues even though it has adopted the ITSM framework which is ITIL.”

Moreover, Supervisor1 specified the company’s activities with the role of ITSM.

“Our company is using various ITSM mechanisms to provide quality of service, however, there are issues and it should be handled by improving the mechanisms that fit with the current scenario and in my view, ITSM is all about the quality of service, customer satisfaction, and business-IT alignment.”

Manager1 underscored the significance of aligning the company’s vision with the objectives of ITSM.

“.....helps to efficiently manage IT processes and Ethio telecom is delivering its IT services through this mechanism even though there are problems, and, in my understanding, the company’s vision should be aligned with the objective of ITSM.”

Director2 indicated the role of integration for better service delivery.

“..... ITSM encompasses integration as one of its elements and this is because IT systems should come together while delivering an effective service to our customers.”

The interviewee also highlighted the value of steady service through the customers’ eyes.

“.....Additionally, customers should get various IT services without service interruption.”

In general, this indicates that the respondents had a good knowledge of ITSM. Thus, ITSM is vital to sustain customer satisfaction and provide quality IT service. The respondents also indicated that the company has major gaps in utilizing the ITSM principles and this had been witnessed practically. Furthermore, the company’s documents heavily stressed the need for providing quality IT services to satisfy the customers. However, the researcher's physical observation showed that there is still a gap between the company’s objective and the actual ITSM practice.

Transcribed data extracted from the semi-structured interview	Codes (subthemes) extracted from the transcribed data	Main Theme
ITSM efficiently manages internal IT processes as per the standard to deliver satisfactory service for the end-user	Customer satisfaction	ITSM Orientation
The objective of ITSM is to design, deliver, manage, control, and improve IT services to meet the needs and expectations of customers that are aligned with meeting the objectives of the organization	Quality of IT service Business-IT alignment Service management	
ITSM encompasses integration and local context as one of its element and this is because IT systems should come together while delivering an effective service to our customers	Service Integration	

Table 4.2. Theme 1: ITSM orientation

4.2.2. Theme 2: ITIL Perspectives

The other dimension that the interviewees were asked about was their level of ITIL knowledge and experience within the division.

The feedback from Manager3 manifested ITIL as a best practice that comprises various processes and functions.

“It can be taken as a set of best practices that helps an organization to achieve its business objectives. With regard to ET, we have implemented ITIL v3 later in 2011..... Some of the ITIL best practices which are processes and functions are followed very well in comparison to the others.”

Specialist1 argued why ITIL is considered as a framework and the consequences of assuming the framework as a standard.

“ITIL is a framework rather than a standard and based on my involvement during the implementation phase, we have assumed that it will achieve its objective since we were not providing quality of IT services to our esteemed customers and these issues still exist today. For instance, our customers are still complaining about our service quality and repetitive system incidents through our hotlines. These problems are the biggest challenges that we should solve immediately by adjusting the framework not by merely following everything it said as a standard.”

Manager2 strengthens the above feedback.

“It is one of the IT Service Management frameworks since it helps an organization to achieve its business objectives by aligning the IT services. There is no doubt about ITIL since a lot of telecom service providers are successful based on its guidance and principles. But this does not mean that only implementing or adopting the framework cannot solve the service management crisis.....”

Expert1 pointed out the purpose of ITIL in relation to the structure of the division.

“.....its objective is to create a service-oriented IT organization. The division’s structure is crafted from the ITIL V3 phases and some of the section names are directly coined from the functions.....”

Expert2 stressed the reason for choosing ITIL as a governing mechanism for IT services.

“ITIL is a framework for the governance of IT and continually measuring the performance of IT services. The company has implemented ITIL intending to manage the IT services effectively but when we come to the day to day activities, we are not fully successful. This indicates that our initial plan is not aligned with the objective of ITIL and the way we want to govern our IT services.....”

Specialist2 described ITIL as a prescriptive principle and underlined more on contextuality.

“It is a collection of prescriptive principles that helps an organization to improve its IT services. Furthermore, an organization can benefit from ITIL if it customizes the principles based on the local context.”

Based on the above feedback, the researcher observed that the respondents had a very deep understanding of ITIL best practices. Furthermore, they described the basic characteristics of ITIL in relation to their experience which they had witnessed during the ITIL implementation phase. Also, the respondents pondered the reason for considering ITIL, expectation, and its results. Moreover, they also mentioned that the ISD structure resembles the ITIL lifecycle phases. The documentations were also in line with the empirical data even though there was no clear evidence that will show whether the processes are being followed properly or not. As per the company’s documentation, a term called “ISD processes” is used for both ITIL and other job processes. Consequently, those “ITIL processes” are assigned to various departments.

The documentations showed that some of the ITIL processes are updated through time but there is no uniformity within the updated processes. As per the researcher’s physical observation in the division, no sign indicated the updated processes are aligned with the current business need and organizational change. Most of the processes and functions were not institutionalized, automated, and even not known by the staff. Furthermore, as one of the IT governance frameworks, the researcher did not witness any clear relationship with the company’s business objectives.

Summarized transcribed data extracted from the semi-structured interview	Codes (subthemes) extracted from the transcribed data	Main Theme
It is one of the IT Service Management frameworks since it helps an organization to achieve its business objectives by aligning the IT services	ITSM Framework Best Practices	

It can be taken as a set of best practices that helps an organization to achieve its business objectives	Governance of IT	ITIL Perspectives
ITIL is a framework for the governance of IT and continually measuring the performance of the IT services		
It is a collection of prescriptive principles that helps an organization to improve its IT services	Prescriptive Principles	

Table 4.3. Theme 2: ITIL perspectives

4.2.3. Theme 3: Assessment of the Existing ITSM Practice

The existing ITSM practices of the company were assessed and investigated to identify the status of the overall ITSM practices. Furthermore, the researcher employed a validated capability model besides conducting an interview. This helped to know the current status of each ITSM processes and functions. Based on the outcome of the capability model the company’s ITSM practice was placed on level 2. This means that some of the processes and functions have the tendency to be repeated but they are not performed according to the principle of ITSM. The result of the capability model was also supported by the respondents’ feedback, documents, and physical observation.

According to the supervisor1 point of view, ITSM tools should be capable to provide efficient IT services.

“..... However, some of our services are not fully supported by the ITSM tools. We have used HP tools earlier but later it was changed to Microsoft without our consent and the new tool has a lot of gaps. Therefore, it should be customized to fit our current service delivery.....”

Manager1 indicated the benefit of continuous and incremental service improvements.

“During the ITIL implementation phases there was a dedicated section which will monitor and examine the overall ITSM status but after some time the section vanished. It is necessary to continuously improve and add incremental changes. Improvements and dynamic changes are necessary for the division since we are the one who is responsible for managing and delivering IT services for our customers.....”

Expert2 specified the reasons that can be considered as the basic challenges of the current ITSM practice of the division.

“Some processes are customized based on the section’s roles, but I am afraid that their pertinency is in question and this can be due to organizational structure change, process or function misalignment, and lack of organizational context.”

Expert1 indicated the current ITSM practice in relation to knowledge management and vendor involvement.

“.....most of the activities are performed without guidelines and there is high vendor involvement. Thus, this leads us to have very limited knowledge of the systems.”

Speciliast2 stressed the benefits of proper role assignment within ITSM.

“.....the employees are not informed about their roles and responsibilities and these have a major impact on the division.”

Manager2 reflected a lack of awareness within the staff in line with the former response.

“.....some of the processes are not known by the staff and empowerment should be performed in this regard.....”

Specialist1 expressed the threat of disorganized process or function management while executing daily ITSM activities.

“Most of the division’s activities are performed randomly and is not supported by well-defined processes. If we are not properly following the process or function the consequences are enormous.”

The respondent also indicated the current system issues.

“.....Besides, there are repetitive system interruption, reactive service handling, project mishandling, and other related problems.”

The respondents agreed that in order to measure the performance of the IT services there should be a dedicated measurement method that will be updated with the changing phenomenon. Accordingly, Specialist3 mentioned the importance of metrics and measurement utilization within the ITSM environment.

“.....we do not have adequate evaluation mechanisms to measure the performance of our ITSM practices. Thus, it should be better to have standard metrics or measurements that help to

evaluate the performance and automate some of the critical processes or functions for smooth and quick service delivery. As I know there is a similar evaluation method across the company which is called a balanced scorecard (BSC).”

On the other hand, the strong sides of the ITSM practice were also explained by the respondents. They indicated that the good sides of the current ITSM practice should be improved in relation to the business demand and the dynamic telecom environment.

Manager1 explained the maturity levels of some of the processes and functions of the current ITSM practice.

“As a function help desk is at a good stage in managing various IT services for our internal customers. Change management and incident management are well automated and matured as compared to other processes. Incident management, request fulfillment, service validation, and testing, financial management for IT services, demand management, strategy management for IT services, event management, access management, and other processes or functions are relatively at a good stage but needs a lot of improvements.”

Almost all of the respondents agreed that the previous ITIL implementation in the division was not successful enough and they had raised important factors to support their argument. Moreover, their argument was also in accordance with the result of the assessment model. Various documentations and physical observations indicated similar findings as well. The researcher observed that some of the processes were used to do a similar activity, other processes were used within a given function, some functions or phases were used as section and department names respectively. The researcher had participated in various meetings and observed that most of the processes or functions are not well known by the staff and the daily ITSM practices of the division still need major improvements. In some sections of the division, the ITSM practices are in good shape despite the general issues that hinder the company.

Transcribed data extracted from the semi-structured interview	Codes (subthemes) extracted from the transcribed data	Main Theme
The current ITSM practice is hindered by organizational change, process or function misalignment, and local context issues	Process or function misalignment Organizational change	

There is no standard metrics and measurements within each section that measure the overall status of ITSM	Continuous incremental improvement	Assessment of the existing ITSM practice
Improvement and dynamic change are mandatory within the division	ITSM tools utilization	
Only limited processes and functions are supported by ITSM tools and they are not fully automated	Metrics and measurements	
Most of the activities are performed without guidelines and there is high vendor involvement	Supplier management	

Table 4.4. Theme 3: Assessment of the existing ITSM practice

4.2.4. Theme 4: Perspective of the Proposed Framework

The researcher observed that the current ITSM practice needs improvement in order to address the gaps that are hindering the division. The respondents had raised and discussed important points that should be included in the proposed framework. They articulated the issues that they had observed through their experience and some of them even stressed the impact in relation to service quality, business-IT alignment, and customer satisfaction.

Expert1 emphasized that a feasibility study is helpful to know the existing gaps in the division.

“.....it will be better to assess the current practice of ITSM or evaluate the maturity since the initial feasibility study is not performed during the ITIL implementation phase.”

Ex-staff1 of the company that participated during the ITIL implementation phase strengthens the above point.

“.....we just entered into the implementation phase with a hurry and without a clear plan.....”

Manager3 commented on the necessity of structural changes to the existing functions or processes.

“There are so many processes and functions that need improvement, redesign, or design, so as a division it is mandatory to do this task strictly. Till now we did not perform any fruitful task in this regard.....”

Specialist2 stressed the benefit of internal needs while thinking about a given ITSM framework.

“In my opinion, one of the ITIL implementation failures in the division raises from lack of local context and customization. ITSM frameworks should base on the internal needs of the company rather than fully adopting or implementing everything as it is. Therefore, I suggest that we should look inward to benefit the outward, basically our customers.”

Manager2 indicated the purpose of integration boldly while maintaining and monitoring the IT services in connection with the way the customers access the IT services.

“ITSM should be integrated with our several IT services and this helps the customers to get our IT services through a unified access platform.....especially while monitoring and maintaining the IT services the benefit will be seen vividly. ”

Specialist1 notified the benefit of experience sharing with other telecom service providers. This helps to grasp prominent knowledge to enhance or develop the ITSM framework.

“.... For example, some of the well-known telecom companies are successful in crafting their ITSM frameworks and even others are trying to adopt it. Hence, as a company, we should learn from their experience and check the pros and cons of various ITSM frameworks.”

Expert2 informed the importance of people, technology, organization, and process while managing the IT services as well as other external factors.

“I hope we have missed basic points in the ITIL implementation, and these are combing people, technology, organization, and process. Additionally, we should go in line with the current customer need, business requirements, technological advancement, and other related factors.”

Manager1 expressed the need for an effective and innovative service management hub to address the changing business demand.

“We do not have an innovation center that helps to continuously address the latest issues and emerging technologies. Thus, the ITSM framework should entertain such kinds of elements since we should able to compete with the competitive telecom environment”

As per the feedbacks of the interviewees, the researcher observed that the proposed framework was expected to improve the current ITSM practice. Additionally, the framework was expected to include additional elements to enhance the ITSM activities to the maximum level. The physical

observation of the researcher showed that there was a need for additional elements since they were not addressed by the current framework.

Transcribed data extracted from the semi-structured interview	Codes (subthemes) extracted from the transcribed data	Main Theme
The company should learn from other company’s experience and check the pros and cons of their ITSM frameworks	Customization & localization	Perspectives of the proposed framework
ITSM frameworks should base on the internal needs of the company rather than fully adopting or implementing everything as it is	Competitive advantage	
Current customer need, business requirement, technological advancement, and other related factors should be considered	Capacity empowerment	
We do not have an innovation center that helps to continuously address the latest issues and emerging technologies	Learning organization	
	Incremental assessment	

Table 4.5. Theme 4: Perspective of the proposed framework

4.3. Discussion

In this section, the findings of the research study are discussed in relation to the research questions, specific research objectives, semi-structured interviews, observation, and document analysis. Thence, to achieve the research objective the researcher conducted a rigorous interview with knowledgeable and experienced respondents on the subject matter. Then, those interviews are supported with valuable documentation and observation. Lastly, four basic themes had been drawn from the respondents’ feedback and they are discussed as follows:

Theme 1: ITSM Orientation

The researcher found out that the employees had a better knowledge of ITSM and its related concepts. This helped the researcher to get further information on the subject matter. The respondents stressed the connection of customer satisfaction and quality of service with the

objective of ITSM. They reflected their views that the objective of ITSM should be aligned with the company's business objective and vision. Figuerola (2012)² stated that ITSM supports the business objective and vision of the company, even it improves the services the company is providing. According to the company's *three-year strategic plan*¹² which was announced in August 2019, it aimed at increasing the company's competitiveness and efficiency. The strategic plan which is also called BRIDGE has six themes and these are; best customer experience, reputable brand, innovative products/services, and technology excellence, develop a people-oriented learning organization, growth in financial capacity, and excellence in operation.

The company documentation also revealed that the organization is striving to satisfy a customer need, business demand, and high quality of IT services. In addition to this, the company plans to bring operational excellence, ensure affordable and quality services to the customers, (Ethiopian Press Agency¹³, 2019). Furthermore, the company's vision is to become a world-class telecom service provider. So, these factors should be mapped with the goal of the ITSM in order to achieve a quality of service and increase customer satisfaction. According to (Alqahtani, 2017), the objectives of ITSM can be different based on the organization's needs, directors, system, and other stakeholders who are susceptible to the organization's policies. Hence, the company should align its strategic plan based on the purpose of ITSM.

Theme 2: ITIL Perspectives

The respondents stated the need for ITIL in relation to the division's mission. They indicated that ITIL is one of the ITSM framework and a collection of best practices. They tried to show the benefit the division has gained in some areas. However, they also showed that the division needs a lot of improvements in several domains. The researcher examined that the four perspectives of ITIL were still not matured enough. Furthermore, they indicated that the division implemented ITIL 2011, but it was not successfully addressed the initial consideration which was ensuring the quality of service. As per the findings of (Iden & Eikebrokk, 2014), there is a tendency of achieving better IT governance by implementing the ITIL framework. The statement of (Mehravani, Hajiheydari, & Haghghinasab, 2011) indicated that ITIL goes beyond best practices within ITSM but also yields a framework for governing IT. They noted that the division structure resembled the

¹² <https://www.ethiotelecom.et/ethio-telecom-bridge-strategy-bp/> Accessed on Nov 05, 2019

¹³ <https://www.press.et/english/?p=10627#> Accessed on Nov 05, 2019

ITIL V3 life cycle since it incorporated the four ITIL phases, and functions were taken as section names. The reflection of the respondents was also confirmed by various company documents. According to Figuerola (2012)², ITIL informs what an organization does rather than how to do it. Therefore, it is the responsibility of the given organization or division to examine the ground for successful implementation or improvement of ITIL.

Theme 3: Assessment of the Existing ITSM Practice

The researcher incorporated two methods to know the maturity of the ITSM practice within the division. One of the methods that were employed was a semi-structured interview with other supportive techniques. The other employed technique was ITSM capability assessment model. The researcher adjusted the model to fit the area under study. The researcher investigated the pros and cons of (Alshamy et al., 2012; Meziani & Saleh, 2010) assessment findings and then incorporated them together to align with the existing ITSM practice of the division. Based on the model the researcher has found out four basic points and these are listed as follows:

Topics	Functions	Processes
Needed (Not available)		Knowledge management Seven-step improvement process Supplier management Transition planning and support
Needs improvement (functional & partially available)	Application management IT operations management Technical management	Strategy management for IT services Financial management for IT services Access management Request management IT service continuity management Service portfolio management Service level management Information security management Service validation and testing

Needs to be radically redesigned (Old to current business need)		Availability management Capacity management Service asset and configuration management Problem management Event management Change evaluation Design coordination Release and deployment management Demand management Service catalogue management Business relationship management
Sufficient for business & does not need improvement	Service desk	Incident management Change management

Table 4.6. The final ITSM assessment result

The evidence that had been gained from the assessment model was supported by the respondents’ feedback and it was also analyzed with the available company’s documents. This helped to know the business need of the organization with regard to ITSM and then based on that the division can craft its processes or functions from scratch, or redesign old processes or functions that do not fit the current business need, or improve the current processes or functions that are partially implemented or available, or continue with the current processes or functions that are aligned with the current business objectives. The respondents indicated that even though there are promising activities with the current ITSM practices of the organization, there are major areas that need basic improvement. Some of the issues are listed as follows; inappropriate project management, repetitive service interruptions, reactive service handling, inadequate service maintenance and delivery, vendor dependency, lack of skilled human power, improper service planning, inappropriate resource utilization, and lack of integration.

Moreover, (Alshamy et al., 2012) stated that the company has to decide to what extent to use ITSM while assessing its need. Clearly stating the status of ITSM helps the division to know where it is located, what it should do, and what it will achieve. According to (Wulf et al., 2015), employing the ITSM capability model helps an organization to know its current ITSM practice. Furthermore, the respondents stressed that the employees of the division have a better knowledge of the ITSM

tools, and the tools should be integrated completely. As per the indication of (Alsawadi, 2017), ITSM tools should be carefully selected and well managed.

Theme 4: Perspective of the Proposed Framework

The respondents indicated their future suggestion on what the division should have to do to enhance or improve the existing ITSM practice. They informed that a better and improved ITSM framework is expected to address the issues that are discussed in the above section. As per (Alshamy et al., 2012), a given company should build and implement its ITSM which can effectively govern its IT services. Moreover, they stressed performing a feasibility study before rushing on adopting everything even they indicated that it was one of the reasons that make ITIL implementation unsuccessful. The feasibility study helped to understand the internal needs of the division and overall capacity towards ITSM. The researcher observed that ITSM components have not adhered and some limited procedures or policies support the ITSM practice. On the other hand, metrics and measurement techniques helped to evaluate or improve the ITSM activities. The above point is also supported by (Wulf et al., 2015), they stated that it is helpful to have an accurate assessment method.

The interviewees disclosed that the existing ITSM practices of the organization have major issues while planning, implementing, controlling, and managing the ITSM processes and functions. Therefore, the proposed framework is expected to consider those issues. In addition, the respondents reflected that lessons should be taken from other similar telecom companies that effectively use other ITSM frameworks. Other responses indicated that staff empowerment should be considered as one element within the ITSM practice. Another important issue that was raised by the interviewees was the misalignment of process and function in the current ITSM practice. Furthermore, the five-year strategic roadmap of ISD has identified six basic pillars that are expected to improve the telecom service productivity until 2024. The pillars are focused on IT initiation, IT development and improvements, and building the division's internal capacity. The pillars are listed as follows:

- **Pillar One:** Business-IT alignment
- **Pillar Two:** Enhance Customers' Quality of Experience
- **Pillar Three:** Implementing state of the Art Technology
- **Pillar Four:** Improve Internal Core Capabilities

- **Pillar Five:** Identify & Prioritize IT Initiatives and Strategic Plans
- **Pillar Six:** ISD Human Development & Provisioning Readiness

On the other hand, the company listed its strategic themes that should be addressed by ISD and they are listed below.

- Agility, Time to Market (TTM) & Lead Time
- Modern Technology
- Operational Excellence
- Resource Utilization and Infrastructure Management
- Innovative Solution
- Customer Experience
- Quality of Service
- Continuous incremental improvement

Hence, those basic pillars including the company's strategic themes were incorporated within the proposed framework.

4.4. Chapter Summary

This chapter analyzed the empirical data that was gathered through a semi-structured interview, assessment model, and observation and it was supported by the necessary documents. In order to keep the validity and reliability of the analysis, triangulation had been employed. Moreover, the semi-structured interview was also designed that way to enhance the credibility and trustworthiness of the research. The researcher framed four basic themes that were identified from the transcribed data. The analysis was backed by literature to support the argument of the findings. Then, the findings of the research study were interpreted and discussed with a firm stand to answer the research questions in line with the research objectives.

CHAPTER FIVE

ARTIFACT DESIGN AND DEVELOPMENT

5.1. Overview

This chapter focuses on building the ITSM framework based on empirical data, additional techniques, and methodologies. The framework development comprised PDSA (Plan, Do, Study, Act) and Agile SDLC methodology as its building blocks. This is also supported by various literature and empirical data. Additionally, the framework incorporates service management excellence elements as an enhancement. Furthermore, the framework is evaluated by the standard evaluation model iteratively through domain experts qualitatively and quantitatively. Finally, the last mature framework is produced after passing rigorous design, development, and evaluation phases.

5.2. Framework Development Process

According to (Hevner et al., 2004), the end solution of a design science research in IS, is an IT artifact that solves a prominent organizational issue. One of the design science research outputs or IT artifact is a framework. As per the definition of (Vaishnavi et al., 2004), a framework is “*Real or conceptual guides to serve as support or guide*”. Moreover, (Hevner et al., 2004) indicated that the objective of design science is producing utility whereas behavioral science is truth. The proposed framework can be considered as a descriptive conceptual framework that guides how the current ITSM practice of the division will be improved. The proposed framework is built by incorporating the results of the semi-structured interview, assessment model, company’s documents, and researcher’s observation. Additionally, several methods, techniques, and methodologies are included besides the empirical data.

To sum up, the design process is initiated by gathering feedback from knowledgeable respondents and it is supported by physical observation and documentation. Furthermore, the process is enhanced by employing an assessment model to know the current status of the ITSM practice within the division. Each of the framework development processes is supported by the available theoretical and conceptual literature. The above-listed steps help to investigate the problems of the division and then to provide a firm solution. Having this in mind, the framework is constructed by three basic constituents. These are explained as follows:

- 1) **PDSA technique:** the technique alike PDCA (Plan, Do, Check, Act) technique focuses on continuous improvement and stays up to date with the dynamic environment. Both of the techniques are cyclic and iterative. However, there are major differences between the two techniques. According to Shmula (2018)¹⁴, PDSA tries to study situations more closely and in-depth than PDCA. Hence, better improvements are gained while using the PDSA technique rather than PDCA. The researcher has adopted this method over to PDCA because the former technique helps to learn the issue thoroughly and provides a solution quickly. It is also beneficial to create a learning organization if it is used effectively, (Reed & Card, 2016).



Figure 5.1. PDSA technique adopted from Jane (n.d.)¹⁵

- 2) **Agile SDLC (software development life cycle) methodology:** As per the statement of (Sharma, Sarkar, & Gupta, 2012), Agile gives higher value to customer satisfaction with the shortest development time. Additionally, they indicated that Agile as one of the SDLC methodology has seven basic phases and these are requirement gathering, analysis, design, coding, testing, delivery of partially incremented software, and feedback from the customer. Various scholars have different opinions on the agile phases. Some of them merge the phases while others separate the phases. However, the scholars have a similar perspective towards the objectives and manifestation of the agile methodology. Agile phases are cyclic and incremental. The researcher has adopted this technique since agile provides a better focus on customer needs and responds to changes rapidly. The argument is also in accordance with the company's objective. According to the company's objective towards the technical areas indicated that agile and responsive organizational structure is

¹⁴ <https://www.shmula.com/25225-2/25225/> Accessed on May 15, 2020

¹⁵ <https://www.mapwright.com.au/PDSA-cycle-Plan-Do-Study-Act-cycle.html> Accessed on May 15, 2020

mandatory to handle the business need and customer satisfaction. Thus, adding agile SDLC in the proposed framework should not be considered as a simple option rather it should be taken as a compulsory element.

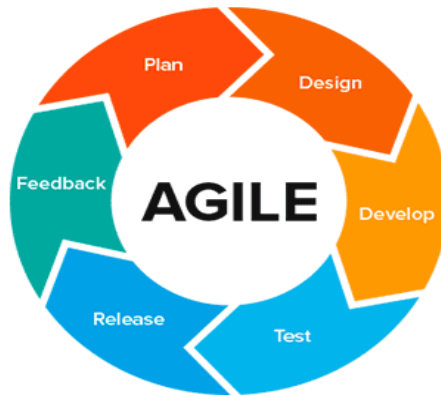


Figure 5.2. Agile SDLC methodology adopted from Paridhi (2020)¹⁶

3) **Service management excellence:** The findings of (Jäntti, 2016, Results, section, para. 13) indicated that service management excellence is the sum of project excellence, service excellence, process excellence, continual service improvement, proactive service management, business relationship management, change management, and social and community based IT service management. According to the author, considering the above main elements helps an IT service provider to deliver a better IT service to its customer. Hence, adopting those important elements from the service management excellence framework helps to heighten and strengthen the proposed framework.

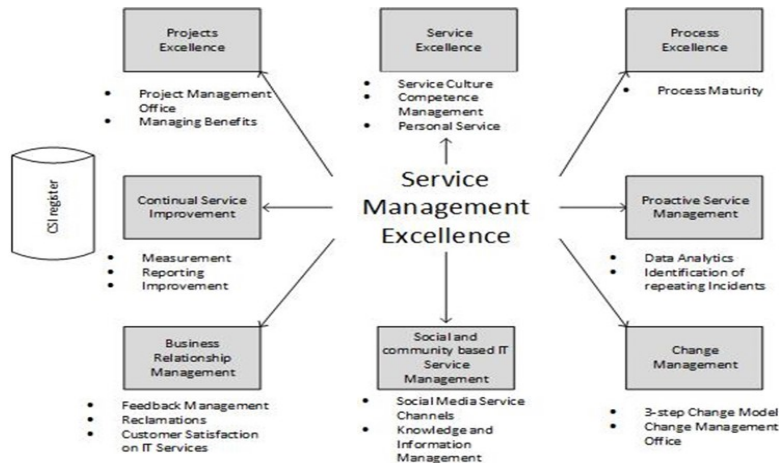


Figure 5.3. Service management excellence framework adopted from (Jäntti, 2016, Results section, para. 13)

¹⁶ <http://www.techgeekbuzz.com/sdlc-methodologies/> Accessed on May 20, 2020

5.3. The Proposed Framework

Based on the research findings, the proposed framework is designed and developed to improve and maximize the existing ITSM practices of the organization. Consequently, the proposed framework addressed the business need, changing customer demand, and the dynamic telecom environment. Besides the empirical data, fundamental elements are included from the Agile SDLC methodology, PDSA technique, and service management excellence framework. The adapted elements contributed to enrich the proposed framework. The research findings produced two basic frameworks. The first framework indicated the high-level ITSM overview. The second framework showed the service components and their activities. Having this in mind, the proposed high-level ITSM framework has four basic phases, and these are plan, implement, control, and govern. The govern phase is responsible for managing and controlling the overall framework. Those four basic phases are cyclic and interrelated. The research result has identified major improvement areas in the existing ITSM practices of the organization. Different issues are witnessed while planning, implementing, controlling, and managing various IT services. Thus, the proposed high-level ITSM framework was designed and developed to address those listed issues. The proposed high-level ITSM framework is presented as follows:

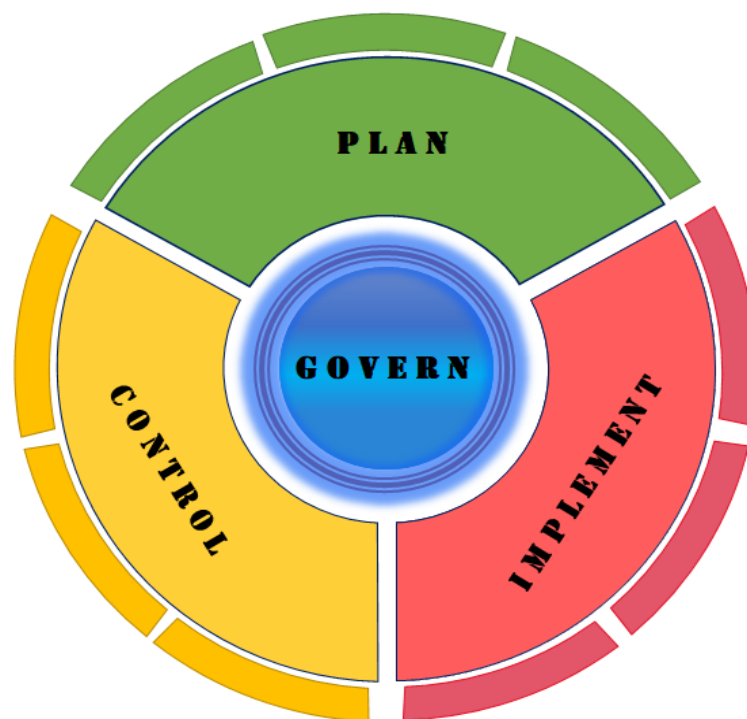


Figure 5.4. The proposed high-level ITSM framework

Plan: the planning phase is responsible for crafting high-level strategic plans and managing resources that are aligned with the business objectives of the company and customer needs.

Implement: the implementation phase focuses on designing and deploying different kinds of IT services. It performs several IT projects as per the strategic plan and then delivers to the operation team.

Control: it manages and controls every IT services throughout the lifecycle. The component preserves the service value throughout the service control lifecycle. It maintains and operates various services. It is the core of the division since a single point of failure will impact the overall service delivery and quality. It provides proactive service management rather than reactive. (Jäntti, 2016) stressed that IT service provider organizations should divert their focus from proactive problem handling to reactive service management. Various service issues are handled within a given service level agreement or metrics.

Govern: it examines the service management activities and controls the structure of the proposed framework. It also secures the overall service management by employing various security policies. It integrates the framework with other IT governance frameworks of the organization. It stays up to date with the current business demand and changes through time to answer the dynamic telecom environment. It checks the health status of every service and reports back to the planning phase.

Each of the phases has interlinked service components. The phases and service components are interconnected with each other. Based on the rigorous data analysis and findings, the proposed low-level framework was designed and developed to address the ITSM activities of the organization in detail. It presented the ITSM activities that should be performed on a daily basis. The activities are derived from the research findings and then strengthen by incorporating the concepts of ITIL-based ITSM frameworks. The proposed low-level ITSM framework has 14 service components. The service components are formulated by incorporating mature ITSM processes and functions. These are IT and network security management, incident management, change management, service desk, service plan, service deployment, and service delivery. Then, additional components are designed, and developed. Specifically, incremental improvement, customer care, business-IT alignment, service excellence, customer care, service quality, organizational learning, and performance analytics and dashboard are among the newly designed and developed service components. Furthermore, major redesign activity is performed on the

remaining ITSM processes and functions. The proposed low-level ITSM framework is presented as follows:

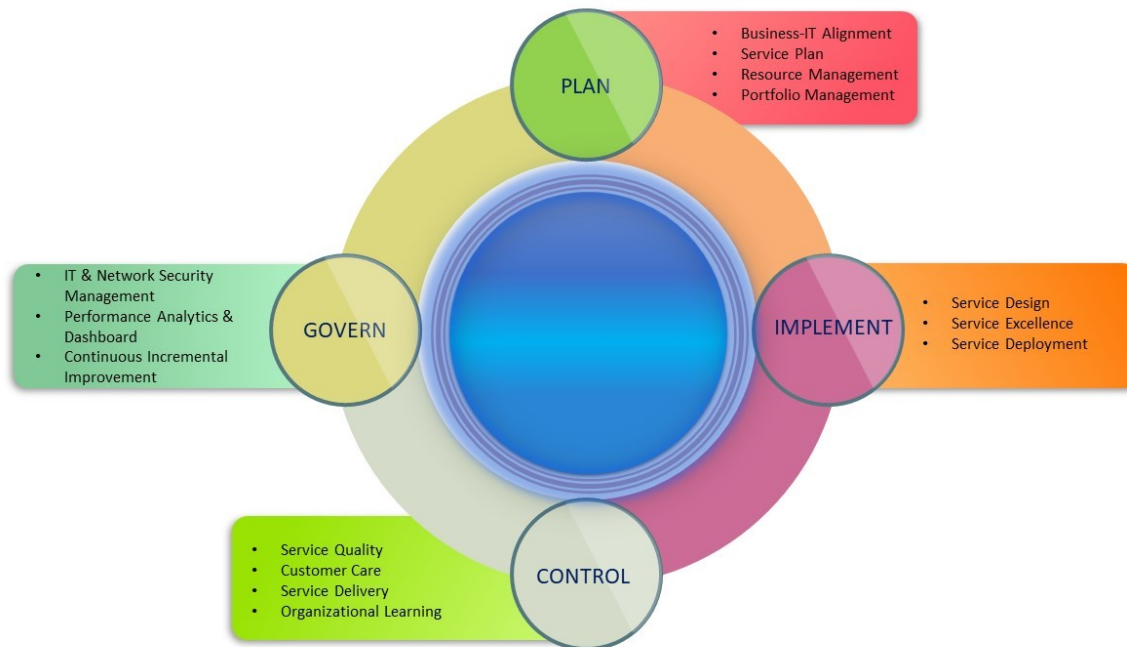


Figure 5.5. The proposed low-level ITSM framework with service components

Plan: It comprises four basic service components and they are explained as follows:

- **Business-IT alignment:** it checks and facilitates how much the company is executing its daily activities based on the company’s business objectives and customer needs. It bridges the gaps that are seen with the IT function and the business. According to (Gray, 2006) The alignment of IT with the business is one of the reasons that organizations should consider while implementing frameworks and standards. The following are the activities that are performed within the service component
 - ✓ Check and monitor whether the IT is used as a business entity
 - ✓ Review every service whether they are in line with the company’s business objective and customer needs
 - ✓ Prepare the IT roadmap of the division
 - ✓ Report the general activities of the division to higher officials
 - ✓ Discuss and improve business and IT requirements with other stakeholders and partners
 - ✓ Learn the experience of other IT service providers and build a strong relationship

- ✓ Perform business analysis on a monthly, quarterly, and yearly basis
- ✓ Prepare and monitor vendor management plans
- ✓ Prepare emergency service management plans and monitor their activities
- **Service plan:** it plans a high-level and detailed strategy. It also crafts several metrics and measurements according to the requirements of the services. The plan is open for review based on feedback from different stakeholders. The following are the activities that are performed within the service component
 - ✓ Develop a high-level strategy of the division
 - ✓ Develop a detailed service plan of the division
 - ✓ Review and monitor whether the service plan is aligned with the strategic plan of the organization
 - ✓ Improve the service plan throughout the lifecycle to achieve the dynamic business demand, customer need, and technological advancements
 - ✓ Craft and update various measurements and metrics for every service to evaluate their performance and then update or modify the services
- **Resource management:** the tangible and intangible resources should be well managed, recorded, and audited since they are the values of the division. Resources can be infrastructures, human power, knowledge, assets, and others. It also addresses different budgets or financial activities, IT investments, and capitals that help to execute service management functions. It performs an inventory of all the IT services throughout the lifecycle. The component also records and reviews every service resource on a monthly, quarterly, and yearly basis. The following are the activities that are performed within the service component
 - ✓ Develop effective resource utilization planning mechanism
 - ✓ Manage human and non-human resources effectively and efficiently
 - ✓ Record every asset of the division on the central resource repository
 - ✓ Review and monitor whether the resources are in line with the service plan and strategic objectives of the organization
 - ✓ Develop detailed financial statements of the division
 - ✓ Utilize the budgets of the division effectively
 - ✓ Audit the resources of the division on a monthly, quarterly, and yearly basis
 - ✓ Determine and manage the supply and demand needs daily

- ✓ Determine and report the profits and losses of the division to the management and stakeholders
- **Portfolio management:** it manages several sub-portfolios, projects, and programs. It helps to achieve the organization's strategic plans. The following are the activities that are performed within the service component
 - ✓ Centrally manage different kinds of projects and programs
 - ✓ Work together with various partners for successful project completion
 - ✓ Check whether the projects or programs are aligned with the strategic plans
 - ✓ Assign project or program leaders and coordinators
 - ✓ Specify project teams and outline their tasks
 - ✓ Prepare and update project charters and proposals
 - ✓ Prepare and deliver various project handling guidelines, policies, and procedures
 - ✓ Participate and provide valuable inputs in auctions, project reviews, and meetings
 - ✓ Report and discuss the status of every project to the management daily

Implement: It comprises three basic service components and they are explained as follows:

- **Service design:** it designs the overall services or products. It acts as the blueprint for service architecture. The following are the activities that are performed within the service component
 - ✓ Craft high-level and low-level design for internal and external services
 - ✓ Develop, enhance, update, and manage system requirements
 - ✓ Integrate business and system requirements
 - ✓ Incorporate user feedback while designing and improving the services
 - ✓ Enhance and design new and current services in a cost-effective manner
 - ✓ Manage and control the overall service architecture
 - ✓ Prepare and update service design documentation, and guidelines
 - ✓ Incorporate state of the art technologies and customize it with the business need of the organization
- **Service excellence:** it builds, customizes, and tests the services, systems, or products iteratively. It integrates user feedback from related components and incorporates them while developing the services. It acts as a center of innovation and excellence for the division by developing various IT systems (software and hardware). It is also termed as a

research and development center. The following are the activities that are performed within the service component

- ✓ Develop new services, IT functions, modules, or components based on the requirements or customize adopted systems
 - ✓ Modify, analyze, and adjust the current services through rigorous research
 - ✓ Validate and test the services for their compliance with the required settings
 - ✓ Improve every service with current business demand, customer need, and technological advancements iteratively
- **Service deployment:** it implements the service or products as per the service plan. It validates and tests the services throughout the deployment phase. It also delivers documents that help to manage and control the deployed services. It also transfers knowledge to operation teams after successful service testing. The following are the activities that are performed within the service component
 - ✓ Deploy newly developed services and customized functionalities based on the local context
 - ✓ Validate and test the services rigorously to know whether they meet the objectives
 - ✓ Record and report every challenge that has occurred during the implementation phase
 - ✓ Prepare different service management documentation, guidelines, and principles
 - ✓ Provide training for staff who will manage the services

Control: It comprises four basic service components and they are explained as follows:

- **Service quality:** a given IT service should be quality based while delivering to internal and external customers. Quality of service will be achieved through extensive work with various stakeholders. It evaluates and manages several service changes whether they are performed in accordance with the plan or not. As per (Cronholm & Salomonson, 2014) findings, better service quality can be achieved with continuous customer interaction. The following are the activities that are performed within the service component
 - ✓ Control the quality of service throughout the lifecycle
 - ✓ Provide, manage, analyze, and report service issues and then log them into the service repository that came from various stakeholders
 - ✓ Manage, evaluate, and record various service changes
 - ✓ Employ state-of-the-art service quality enhancement technologies

- ✓ Propose and determine service improvements based on the request from stakeholders and analysis findings
- ✓ Incorporate user feedback and system reviews
- ✓ Control and manage the service continuity and availability throughout the lifecycle
- **Customer care:** customers are the backbone of any service provider organizations. Thus, in order to understand and examine the feelings of the customers, a given component is required and should be combined with other components. Different kinds of mechanisms will be used to gather customer feedback and complaints, and these are virtual call centers, surveys, prototype tests, and service or product promotional discounts. (Cronholm & Salomonson, 2014) argued that IT service providers should consider customers' if they want to enhance their business demand. The following are the activities that are performed within the service component
 - ✓ Facilitate different mediums to gather customer needs, desires, and feedbacks
 - ✓ Provide a platform for a provision, maintenance, and support of services through a call center, social media, and other methods
 - ✓ Provide various short-term and long-term discounts on some services
 - ✓ Craft different schemes to sustain and create loyal customers
 - ✓ Build a strong relationship with various suppliers and partners
 - ✓ Record and incorporate customer views throughout the lifecycle
 - ✓ Build a strong brand and relationship within the local community through several mechanisms
 - ✓ Develop marketing and customer management schemes
 - ✓ Communicate planned and unplanned service outages through various mediums
 - ✓ Assess the needs, and feedbacks of customers, partners, or suppliers through surveys
- **Service delivery:** the final tested service will be delivered to internal and external customers. The service should not be interrupted, and proactive maintenance will be employed to check its availability. It also manages the service and operational level activities within and across the division. It is the place where the works of the division will be tasted and valued by its customers. According to (Timothy, Egena, & Richard, 2017) findings, a better service delivery that goes with and beyond customer expectations helps customers to remain with their service providers. The following are the activities that are performed within the service component

- ✓ Deliver services to internal and external customers 24 Hours and 7 days a week
- ✓ Provide support for internal and external customers
- ✓ Maintain, manage, and report the service activities proactively
- ✓ Utilize the ITSM and system supporting tools for effective service management
- ✓ Handle incidents and disasters with the shortest recovery time as possible
- ✓ Prepare high-level and detailed incident, event, problem, and disaster management plans
- ✓ Prepare and log RCA (root cause analysis) report for any incidents, problems or events or disasters
- ✓ Manage and administer every IT infrastructures, applications, and other IT systems
- ✓ Employ analytics to exploit the root cause of incidents, problems, events, and disasters
- ✓ Provide a platform for effective vendor management for on-site and off-site support
- **Organizational learning:** it helps to facilitate the knowledge (tacit and explicit) management within the employees of the division. Moreover, it provides a centralized system to learn each activity of the services. It also records every additional information in the repository and provides theoretical and hands-on training for its employees. (Özen, Karagöz, Chouseinoglou, & Bilgen, 2013) indicated that IT organizations should create strategies for managing the existing and new knowledge and Thus, it helps to improve the ITSM practice within the organization. The component is adaptive enough to handle organizational changes that impact the employees of the division either positively or negatively. The following are the activities that are performed within the service component
 - ✓ Prepare, update, and manage training documentations, modules, knowledge management repositories
 - ✓ Deliver hands-on training continuously for new and former employees
 - ✓ Manage and adapt organizational changes and technological advancements
 - ✓ Facilitate different kinds of training delivery platforms
 - ✓ Prepare and update roles and responsibilities for each service component owners
 - ✓ Take a lesson on every change and use the opportunity to build an organizational memory

Govern: It comprises three basic service components and they are explained as follows:

- **IT and network security management:** the service should be well secured starting from the initial design phase up to the service delivery. A single security breach will impact unexpected service interruption, customer dissatisfaction, and bad company reputation. Hence, security should be the main concern in the overall service life cycle and should be updated with the dynamic cybersecurity environment. Furthermore, it comprises access control related system controlling mechanisms. As per (Addy, 2007, p. 70), IT service providers should employ the necessary service security measurements to protect the organization, employees, and customers. The following are the activities that are performed within the service component
 - ✓ Prepare, customize, and implement security policies and technologies
 - ✓ Control, monitor, and evaluate the security activities of every IT systems at a daily, monthly, quarterly, and yearly basis
 - ✓ Investigate, report, record, and solve security breaches and frauds
 - ✓ Educate the employees of the division on various security issues
 - ✓ Validate, test, and log every IT equipment and systems before and after their deployment for security reasons
 - ✓ Take corrective measurements on staff who are caught in security breaches and frauds
- **Performance analytics and dashboard:** it provides and reports up to date, online, and comprehensive service information to the concerned department or management. It includes analytical methods and techniques to identify hidden concepts and to maximize division performance. (Addy, 2007, p. 42) strengthen that a performance dashboard helps a user to get the current information and to gather a specific topic. The following are the activities that are performed within the service component
 - ✓ Provide up to date report for the management of the division and stakeholders
 - ✓ Implement analytics to find hidden patterns and predict future insights
 - ✓ Support the management for concrete managerial decision
 - ✓ Asses, deliver, record and report the overall performance of the IT systems centrally
 - ✓ Collect the health status of every service daily and deliver the report to responsible departments
- **Continuous incremental improvement:** the services should be improved continuously with the necessary input from different service components. It also adds new components or removes outdated components or redesign components based on the collected data. The

overall activity is performed with the concept of the PDSA technique. The technique provides much focus to study the case and provides a long-lasting solution rather than controlling the issue. Furthermore, this service component manages, controls, adjusts, and changes the structure of the proposed framework. It evaluates the performance of other service components on a monthly, quarterly, and yearly basis through a customized measurement or metrics. The following are the activities that are performed within the service component

- ✓ Implement the technique of PDSA while improving the service components and the phases
- ✓ Implement the agile SDLC methodology while improving the service components and the phases
- ✓ Continuously improve the service components and the phases in relation to organizational changes, business need, customer requirement, and technological advancements
- ✓ Continuously enhance various IT services and fine-tune new service increments throughout the lifecycle
- ✓ Control, manage, and customize the framework and record every change
- ✓ Record the configuration of every service components and services in the service repository
- ✓ Evaluate each service components and adjust the status based on the result
- ✓ Employ up to date measurement methods and metrics that will be used to evaluate the performance of the service components and phases
- ✓ Implement several ITSM tools for service automation then check, and modify them accordingly

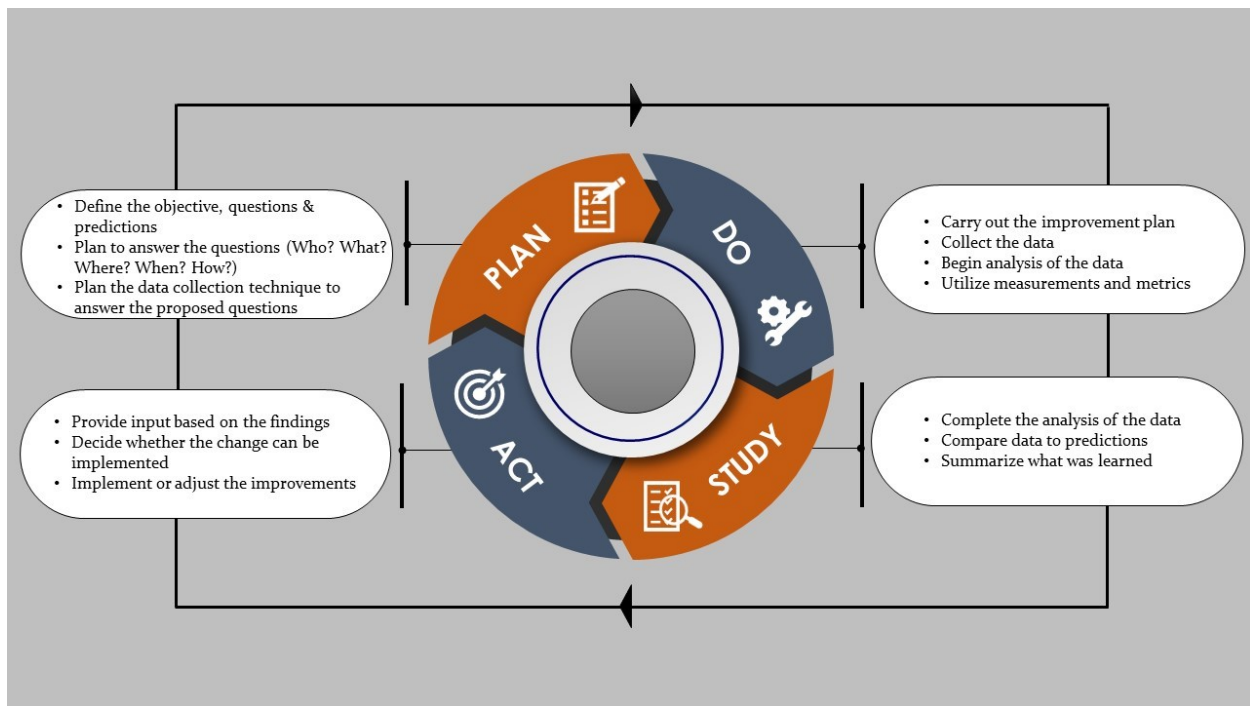


Figure 5.6. Continuous incremental improvement with PDSA technique

5.4. Demonstration of the Proposed Framework

According to (Peffer et al., 2007) the aim of the demonstration is to show how to solve a problem by introducing effective knowledge. It can be demonstrated through experimentation, simulation, case study, proof, or other different methods. Moreover, the demonstration can be taken as a proof of concept, which shows how much the IT artifact is in harmony with the research process.

The proposed framework was demonstrated to the respondents of the research study and selected ISD staff through the agile SDLC methodology pictorially. The selected staff were chosen based on their deep knowledge of the subject matter. The staff provided several comments that should be incorporated into the proposed framework. Furthermore, (Gregor & Hevner, 2013) affirmed that the outputs of the DSR are presented as an artifact and evaluated iteratively.

5.5. Evaluation of the Proposed Framework

As per (Gregor & Hevner, 2013) argument, evaluation of the artifact should be evaluated based on certain criteria and these are validity, utility, quality, and efficacy. On the contrary, (Peffer et al., 2007) indicated that evaluation could take many forms based on the problem of the research and artifact. Moreover, the researcher can rigorously evaluate the artifact to improve the framework. (Hevner et al., 2004) emphasized that evaluation of the artifact not only helps to improve the

quality of the product but also the research design process since it is iterative and incremental activity. They also noted that evaluation of IT artifacts can also be evaluated based on their functionality, completeness, consistency, accuracy, performance, reliability, usability, fitness with organizational need, and other pertinent characteristics.

The researcher employed an expert evaluation method to evaluate the proposed framework through qualitative and quantitative approaches. In connection with, two evaluation models were adapted to facilitate the evaluation activity. ISO/IEC 25010:2011 ‘quality in use’ model was used to evaluate the proposed framework qualitatively in terms of effectiveness, efficiency, satisfaction, freedom from risk, and context coverage. Additionally, the model of (Prat et al., 2014, 2015) was applied to evaluate the framework quantitatively in terms of goal, environment, structure, activity, and evolution.

Three respondents are picked to evaluate the framework in a separate interview session. In addition, eight respondents that were involved during the interview session are participated to evaluate the framework through a survey method. Besides, four participants whose work is related to the phenomenon took part in the survey evaluation. This helps the researcher to gather the feedback of external users besides those who are involved during the interview session and reinforce the evaluation. In general, 15 participants were involved in the evaluation process.

Participant Description	No. of Participants	Evaluation Method
Previous interview respondents	3	Semi-structured interview
Previous interview respondents	8	Survey
External users of the division	4	Survey
Total	15	

Table 5.1. Participant classification for the proposed ITSM framework evaluation

As per the qualitative evaluation results, the respondents indicated that some service components should be included like lesson learning from incidents. This component helps to improve the system before a big impact occurs soon. The respondents also informed that the proposed framework should be inclusive, complete, and contextual. As per their feedback, the proposed framework should solve the current and future problems. Thus, the framework is expected to be flexible and adaptable to various internal and external changes. Subsequently, the respondents stressed that service quality and customer satisfaction should be the central points in the proposed framework.

The respondents informed that human power and other valuable resources should not be omitted since effective resource utilization helps the division to achieve its objective. The respondents contended that the proposed framework can be helpful and applicable if the previously mentioned comments are incorporated. The feedbacks of the respondents that are collected during the evaluation session are included to enhance the proposed framework.

On the other hand, the evaluation survey was undergone through a Cronbach’s alpha test to check the reliability or internal consistency of the instrument before conducting the actual evaluation. Based on that, the survey achieved a value of ~ 0.92 (approximately) which means that the question items have high collinearity, redundancy, and interrelation to measure the same concept or construct. According to (Tavakol & Dennick, 2011) findings, A high value of Cronbach's alpha (>0.90) indicates redundancy and less measurement error.

Reliability Statistics	
Cronbach’s Alpha	N of Items
.922	23

Table 5.2. Reliability statistics for the evaluation survey

A total of 23 question items were used to evaluate the proposed framework through a Likert scale data measurement technique and then those interval scale items are grouped into five basic categories. The researcher used the mean value to know the central tendency of the framework. This is because it incorporates the same score from every subject, (McHugh, 2003). The final survey evaluation result showed that the framework achieved an aggregate value (mean of the mean) of ~ 4.12 (approximately). Consequently, the results of the categorical variables which are used to evaluate the framework are above 4. This entails the respondents agreed that the framework fulfilled the requirements of goal, environment, structure, activity, and evolution. Moreover, to achieve the maximum benefit of the framework improvement areas are also noted from the survey evaluation.

Descriptive Statistics					
Evaluation Criteria	N	Minimum	Maximum	Mean	Std. Deviation
Goal	12	3.50	4.75	4.0625	.41458
Environment	12	3.00	5.00	4.0278	.54045
Structure	12	3.40	5.00	4.2167	.55569
Activity	12	3.67	4.67	4.1250	.28538
Evolution	12	3.60	4.80	4.1167	.38573

Total score of the framework	12	3.70	4.57	4.1196	.32910
Valid N (listwise)	12				

Table 5.3. Descriptive statistics for the evaluation survey

Lastly, the overall evaluation result indicated that the proposed framework is efficient to address the current ITSM gaps of the division despite the gaps that should be undertaken continuously.

5.6. The Proposed Framework Versus ITIL-Based ITSM Frameworks

The proposed framework tried to answer basic points academically that are not addressed before. The proposed framework can be considered as one of the academic outputs since most of the well-known ITSM frameworks are the results of the industry. The framework tried to answer what, when, who, and how to do the service management activities. On the contrary, ITIL tried to answer what to do whereas MOF answers what and how to do the activities. HP ITSM includes when and where to do.

The research study of (Tadesse, 2017) tried to answer the process side of ITIL and tailored most of the processes. The author only viewed ITIL from the process perspective rather than combining both the processes and functions together. However, this proposed framework gives much concern to both the processes and functions of ITSM and then assumed that both elements should be combined to achieve better performance. Most of the scholars that are discussed under the subsection of related works within chapter two, gave greater concern to single or multiple processes rather than combining processes and functions. Through the empirical data, the researcher observed that within a given function; other processes are utilized to facilitate the day to day ITSM practices of the organization.

The proposed framework combines three basic techniques, methodology, and model whereas the other ITIL and ITIL-based ITSM frameworks still consider PDCA as their central technique. Furthermore, the proposed framework is adaptive to internal and external changes. It will change its overall form to accommodate technological advancements and customer needs. It can fit itself with the changing telecom and business environment. Thus, it has a dedicated phase that will monitor and manage its structural changes.

The proposed framework not only improves itself continuously but also adds new changes both horizontally and vertically. Incremental continuous improvement helps to adapt to the dynamic telecom environment, customer needs, and technological advancements. It also helps the company

to be prepared and equipped for various internal and external factors that will have a major influence on the business.

In the proposed framework, the processes and functions go hand in hand, and thus, they are termed as service components. The proposed framework has fourteen service components; however, these are called processes or functions in ITIL 2011. The service components are interconnected with each other and they are also interlinked with other service components across the phases. It has four phases and each of the phases are interconnected. On the contrary, ITIL V3 is built on 26 processes within five service lifecycle stages. Additionally, it has four basic functions.

The proposed framework introduced three types of repositories that work parallelly with each other. The first is the service repository, which logs any kinds of system issues, user feedback, and service performance, and system information. The second is a resource repository, which records any resources of the division, business-IT plans, and high-level strategies, and different agreements. The third is a knowledge management repository, that records training documentation, organizational structures, frameworks, and governance documents, and also manages other portals. However, ITIL and ITIL-based frameworks did not indicate the purpose of repositories in their frameworks.

The proposed framework also incorporates the RACI matrix or model. It helps to classify the roles and responsibilities of each team. Moreover, it shows what kind of activities that will be executed by the assigned teams within each of the service components and phases. Working as a team on each task helps to have good communication, coordination, knowledge transfer, and quick delivery of assignments. On the other hand, ITIL V3 and other ITIL-based frameworks give prior concern for individuals than teams.

5.7. RACI Matrix for the Proposed Framework

The proposed framework explicitly listed the activities that will be performed in each of the phases and service components. However, the structure of the framework will change depending on the internal and external factors besides adopting the Agile SDLC methodology. Hence, those listed activities within the framework are subject to this change. The proposed framework answers four basic questions and these are:

- **What to do:** lists activities that should be done within the phases and service components

- **When to do:** indicates that activities should be performed continuously but indicates the initial activity should start from the planning phase
- **How to do:** provides general guiding principles and high-level ITSM framework to do every service management functions
- **Who will do:** provides a high-level RACI (Responsible, Accountable, Consult, and Inform) matrix

The first three of the questions are already explained in the previous subtopics of the chapter. The last question involves assigning a task for a team or person, which is achieved by using the RACI model. The model helps to assign roles and responsibilities. It is also termed as a responsibility matrix. According to Adam (2018),¹⁷ the model or matrix indicates explicit responsibility and accountability within ITSM. The author also stressed that the matrix should be updated based on the ongoing changes in the organization. The proposed framework gives greater concern for teamwork and collaboration. Therefore, the researcher assigns basic tasks for teams to get fruitful and enhanced functions. The manifesto of agile SDLC methodology also supports this argument. (Lalband & Kavitha, 2019; Sharma et al., 2012) stressed that agile SDLC methodology encourages working in pairs or teams for delivering a product with the shortest possible time and to incorporate insights of experts.

According to David (2013)¹⁸, the RACI matrix has four levels of accountability and they are explained as follows:

- **Responsible:** the person is assigned to execute and deliver a specific task. He/she is also responsible to provide support or assist, and resources to other stakeholders. In addition, they are responsible to complete the assigned job appropriately.
- **Accountable:** the person is accountable for the task that he/she has been assigned for and they are accountable for its completion and correctness. They also approve or sign off on a task. Additionally, they can also delegate work to those who are responsible for it.
- **Consult:** the person provides his/her opinions, reviews, and consultation based on their deep knowledge of the domain. They are not directly involved to do the task, but they will be consulted by other people who execute tasks.

¹⁷ <https://www.axelos.com/news/blogs/june-2018/how-important-is-itils-raci-matrix-in-itsm> Accessed June 24, 2020

¹⁸ <http://www.bawiki.com/wiki/Responsibility-Matrix.html> Accessed by June 24, 2020

- **Informed:** the person is not actively involved to perform the tasks, but they are being informed by other members about the status of the activities. They also get the final deliverable from the tasks.

The tasks that will be performed by the employees are classified into four basic categories after analyzing the current structure of the division and these are:

- **Teams:** are employees who execute the activities within their section or department
- **Manager:** is an official who manages his/her section or department
- **Coordinator:** is an employee who facilitates the activities within and across his/her section or department. He/she also organizes the teams within his/her section.
- **Expert:** is a skilled employee who has deep knowledge of a specific domain

Having this in mind, the researcher produced a high-level RACI matrix which is described in detail in **Appendix I**. The matrix should be updated whenever there are changes in the organization and the proposed framework. The matrix is aligned with the concept of both Agile SDLC methodology, PDSA technique, and the current structure of the division. In the matrix, every employee is actively involved throughout the lifecycle. The employees are not confined within a limited section rather they have excessive freedom to do their work within and across the boundary. Thus, the division can get an enormous benefit from its employees and then achieve its business objectives. Furthermore, it maximizes the agility of the division’s structure along with the working environment. A sample RACI matrix of the proposed framework is shown below.

High-level RACI matrix for the proposed framework																	
Service Components	Task Description	Plan				Implement				Control				Govern			
		Teams	Manager	Coordinator	Expert	Teams	Manager	Coordinator	Expert	Teams	Manager	Coordinator	Expert	Teams	Manager	Coordinator	Expert
Business-IT alignment	Check and monitor whether the IT is used as a business entity	R	A	I	C						R	I	C				
	Review every service whether they are in line with the company’s business objective and customer needs	R	A	I	C						R	I	C				
	Learn the experience of other IT service providers and build a strong relationship	R	A	I	C						R	I	C				
	Prepare and monitor vendor management plans	R	A	I	C						R	I	C				
	Prepare emergency service management plans and monitor their activities	R	A	I	C						R	I	C				
	Prepare the IT roadmap of the division	R	A	I	C						R	I	C				
	Report the general activities of the division to higher officials		R,A	I	C						R	I	C				
	Discuss and improve business and IT requirements with other stakeholders and partners	R	A	I	C						R	R	C				
	Perform business analysis on monthly, quarterly, and yearly basis	R	A	I	C						I	I	C				

Figure 5.7. High-level RACI matrix for the proposed ITSM framework (Sample)

5.8. Chapter Summary

This chapter proposed the ITSM framework based on ITIL best practices. It also incorporated several kinds of techniques, methodologies, and models. Besides, the empirical data findings were included in the proposed framework. The framework had been designed and evaluated iteratively until a mature framework was produced. The proposed framework was presented to the respondents of the research study and selected ISD staff who are assumed to have a better understanding of the subject matter. In the middle of this, respondents had been asked various questions to know their perspectives of the proposed framework. Then, the proposed framework was evaluated quantitatively and qualitatively through well-known evaluation models. The model had been modified to include important elements that help to evaluate the proposed framework holistically. After addressing the comments and evaluation results, the final framework was produced.

RACI matrix for the proposed framework was also proposed to show the roles and responsibilities of the employees or teams within or across the phases. The framework had four phases and fourteen service components that were interlinked with each other. The proposed framework would be updated continuously based on internal and external factors. These are organizational changes, business objectives, customer needs, and technological advancements.

Finally, the unique characteristics and similarities of the proposed framework against other ITSM frameworks, more specifically the ITIL and ITIL-based ITSM framework was explained in detail

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1. Overview

This chapter summarizes the results of the research study in relation to the research questions and objectives. It proposes activities that should be performed by practitioners within the division. Additionally, it recommends future and related research works that should be addressed by fellow researchers in the domain.

6.2. Results and Conclusion

The purpose of the research study was to design and develop the ITSM framework for Ethio telecom based ITIL best practices. The ITIL best practices were used as a benchmark since the division slightly implemented some of the processes and functions. Furthermore, the researcher aimed at improving the current ITSM usage of the division to enhance the service quality and maximize customer satisfaction.

The researcher reviewed different kinds of literature to identify the research gaps within the domain. In addition, the literature is used to formulate theoretical and conceptual settings. Design science research methodology was employed to design, develop, and evaluate the proposed framework rigorously. Moreover, a qualitative approach was implemented to collect data from knowledgeable employees of the organization. It was also used to analyze the data back and forth until a given saturation was reached.

The proposed framework was built through continuous development and evaluation activities. It is also demonstrated pictorially to knowledgeable and experienced employees of the organization. Additional techniques, models, and methodologies were adapted to enhance the proposed framework. A high-level RACI matrix was prepared to show the roles and responsibilities of the employees of the division within and across the service components and phases. The matrix was developed to increase the agility of the organization activities, improve the working environment, and maximize the abilities of the employees by providing absolute freedom. Hence, the matrix gave great concern for teamwork and collaboration within and across the service components and phases. As per the qualitative and quantitative evaluation results, the proposed framework addressed the basic ITSM practices of the company despite the gaps that need improvement.

The researcher assessed the existing ITSM activities through a semi-structured interview together with an assessment model. Additionally, the research findings are also supported by the company's documents and the researcher's physical observation. Thus, the results of the research study are presented by answering the research question (RQ)s as follows:

RQ1: What is the current status of ITSM practice in Ethio Telecom?

According to the research findings, some ITSM processes and functions are utilized very well and the others still need major improvement. Among the processes; incident management and change management are sufficient enough to handle the current IT services. The service desk, one of the ITSM functions, is well-practiced. On the contrary, transition planning and support, knowledge management, supplier management, and seven-step improvement processes are not implemented in the division. The remaining processes and functions are relatively utilized but need a major redesign.

The research findings indicated that there is a gap to align the business objectives with the current IT services. The pillars and themes of the business objectives of the organization are not addressed in the current ITSM practices. It asserted that improper management of the IT services will create a negative impact on customer satisfaction, and quality service delivery.

The findings of the research study showed that there is a need for an agile-based organizational structure to accommodate the dynamic telecom environment. It helps to sense and respond to the competitive market while delivering various IT services to the customers.

The research results disclosed that the employees of the organization who utilized the ITSM do not have sufficient knowledge of the subject matter. Moreover, employees should be well informed about their roles and responsibilities while managing various IT services.

The research findings showed that some procedures are crafted and updated but they are not pursued accordingly. Hence, the procedures should be adjusted and mapped with the objectives of ITSM.

As per the research findings, service activities are not measured or monitored on a daily basis. Thus, there should be a mechanism that should check and evaluate the status of ITSM practices.

The research findings exposed that after the project completion and service handover; the operation teams get difficulty while handling the IT services. This is due to a lack of service management

documents, service integration, and insufficient training. Moreover, improper service validation and testing activities impacted the service operation jobs.

The results of the research study showed that there is reactive service management due to insufficient training, improper tools, unavailability of the service manual, dependency on the vendor. Therefore, proactive service management should be practiced to handle repetitive service interruptions by solving the previously listed issues. Additionally, solving those issues will help to ensure the quality of the IT services, and sustainable service delivery.

Furthermore, the research results showed that there is improper service planning. As a result, resources are wasted and expired before their end of life period, and customer demands are not fulfilled.

Additionally, improvement areas are identified to redesign, develop, and update the current ITSM practices in relation to the objectives of the organization.

RQ2: What ITSM Framework can best fit Ethio telecom based on the ITIL best practices?

The proposed framework incorporates the findings that are being identified previously. Furthermore, the findings of the research study indicated that the improvement areas that are identified previously should be included and addressed in the proposed framework. Thus, to solve the challenges of the current ITSM practices, the proposed ITSM framework was designed and developed. Besides, the proposed framework is believed to improve and maximize the ITSM practices of the organization.

According to the findings of the research, the proposed framework incorporates improved processes and functions, and also new service components. The processes and functions which are well-practiced are just included without performing any major adjustments whereas the remaining processes and functions are modified to fit the needs of the organization.

The proposed framework is organized into four phases which are plan, implement, control, and govern. The framework is managed and controlled by the govern phase. Each of the phases has its service components. Among the service components, business-IT alignment, service excellence, customer care, service quality, organizational learning, and performance analytics and dashboard are the newly introduced service components. IT and network security management, incident management, change management, service desk, service plan, service deployment, and service delivery are included without any major adjustment. On the other hand, the remaining service

components are redesigned and improved to fit the needs of the organization. Additionally, the proposed framework tried to include the pillars and themes of the business objectives of the organization.

The proposed framework indicated the activities that each service component should perform. The activities are derived from the research findings and then reinforced by incorporating the concepts of other ITIL-based ITSM frameworks.

Three basic repositories are included in the proposed framework. These are service, resource, and knowledge management repositories. The repositories help to log and record various ITSM activities. Due to this, the organization and the employees can get service documentation easily, refer to prior activities, enhance lesson learning, improve knowledge management, and increase organizational memory.

The proposed framework combines people, technology, organization, and process. Then, it added a new concept called integration, that will harmonize those listed ITSM components together.

Furthermore, the proposed framework incorporates the RACI matrix to demarcate the roles and responsibilities of the employees who utilize ITSM. It promotes teamwork and collaboration throughout the lifecycle to enhance the daily ITSM activities.

Last but not the least, the proposed framework can be taken as an improved solution to address the long-lasting ITSM issues of the organization, specifically in ISD. In addition to the empirical data, it also incorporates state of the art concepts to go in line with the dynamic business and telecom environment. Besides, the proposed framework promotes operational excellence, cost-effective service management, customer-centricity, and quality service delivery.

Taking this into account, the researcher argued that ITSM frameworks should be designed, developed, or customized based on the context of the given organization. Otherwise, adoption or implementation of the whole or some parts of a given ITSM framework without any firm consideration of the existing phenomena will have an enormous negative impact on the organization.

6.3. Recommendation for Practice

The findings of the research study provide support and direction for the employees of the division in their daily activities. The proposed framework states a general guiding principle for managing

the services that the division is delivering to its customers. It can be used as a top-level framework to manage, control, monitor, and update the ITSM of the organization. Moreover, it lists specific activities that will be performed in each service component.

The proposed framework incorporates the RACI matrix to show the roles and responsibilities that the employee will have within and across the phases and service components. The framework encourages teamwork and collaboration throughout the lifecycle. Hence, the active involvement of every employee as a team is required to achieve the intended objectives of the organization or division. Teamwork and collaboration help to build a strong commitment and a sense of ownership.

According to the evidence of the research findings, there is a knowledge gap. Hence, the organization is responsible to provide continuous training for every employee of the company. A well informed and trained staff helps to provide and manage the IT services efficiently and effectively. Furthermore, the company should facilitate various mechanisms for successful knowledge management and organizational learning trends. Furthermore, the division should develop and manage various repositories for successful resource utilizations.

As per the results of the research, the ISD is responsible to perform a continuous service improvement activity. Due to this IT services will be improved, redesigned, and developed throughout the lifecycle. If the organization follows the service improvement task strictly, sound service delivery and satisfied customer will be achieved. Furthermore, the organization can sustain the quality of IT services. The organization should also employ a measurement technique to evaluate and improve the performance of IT services.

The empirical findings showed that the organization should align the business and IT throughout the lifecycle of the ITSM. If there is a gap between the two elements, the organization will lose its competitive advantages. Thus, the organization should regulate business-IT alignment daily.

The research findings illustrated that agility helps to keep the organization up to date with the dynamic telecom environment. The organization should align its agile structure with the overall ITSM activities and vice versa. Furthermore, the organization should be well prepared and adaptable enough to accept the challenges and prospects of the competitive world. Hence, the organization should sense and respond as quickly as possible while providing IT services to its internal and external customers.

6.4. Recommendation for Future Research

The research study has added an important body of knowledge for the domain area. Nevertheless, it leaves additional settings to explore and investigate the subject matter. Hence, future works should consider the following potential research areas that are not addressed by the research study.

- This research study focuses on a few knowledgeable and experienced IT professionals and did not incorporate the perspective of other employees of the division. Accordingly, it is better to combine the perspective of both sides to get the full picture of the area under study
- This research study is specific to a single case company and specifically a telecom industry. Thus, future studies should be conducted in various environments to prove and examine the research findings. Consequently, it helps to find additional knowledge in different research settings.
- This research study employed a design science research methodology and qualitative research as an approach. It is important to incorporate additional research methodologies to yield concrete research findings and a holistic picture of the phenomenon.
- This research study used ITIL V3 as its benchmark to design and develop the ITSM framework for Ethio telecom. However, it will be better to include well-known and validated ITSM frameworks to acquire the maximum benefit from the proposed framework.

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APPENDICES

Appendix A: Semi-structured Interview Guideline with Matrix

Dear respondent,

I am conducting research that aims to design and develop an IT Service Management framework based on the ITIL best practices for Ethio telecom, as part of the partial fulfillment of the master's degree in Information Systems, at Addis Ababa University.

Information Technology (IT) is playing a substantial role in different organizations. In past times, a lot of IT organizations concentrated on technical activities but nowadays the IT organizations are shifting towards providing high-quality services. One of the IT organizations that use IT as their key asset for their business transaction is the telecom sector. IT service provider organizations are engaged in improving their IT support processes by introducing various IT management frameworks. IT Service Management (ITSM) is a discipline for managing IT systems, which gives prior emphasis to customer satisfaction and quality of IT service delivery.

Ethio telecom as one of the service providers is in a struggle to provide quality IT services and satisfy its customers. Thus, to investigate the current ITSM practices of the company the researcher employed a semi-structured interview. The interview will be conducted with knowledgeable and experienced employees of the company more specifically with ISD and other stakeholders.

The interview session will last for a minimum of 30 minutes and extends for up to 60 minutes based on the situation. The results of the interview will be used for academic research only. Hence, all your responses will be kept in strict confidentiality and would not affect anyone in any case. Taking this into account, your active participation is eminent for the success of the research study.

Thank you in advance for your active participation and involvement in the interview session.

Kind Regards,

Getamesay Berihun

No.	Semi-structured Interview Questions	Research Questions	
		What is the current status of ITSM practice in Ethio Telecom?	What ITSM Framework can best fit Ethio telecom based on the ITIL best practices?
1	Is there a regular service review held to discuss the current and future requirements of the organization? Can you share your experience?		
2	Does your organization offer any IT services to internal and external customers? If your answer is Yes, what are the core IT services that the company is providing, and are they aligned with ITSM?		
3	What do you understand about the term 'ITSM' and can you discuss the type of ITSM frameworks do you know?		
4	How the offered IT services are being managed, is there any ITSM framework being followed or adopted or implemented?		
5	What is the objective of ITSM and How well are you meeting your ITSM objectives based on the company's objectives?		
6	Do you believe that the IT staff clearly understand ITSM? How?		
7	Does the division have policies and procedures that support ITSM? Can you discuss some of them?		
8	Does the division applied tools that help to support the ITSM activities and are these tools fully utilized?		
9	What do you understand about 'ITIL best practices'?		
10	What is the primary objective of considering ITIL in the division?		
11	Which ITIL version is being practiced in your organization? Can you justify your answer?		
12	Do you think ITIL is supporting the organization in achieving business goals? How?		
13	Have the adoption and implementation of ITIL improved the ITSM in your organization and How?		

14	What are the lists of the ITIL processes and functions that the company has implemented or adopted, and do you think those processes and functions are sufficient or additional processes and functions are required and why?		
15	Have you had any improvement and have the improvements in the areas been noted by the business? Have the improvements been backed by metrics?		
16	Have you witnessed any regular review of the activities associated with the ITSM?		
17	How the performance of the offered IT services is measured? Can you justify your answer?		
18	What is your experience with the current ITSM practice of the division?		
19	What is your suggestion to enhance the current ITSM usage of the division?		
20	Thank you for your time. Do you have any questions or comments?		

Interview Questions are adapted from (Lubambo, 2009; Marrone & Kolbe, 2011a, 2011b; Tadesse, 2017; Wulf et al., 2015)

Appendix B: Document Analysis Checklist

The document analysis checklist helps to examine various written documents of the organization and the checklist which is adapted from National Archives¹⁹ is prepared to facilitate this task.

- 1) Type of the document
- 2) Date(s) of the document
- 3) Author of the document
- 4) For what audience was the document written?
- 5) Specific information on the document
 - a. List the main information presented in the document?
 - b. Why was the document written?
 - c. What was your justification to decide why it was written? Include some quotes from the document.
 - d. What historical event(s) does this document refer to at the time of the document creation or modification?
 - e. What did you learn from the document?

¹⁹ <https://www.archives.gov/education/lessons/worksheets/document.html> Accessed on Nov 20, 2019

Appendix C: Observation Checklist

The observation checklist helps to examine the current phenomena of the organization and the checklist is adapted from understand the

- 1) Participate in the working environment as a user of IT service
- 2) Join in ITSM related meetings and discussions at a section, department, division, and company levels
- 3) Examine what kind of tools and methods the employees will use to manage and deliver the IT services
- 4) Examine the flow of ITSM practices while the employees are managing and delivering various IT services?

Appendix D: ITSM Capability Model

The ITSM Capability Model is adapted from (Wulf et al., 2015) and it is based on six multi-attributive scales. These maturity level definitions are aligned with COBIT and CMMI definitions. The model helps to assess the current ITSM practice of the company. It assesses 26 ITSM processes that are defined and described by the ITIL framework. Besides, the researcher customized the model to include functions to get the full picture. Furthermore, it is better to know the overall ITSM status before generalizing the current practice of the company.

The criteria that are used to assess the existing ITSM practice of the division is defined as follows:

- **Awareness and stakeholder communication:** is the first attribute, addresses the need to recognize all process requirements and communicate them throughout the organization and to external stakeholders.
- **Plans and procedures:** cover the adoption of good practices, the documentation of processes, and the institutionalization of regular improvements to policies, standards, and procedures to increase process efficiency.
- **Tools and automation:** addresses the level of automation of the process, the tools which are applied to increase process efficiency, and their level of integration.
- **Skills and expertise:** covers how skill requirements are defined and documented as well as how training and further education are organized.
- **Responsibility and accountability:** addresses whether responsibilities and accountabilities are defined and accepted and whether process owners are empowered to make decisions.
- **Goal setting and measurement:** covers whether clear goals are defined for the IT process and activities. Furthermore, this attribute assessed whether the achievement of the objectives is measured and whether the measurement is applied for continuous improvement of the process and the efficient delivery of process results.

The maturity levels are defined as follows:

Level 0 – None: No recognizable process or not implemented.

Level 1 – Initial: Process and function are ad-hoc, or only partially defined.

Level 2 – Repeatable: Process and function have developed to the stage where similar procedures are followed by different people. There is no formal training or communication of standard

procedures, and responsibility is left to the individual. There is a high degree of reliance on the knowledge of individuals; therefore, deviations are likely.

Level 3 – Defined: Procedures forming the process have been standardized and documented and communicated through training. It is mandated that a process should be followed; however, it is unlikely that deviations will be detected. The procedures themselves are not sophisticated but are rather the formalization of existing practices.

Level 4 – Managed: Management monitors and measures compliance with the standardized process/function and takes action where it appears not to be working effectively. A process/function is under constant improvement and provides good practice. Automation and tools are used.

Level 5 – Optimized: The process has been refined to a level of good practice based on the results of continuous improvement. IT tools are used in an integrated way to automate the workflow and to improve quality and effectiveness.

Maturity Levels						
Criterion	0. None	1. Initial	2. Repeatable	3. Defined	4. Managed	5. Optimized
Awareness & Stakeholder Communication	no awareness	partial awareness	wide awareness	full awareness	comprehensive reporting	proactive communication
Plans and Procedures	no process or function	ad hoc process or function	informal process or function	Process or function is formally defined	robust process or function execution	good process or function practice
Tools and Automation	no tools	only standard desktop tools	tools individually managed	tools centrally managed	tools fully integrated	end-to-end automation
Skills and Expertise	required skills unknown	required skills identified	informal ad hoc training	formal training plan	long-term training program	continuous skill improvement
Responsibility and Accountability	responsibilities unknown	no responsibility allocation	informal responsibilities	defined responsibilities	responsibilities fully dischargeable	responsibilities fully harmonized
Goal Setting and Measurement	no goals	unclear goals	partial goals	goals defined globally	goals enforced	proactive control

Based on the defined criteria and maturity levels; all of the ITSM processes and functions are listed within the phases of ITIL.

ITSM Processes and Functions	Maturity Levels					
	None	Initial	Repeatable	Defined	Managed	Optimized
Service Strategy						
Service Portfolio Management						
Financial Management for IT Services						
Demand Management						
Business Relationship Management						
Service Design						
Service Catalogue Management						
Service Level Management						
Availability Management						
Capacity Management						
IT Service Continuity Management						
Information Security Management						
Supplier Management						
Design Coordination						
Service Transition						
Transition Planning and Support						
Change Management						
Service Asset and Configuration Management						
Release and Deployment Management						
Service Validation and Testing						
Change Evaluation						
Knowledge Management						
Service Operation						
Event Management						
Incident Management						
Request Management						
Problem Management						
Access Management						
Service Desk						
Technical Management						
Application Management						
IT Operations Management						
Continual Service Improvement						
Continual Service Improvement						

Appendix E: Framework Demonstration Meeting

Meeting Name: Artifact demonstration session for the proposed ITSM framework

Date: August 28, 2020

Time: 10:00 AM – 11:40 AM

Venue: ISD meeting hall

Attendees: Managers, Experts, and Specialists

Objective

To present the proposed ITSM framework which is designed and developed based on the ITIL best practices for Ethio telecom. After the demonstration session, the attendees are expected to provide their valuable feedback that will be used to enhance the framework.

Topics with time slots

- 10:00 AM to 10:10 AM: Provide a general overview of the research study
- 10:10 AM to 10:30 AM: Presentation on the proposed high-level ITSM framework
- 10:30 AM to 10:50 AM: Presentation on the proposed low-level ITSM framework
- 10:50 AM to 11:00 AM: Presentation on continuous incremental improvement
- 11:00 AM to 11:20 AM: Presentation on the proposed RACI matrix
- 11:20 AM to 11:40 AM: Questions and answers

Appendix F: Interview Evaluation

Dear respondent,

I am conducting a research entitled “**IT Service Management Framework for Ethio telecom Based on ITIL Best Practices**” as part of the partial fulfillment of the requirements for the Degree of Master of Science in Information Systems, at Addis Ababa University. Throughout the research process, you have provided valuable inputs especially during the framework demonstration and evaluation phases. In this sense, the proposed framework is improved rigorously based on your previous comments and suggestions.

According to the explanation of ISO, Quality in use is the degree to which a product or system can be used by specific users to meet their needs to achieve specific goals with effectiveness, efficiency, freedom from risk, and satisfaction in specific contexts of use. The adapted model helps to measure the quality of the framework and the applicability within the organization. This semi-structured interview is used to evaluate the proposed framework based on five basic characteristics and their subcomponents. These are effectiveness, efficiency, satisfaction, freedom from risk, and context coverage.

As part of the continuous design, development, and evaluation of the research process; this evaluation method helps to enhance the proposed framework by incorporating valuable feedback from the respondents. The evaluation session will last for a minimum of 30 minutes and extends for up to 60 minutes based on the situation. The results of the interview will be used for academic research only. Hence, all your responses will be kept in strict confidentiality and would not affect anyone in any case.

Thank you in advance for your active participation and involvement in the interview session.

Kind Regards,

Getamesay Berihun

Semi-structured Evaluation Interview

No.	Evaluation characteristics	Evaluation criteria based on sub characteristics
1	Effectiveness <ul style="list-style-type: none"> • Accuracy • Completeness 	How do you evaluate the framework in terms of accuracy and completeness?
2	Efficiency <ul style="list-style-type: none"> • Resource utilization 	How do you evaluate the framework in terms of efficient resource utilization?
3	Satisfaction <ul style="list-style-type: none"> • Usefulness • Trust • Pleasure • Comfort 	How do you evaluate the framework in terms of usefulness, trust, pleasure, comfort?
4	Freedom from risk <ul style="list-style-type: none"> • Economic risk mitigation • Health and safety risk mitigation • Environmental risk mitigation 	How do you evaluate the framework in terms of the degree to which the framework mitigates the potential risk to economic status, human life, health, or the environment?
5	Context coverage <ul style="list-style-type: none"> • Context completeness • Flexibility 	How do you evaluate the framework in terms of context completeness, flexibility, usability, practicality, fitness with organizational needs?

The framework evaluation method is adapted from ISO/IEC 25010:2011 ‘quality in use’ model

Appendix G: Evaluation Survey

Dear respondent,

I am conducting a research entitled “IT Service Management Framework for Ethio telecom Based on ITIL Best Practices” as part of the partial fulfillment of the requirements for the Degree of Master of Science in Information Systems, at Addis Ababa University. Throughout the research process, you have provided valuable inputs especially during the framework demonstration and evaluation phases. In this sense, the proposed framework is improved rigorously based on your previous comments and suggestions.

This evaluation survey as the extension to the previous interview evaluation is developed based on five categories and these are goal, environment, structure, activity, and evolution. The first section will evaluate the goal of the proposed framework in terms of goal attainment, utility, feasibility, and generality. The second section will evaluate the environmental perspective of the proposed framework in terms of people, technology, and organization. The third section will evaluate the structure of the proposed framework in terms of completeness, simplicity, understandability, consistency, and homomorphism. The fourth section will evaluate the activity of the proposed framework in terms of completeness, simplicity, consistency, functionality, trustworthiness, and performance. The last section will evaluate the evolution of the proposed framework in terms of robustness, scalability, adaptability, modifiability, and learning capability.

The evaluation survey will take approximately 25 minutes to complete and the results of the survey will be used for academic research only. Hence, all your responses will be kept in strict confidentiality and would not affect anyone in any case. If you faced any unclear points or need support, please do not hesitate to contact me through the below address.

The evaluation survey is conducted by employing a five-point Likert scale technique. The scales are; strongly agree, agree, neutral or neither agree nor disagree, disagree and strongly disagree and their assigned weights are 5, 4, 3, 2, 1 respectively

Thank you in advance for your active participation and generous contribution to the evaluation of the proposed framework.

Best Regards,

Getamesay Berihun

Email Address: gbgetish@gmail.com

Evaluation Questionnaire

No.	Evaluation Criteria	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Goal						
1	The proposed framework is worthy of achieving its objectives correctly or can produce the desired artifact in a real environment					
2	The proposed framework achieved its goal despite its expenses					
3	The proposed frameworks are feasible in terms of technical, operation, and economic perspective					
4	The proposed framework is broader in scope to address the problem					
Environment						
5	The proposed framework is consistent with people in terms of usefulness, ease of use, ethicality, and absence of side effects					
6	The proposed framework is consistent with the organization in terms of business alignment, and absence of side effects					
7	The proposed framework is consistent with technological fitness, and the absence of side effects					
Structure						
8	The degree to which the structure of the proposed framework contains all necessary elements and relationships between elements					
9	The proposed framework contains a minimal number of elements and relationships between elements					
10	The degree of uniformity, standardization, and freedom from contradiction among the elements of the structure of the proposed framework					
11	The degree to which the proposed framework can be comprehended, both at a global level and the detailed level of the elements and relationships inside the framework					
12	The proposed framework is in harmony with another model and the modeled phenomenon					
Activity						
13	The degree to which the activity of the proposed framework contains all necessary elements and relationships between elements					
14	The capability of the proposed framework to provide functions which meet stated and implied needs when it is used under specified conditions					

15	The degree to which the activity of the proposed framework contains the minimal number of elements and relationships between elements					
16	The degree of uniformity, standardization, and freedom from contradiction among the elements of the activity of the proposed framework					
17	The proposed framework is trustworthy in terms of expected outputs delivery and performing correctly					
18	The degree to which the proposed framework accomplishes its functions within given constraints of resources					
Evolution						
19	The ability of the proposed framework to handle invalid inputs or stressful environmental conditions					
20	The ability of the proposed framework to either handle growing amounts of work gracefully or to be readily enlarged					
21	The ease with which the proposed framework can work in contexts other than those for which it was specifically designed					
22	The ease with which the proposed framework can be changed without introducing defects					
23	The ability of the proposed framework to learn from experience					

The survey evaluation framework is adapted from (Prat et al., 2014, 2015)

Appendix H: List of Documents

Ethio Telecom Organization Chart, 2015

IT Service Desk Report, 2018

ISD Processes, 2018

Ethio telecom Annual Plan, 2018

ISD Annual Report, 2018

ISD Annual Performance Report, 2018

Organizational Structure Amendment, 2019

Ethio Telecom Strategic Plan, 2019

Internal Communication Report, 2019

ISD Communication Report, 2019

ISD Annual Plan, 2019

ISD Annual Performance Report, 2019

ISD Annual Plan, 2020

ISD Annual Performance Report, 2020

Appendix I: RACI Matrix for the Proposed Framework

High-level RACI Matrix for the Proposed Framework																	
Service Components	Task Description	Plan				Implement				Control				Govern			
		Teams	Manager	Coordinator	Expert	Teams	Manager	Coordinator	Expert	Teams	Manager	Coordinator	Expert	Teams	Manager	Coordinator	Expert
Business-IT alignment	Check and monitor whether the IT is used as a business entity	R	A	I	C		R	I	C		R	I	C		R	I	C
	Review every service whether they are in line with the company's business objective and customer needs	R	A	I	C		R	I	C		R	I	C		R	I	C
	Learn the experience of other IT service providers and build a strong relationship	R	A	I	C		R	I	C		R	I	C		R	I	C
	Prepare and monitor vendor management plans	R	A	I	C		R	I	C		R	I	C		R	I	C
	Prepare emergency service management plans and monitor their activities	R	A	I	C		R	I	C		R	I	C		R	I	C
	Prepare the IT roadmap of the division	R	A	I	C		R	I	C		R	I	C		R	I	C
	Report the general activities of the division to higher officials		R, A	I	C		R	I	C		R	I	C		R	I	C
	Discuss and improve business and IT requirements with other stakeholders and partners	R	A	I	C		R	R	C		R	R	C		R	R	C
	Perform business analysis on a monthly, quarterly, and yearly basis	R	A	I	C		I	I	C		I	I	C		I	I	C
Service Plan	Develop a high-level & detail strategy of the division	R	A	I	C		R	I	C		R	I	C		R	I	C
	Review and monitor whether the service plan is aligned with the strategic plan of the organization	R	A	I	C		R	I	C		R	I	C		R	I	C
	Craft and update various measurements and metrics for every service in order to evaluate their performance and then update or modify the services	R	A	I	C		R	I	C		R	I	C		R	I	C
	Improve the service plan throughout the lifecycle to achieve the dynamic business demand, customer need, and technological advancements	R	A	I	C		R	I	C		R	I	C		R	I	C
Resource Management	Develop effective resource utilization planning mechanism	R	A	I	C		R	I	C		R	I	C		R	I	C
	Manage human and non-human resources effectively and efficiently	R	A	I	C		R	I			R	I			R	I	
	Develop detailed financial statements of the division	R	A	I	C		R				R				R		
	Utilize the budgets of the division effectively	R	A	I	C		R, A	R			R, A	R			R, A	R	
	Audit the resources of the division on a monthly, quarterly, and yearly basis	R	A	I	C		I	I	C		I	I	C		I	I	C
	Determine and manage the supply and demand needs daily	R	A	I	C		R	I			R	I			R	I	
	Record every asset of the division on the central resource repository	R	A	I	C		R	I			R	I			R	I	
	Determine and manage the supply and demand needs daily	R	A	I	C		R	I			R	I			R	I	
	Determine and report the profits and losses of the division to the management and stakeholders	R	A	I	C		I	I	C		I	I	C		I	I	C
Portfolio Management	Centrally manage different kinds of projects and programs	R	A	I	C		R	I	C		R	I	C		R	I	C
	Work together with various partners for successful project completion	R	A	I	C	R	A	I	C	R	A	I	C	R	A	I	C
	Check whether the projects or programs are aligned with the strategic plans	R	A	I	C		R, A	I	C		R, A	I	C		R, A	I	C
	Assign project or program leaders and coordinators	R	R, A	I	C	R	R, A	I	C	R	R, A	I	C	R	R, A	I	C
	Specify project teams and outline their tasks	R	R, A	I	C	R	R, A	I	C	R	R, A	I	C	R	R, A	I	C

	Prepare and update project charters and proposals	R	R, A	I	C	R	R, A	I	C	R	R, A	I	C	R	R, A	I	C
	Prepare and deliver various project handling guidelines, policies, and procedures	R	R, A	I	C		R, A	I	C		R, A	I	C		R, A	I	C
	Participate and provide valuable inputs in auctions, project reviews, and meetings	R	R, A	I	C		R, A	I	C		R, A	I	C		R, A	I	C
	Report and discuss the status of every project to the management daily	R	A	I	C		I	I			I	I			I	I	
Service Design	Craft high-level and low-level design for internal and external services		R	I	C	R	A	I	C		R	I	C		R	I	C
	Develop, enhance, update, and manage system requirements		R	I	C	R	A	I	C		R	I	C		R	I	C
	Integrate the business and system requirements	R	A	I	C	R	A	I	C	R	A	I	C	R	A	I	C
	Incorporate user feedback while designing and improving the services		R	I	C	R	A	I	C		R	I	C		R	I	C
	Manage and control the overall service architecture		R	I	C	R	A	I	C		R	I	C		R	I	C
	Prepare and update service design documentation, and guidelines		R	I	C	R	A	I	C		R	I	C		R	I	C
	Incorporate state of the art technologies and customize it with the business need of the organization		R	I	C	R	A	I	C		R	I	C		R	I	C
	Enhance and design new and current services in a cost-effective manner		R	I	C	R	A	I	C		R	I	C		R	I	C
Service Excellence	Develop new services, IT functions, modules, or components based on the requirements or customize adopted systems		R	I	C	R	A	I	C		R	I	C		R	I	C
	Modify, analyze, and adjust the current services through rigorous research		R	I	C	R	A	I	C		R	I	C		R	I	C
	Validate and test the services for their compliance with the required settings	A	R	I	C	R	A	I	C	A	R	I	C	A	R	I	C
	Improve each service with current business demand, customer need, and technological advancements iteratively		R	I	C	R	A	I	C		R	I	C		R	I	C
Service Deployment	Deploy newly developed services and customized functionalities based on the local context		R	I	C	R	A	I	C		R	I	C		R	I	C
	Validate and test the services rigorously to know whether they meet the objectives	A	R	I	C	R	A	I	C	A	R	I	C	A	R	I	C
	Prepare different service management documentation, guidelines, and principles	A	R	I	C	R	A	I	C	A	R	I	C	A	R	I	C
	Provide training for staff who will manage the services		R	I	C	R	A	I	C		R	I	C		R	I	C
	Record and report every challenge that has occurred during the implementation phase			I		R	A	I	C	I	I	I				I	
Service Quality	Control the quality of service throughout the lifecycle		R	I	C		R	I	C	R	A	I	C		R	I	C
	Provide, manage, analyze, and report service issues and then log them into the service repository that came from various stakeholders		R	I	C		R	I	C	R	A	I	C		R	I	C
	Manage, evaluate, and record various service changes		I				R	I	C	R	A	I	C		R	I	C
	Employ state-of-the-art service quality enhancement technologies	R	A	I	C	R	A	I	C	R	A	I	C	R	A	I	C
	Incorporate user feedback and system reviews		I				R	I	C	R	A	I	C		R	I	C
	Propose and determine service improvements based on the request from stakeholders and analysis findings		R	I	C		R	I	C	R	A	I	C		R	I	C
	Control and manage the service continuity and availability throughout the lifecycle		R	I	C		R	I	C	R	A	I	C		R	I	C

Customer Care	Facilitate different mediums to gather customer needs, desires, and feedbacks		R	I	C		R, A	I		R	A	I	C		R	I	C
	Provide a platform for the provision, maintenance, and support of services through a call center, social media, and other methods		R	I	C		R, A	I		R	A	I	C		R	I	C
	Provide various short-term and long-term discounts on some services		R	I	C		R, A	I		R	A	I	C		R	I	C
	Craft different schemes to sustain and create loyal customers		R	I	C		R, A	I		R	A	I	C		R	I	C
	Build a strong brand and relationship within the local community through several mechanisms		R	I	C		R, A	I		R	A	I	C		R	I	C
	Build a strong relationship with various suppliers and partners		R	I			R	I		R	A	I	C		R	I	C
	Record and incorporate customer views throughout the lifecycle		R	I	C		R	I	C	R	A	I	C		R	I	C
	Develop marketing and customer management schemes		R	I	C		R	I	C	R	A	I	C		R	I	C
	Communicate planned and unplanned service outages through various mediums		R	I	C		R	I	C	R	A	I	C		R	I	C
	Assess the needs, and feedbacks of customers, partners, suppliers, or stakeholders through surveys		R	I			R	I		R	A	I	C		R	I	
Service Delivery	Deliver services to internal and external customers 24 Hours and 7 days a week		R, A				R, A			R	A	I	C		R, A		
	Provide support for internal and external customers		R, A				R, A			R	A	I	C		R, A		
	Maintain, manage, and report the service activities proactively		R, A	I			R, A	I		R	A	I	C		R, A	I	
	Utilize the ITSM and system supporting tools for effective service management		R, A	I			R, A	I		R	A	I	C		R, A	I	
	Handle incidents and disasters with the shortest recovery time as possible		R, A				R, A			R	A	I	C		R, A		
	Prepare high-level and detailed incident, event, problem, and disaster management plans		R	I	C		R	I	C	R	A	I	C		R	I	C
	Prepare and log RCA (root cause analysis) report for any incidents, problems or events or disasters		R	I			R	I			R	I			R	I	C
	Manage and administer every IT infrastructures, applications, and other IT systems		R	I			R	I		R	A	I	C		R	I	C
	Provide a platform for effective vendor management for on-site and off-site support		R	I	C		R	I			R	I	C		R	I	C
	Employ analytics to exploit the root cause of incidents, problems, events, and disasters		I	I	C		I	I	C	R	A	I	C		I	I	C
Organizational Learning	Prepare, update, and manage training documentations, modules, knowledge management repositories	R	A	I	C	R	A	I	C	R	A	I	C	R	A	I	C
	Deliver hands-on training continuously for new and former employees	R	A	I		R	A	I		R	A	I	C	R	A	I	
	Manage and adapt organizational changes and technological advancements		R, A	I	C		R, A	I	C	R	A	I	C	R	A	I	C
	Prepare and update roles and responsibilities for each service component owners		R, A	I	C		R, A	I	C	R	A	I	C		R, A	I	C
	Take a lesson on every change and use the opportunity to build an organizational memory		R	I	C		R	I	C		R	I	C	R	A	I	C
	Prepare, customize, and implement security policies and technologies		I	I	C		I	I	C		I	I	C	R	A	I	C

IT & Network Security Management	Control, monitor, and evaluate the security activities of every IT systems at a daily, monthly, quarterly, and yearly basis		R	I			R	I			R	I		R	A	I	C
	Investigate, report, record, and solve security breaches and frauds		I	I			I	I			I	I		R	A	I	C
	Educate the employees of the division on various security issues	A	R	I	C	A	R	I	C	A	R	I	C	R	A	I	C
	Take corrective measurements on staff who are caught in security breaches and frauds		I	I			I	I			I	I		R	A	I	C
	Validate, test, and log every IT equipment and systems before and after their deployment for security reasons		R	I	C		R	I	C		R	I	C	R	A	I	C
Performance Analytics & Dashboard	Provide up to date report for the management of the division and stakeholders		R	I			R	I			R	I			R, A	I	C
	Implement analytics to find hidden patterns and predict future insights		R				R				R			R	A	I	C
	Support the management for concrete managerial decision		R, A	I			R, A	I			R, A	I		R	A	I	C
	Collect the health status of every service on daily basis and deliver the report to responsible departments		R, A	I	C		R, A	I	C		R, A	I	C	R	A	I	C
	Asses, deliver, record, and report the overall performance of the IT systems centrally		R	I	C		R	I	C		R	I	C	R	A	I	C
Continuous Incremental Improvement	Implement the technique of PDSA while improving the service components and the phases		R	I	C		R	I	C		R	I	C	R	A	I	C
	Implement the agile SDLC methodology while improving the service components and the phases		R	I	C		R	I	C		R	I	C	R	A	I	C
	Continuously improve the service components and the phases in relation to organizational change, business need, customer requirement, and technological advancements		R	I	C		R	I	C		R	I	C	R	A	I	C
	Continuously enhance various IT services and fine-tune new service increments throughout the lifecycle		R	I	C		R	I	C		R	I	C	R	A	I	C
	Control, manage, and customize the framework and record every change		R	I	C		R	I	C		R	I	C	R	A	I	C
	Evaluate each service components and adjust the status based on the result		R	I	C		R	I	C		R	I	C	R	A	I	C
	Record the configuration of every service components and services in the service repository		R	I			R	I			R	I		R	A	I	C
	Employ up to date measurement methods and metrics that will be used to evaluate the performance of the service components and phases		R	I	C		R	I	C		R	I	C	R	A	I	C
	Implement several ITSM tools for service automation, check, and modify them accordingly		R, A	I	C	R	A	I	C	R	A	I	C	R	A	I	C