IT SERVICE MANAGEMENT AGILITY ASSESSMENT MODEL: THE CASE OF CBE

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IT Service Management Agility Assessment Model: in the case of Commercial Bank of Ethiopia

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Declaration

I, the undersigned, hereby declare that this thesis intitled “IT Service Management Agility Assessment Model: The case of Commercial Bank of Ethiopia” is my original work carried out under the supervision of Dr. Getachew Hailemariam. It has not been presented as a thesis in other university and all source of material used within this thesis are duly acknowledged.

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Abstract

Research findings show that as the maturity of implementation of IT Service Management Framework increases, the number of realized benefits also increases (Marrone and Kolbe, 2010) and getting a better agility allows companies to benefit from a faster Return on Investment (ROI) and a constant competitive advantage (Sahid, Maleh and Belaissaoui, 2017). Continually assessing IT Service Management agility and knowing the agility level is crucially important for companies to make sure that they can continually improve and ensure that they are still providing value to its customers and stakeholders.

The main objective of this research is to develop an ITSM Agility Assessment Model for Commercial Bank of Ethiopia (CBE) and to test the current ITSM agility levels of the bank. A mixed method research approach using both Quantitative and Qualitative methods were employed. An ITSM Agility Assessment model was developed conceptually based on prior works on Organizational Agility Models and ITSM Best practices. Conceptually hypothesized model was developed and tested using Structural Equation Modeling (SEM) technique and passed all reliability, validity, and structural tests. The defined constructs used to measure the ITSM Agility and the Indicators of the ITSM Agility construct itself produced a relatively similar value. This shows that, those constructs used in the ITSM Agility Assessment Model are true determinants of ITSM Agility in the organization.

Using the defined model, ITSM Agility of CBE has been assessed and identified the current level of agile ITSM practice in the company. The final ITSM agility level of 3.28 was obtained and this shows that CBE is still in a transition phase towards a complete agile ITSM Practice with an overall ITSM Agility Level 2 (Wendler, 2014)**.**

This research contributes a theoretical foundation on how to assess an ITSM Agility practice in an organization and practically, CBE can use this model to regularly check its ITSM Agility levels and plan for future improvements to keep aligned with the business and technological changes and ensure efficient and effective IT Services delivery.

Key Words: *IT Service Management Agility Assessment, Agility Assessment, Maturity Assessment, IT Service Management, Commercial Bank of Ethiopia, CBE ITSM practice Agility*

Certification of Thesis

Candidate: Fiseha Moges Mengistu Signature _____ Date_____

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Fiseha Moges Mengistu

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Acronyms:

ITSM: IT Service Management

ITIL: Information Technology Infrastructure Library

CSI: Continual Service improvement

CBE: Commercial Bank of Ethiopia

ICT: Information Communication Technology

PMO: Project Management Office

SDP: Service Design Package

SLR: Service Level Requirements

COBIT: Control Objectives for Information and related Technology

SVS: Service Value System

SVC: Service Value Chain

TTM: Time-To-Market

ISO: International Organization for Standardization

IEC: International Electrotechnical Commission

BSC: Balanced Scorecard

AVE: Average Variance Extracted

HTMT: Heterotrait-Monotrait

VIF: Variance Inflation Factor

1 Introduction

1.1 Background

The recent trend is towards agility of organizations with the ability to flexibly adjust themselves and continually improve their services in order to stay and to be competent in the market where there are unpredictable fast technological advancements exist and global events, like the recent COVID19, suddenly happen. On the other hand, the ever-changing business models like Business 4.0, which added sophistication in the demand and supply chain and value co-creations where the consumers themselves contribute to the creation of value in the services that they are getting from the service provider are some to mention that could have impact on IT Service Management practice in an organization.

A recent study shows that 32% corporate board members believe that their business is under threat because of disruptive digital innovations (Chan *et al.*, 2019). This indicates that organizations should make ready themselves and work in very agile way to easily adapt themselves with the ever-changing business.

All those mentioned cases are highly linked and supported by Information Technology. So, IT is the backbone of every business and it must be efficient and agile to promote the traditional company transformation to a digital enterprise (Sahid, Maleh and Belaissaoui, 2017) and hence it should be supported by efficient IT Service Management (ITSM). ITSM is an approach for managing information systems. It represents the information system as a set of capabilities that bring value to customers in the form of services(EL et al., 2017).

Information Technology Infrastructure Library (ITIL) is the most popular and the influential framework for ITSM (Ahmed and Assad, 2015). Different organizations have started adopting ITIL V3 framework aiming improvements in delivering value to customers. AXELOS, who owns the ITIL framework, on the other hand, has released ITIL 4 with an agility concept included in it. Considering the dynamically changing business demand and technological advancements, organizations need to transition from currently adopted structured process-based IT Service Management to an agile approach to continually respond to the changing business need and technological advancements.

Agility in IT is the ability to provide new services and IT solutions to support the innovative business processes (Sahid, Maleh and Belaissaoui, 2017) and continually assessing IT Service Management agility and knowing the agility level is crucially important for companies to make sure that they can continually improve in order to stay competent and keep providing value to its customers and stakeholders.

1.1.1 Background Information of CBE

CBE is an Ethiopian Government owned Bank with an asset of 711.96 billion Birr as of June 30, 2019 (CBE Website). Its mission is "to become a world-class commercial bank by the year 2025". As described on the company's website, it has more than 22 million account holders and the number of Mobile and Internet Banking users are more than 2.5 million. There are also more than 8 million Active ATM users.

Taking those figure and facts of the company into consideration, the company should have a strong Information and communication Technology to support its customer and reach to the envisioned world class banking service. Information and communication technology (ICT) has become the heart of banking sector, while banking industry is the heart of every robust economy (Kurashige et al., 1994). The ICT, People, Process and Suppliers needs to be managed with a proper IT Service management (ITSM) practices and the alignment should be checked and rechecked to bring Continual Service Improvements.

Commercial Bank of Ethiopia has gone through the implementation of ITIL best practices since 2016. They have started it by providing ITIL Foundation training to all IT staffs. After completion of the ITIL training and certification, some others were also provided a chance to proceed the intermediate trainings and certification. Some of the employees has taken Foundation and Intermediate Exams and got certified.

Right after the foundation training, an ITIL implementation team has been formed with the aim of leading the ITIL implementation initiative. This team is working on implementation of ITIL processes.

1.2 Statement of the problem

IT Service Management Agility is a relatively new topic. There is no well-studied and defined agility assessment model or instrument that could be adopted by IT units to help them assess their IT Service Management Agility or readiness for it. Axelos (ITIL V3, 2011) has a generic IT Service Management maturity assessment tool that purely focuses on processes and process adoption levels and basically designed for ITIL V3. There are also other researches (Wendler,2014; Izza and Imache, 2008; Imache, Izza and Ahmed-Nacer, 2012) done on Organizational Agility and Enterprise Information System Agility but not on comprehensive and specific to IT Service Management Agility Assessment. Because of the unavailability of specifically fit for purpose ITSM Agility Assessment model, organizations are not specifically assessing their ITSM agility level, and this affects their strategic decisions.

In Commercial Bank of Ethiopia, a team of people has already been formed aiming to facilitate and leading the implementation of ITIL best practices in the company even though there is no streamlined and appropriate implementation model for the team to follow. It is also challenging for the implementation team to decide which practices/processes among the available should be implemented first and which ones should follow, and which others are not required to be implemented within CBE.

The ITIL guidelines are not prescriptive enough for effective implementation in industry and Process selection guidelines need to provide specific steps to follow for selecting critical processes to improve (Shrestha *et al.*, 2015). However, with all those challenges, it has been noted that ITIL processes are defined and documented in CBE.

On the other hand, there are 26 process based on ITIL V3 and according to the newly released version of ITIL 4 in 2019 those processes are replaced by 34 practices with modification on existing and with the addition of new ones. Therefore, CBE needs to make itself ready to align and realign its IT Service Management practice with the rapidly changing best practices and make itself agile enough to accommodate changes in order to keep providing efficient IT Services to customers and stakeholders. Aligned with the current trend, there is no model that helps CBE to check the agility level of its ITSM practice.

1.2.1 Research Question

RQ1. How IT Service Management Agility can be assessed?

RQ2. What is the current ITSM Agility Level of CBE?

1.3 Objectives

1.3.1 General Objective

The main objective of this thesis is to develop an IT Service Management agility assessment model and assess the IT Service Management agility of Commercial Bank of Ethiopia.

1.3.2 Specific objectives

The major activities to be carried out to help answer the research questions are:

- Developing an ITSM Agility Assessment Model comprising of all major aspects
- Evaluate the instrument fitness for assessing agility of ITSM practice in CBE using SEM technique
- Assess Agility of ITSM practice in CBE and determine current level

1.4 Scope of the Study

This research was conducted with the aim of developing an IT Service Management Agility Assessment Model taking Information System Division of Commercial Bank of Ethiopia as a case company. As a scope, it assesses all aspects of ITSM practice within the scoped IT units of CBE and the outputs, findings, and summaries made are solely based on the participants feedback of the same unit.

1.5 Significance of the Study

CBE is investing heavily on ICT. Investing on technologies is a common endeavor for organizations as they are aiming to catchup with global development, improve the quality of customer service delivery, and reduce transaction cost (Kurashige et al., 1994). Information and Communication Technology need to be supported by a proper IT Service Management approach and culture in the organization to use technology and get the most out of it in supporting the business effectively and efficiently.

Research findings show that as the maturity of implementation of the IT Service Management Framework increases, the number of realized benefits also increases (Marrone and Kolbe, 2010) On the other hand, getting a better agility allows companies to benefit from a faster Return on Investment ROI and a constant competitive advantage (Sahid, Maleh and Belaissaoui, 2017).

This research focuses on developing a model that assist CBE to evaluate the agility of its IT Service Management practice to ensure its ability to continually and effectively align and realign the IT Services to the changing technological innovations and associated business demand.

1.6 Organization of the Thesis

This paper is organized in to six chapters. High level content descriptions of each chapter are as follows:

Chapter 1: Introduction

Introduction and background information about the thesis including the background information about the case company, problem statement, research questions, general and specific objectives, scope and limitations, and significance of the research work.

Chapter 2: Literature Review

This chapter includes review of relevant materials. It incorporates review of ITSM related literatures, Industry best practices, Organizational Agility and ITSM agility related literatures and frameworks. Comparisons among available ITSM frameworks and comparisons among different versions of the same framework are also included in this chapter.

Chapter 3: Methodology

Chapter Three contains the Research Methodology used throughout this thesis work. It shows the adopted methodology for model development (ITSM Agility Assessment Model) which is one of the primary objectives of this work. It includes the Research Design overview, Research approach, Sampling and Data Collection techniques, Pilot test results, and tools used while analyzing survey data and open-ended question responses.

Chapter 4: Model Development for assessing ITSM Agility

This chapter covers all aspects required in the development of the ITSM Agility Assessment Model. It includes the constructs in the hypothesized Model with construct detailed specifications, research hypotheses obtained through this process, the Measures/Indicators used to measure the constructs/variables, and Maturity Level specifications.

It also shows how the analysis is done on the initial hypothesized ITSM Agility Assessment Model using SEM techniques and shows also the adjustments made on the hypothesized paths obtained through the high-level analysis. Following this, validity and reliability were analyzed and reported. After the reliability check was made, the analysis and discussion about the final ITSM Agility Assessment Model was included using Structural Equation Modeling Technique.

Chapter 5: CBE's ITSM Agility Assessment Result Analysis and Discussion

This chapter presented the results from both survey and open-ended questions aimed to measure the agility levels of the case company – CBE. The detailed analysis was included about the results of each indicators and the aggregate effect on the respective variables obtained from the survey result. And the qualitative data analysis is also part of this chapter.

The summary of the Agility levels of the ITSM practice in the CBE are documented with discussion on the summarized result and its implications as a Maturity Level.

Chapter 6: Conclusion and Future Work

This chapter summarizes and makes conclusions on the whole research findings. It also included future work suggestions for researchers in the area.

2 Literature Review

This chapter gives an overview of prior academic literatures, publications, research papers on related topics to provide a complete understanding for the readers. ITSM frameworks, agility, best practices, organizational agility, and other research attempts made on related areas are covered in detail.

There are several researches done on IT Service Management, service management frameworks, assessment models, and agility but very few focused-on Agility of IT organization and IT service management. As the objective of this paper is an attempt to develop an IT Service Management Agility Assessment Model, the literature review mainly gives emphasis to prior related research papers and books.

2.1 The Research Literature Review Process

Main search terms suitable and related to this research were identified mainly taking the research questions and the objectives of this thesis.

The search Keys used were: *Agility, IT Service Management Agility, IT Service Agility, Information System Agility, IT Service Management Maturity Assessment, Enterprise Agility, Information System Agility*

In general, a total of total of 184 documents retrieved including those important in completion of this thesis like those related to Research Methods, Structural Equation Modeling techniques, qualitative and quantitative methods. This includes publications from 1988 to 2019

Out of the total 184 found resources, 54 were finally selected and used for this research. Publication years of the 54 selected and used publications are summarized as follows.

Publication year range	Number	Percentage
Papers published before 10 years (before 2010)	8	15%
Papers published before 5-10 years (between 1010 – 2015)	17	30%
Very recent papers published within the past 5 years (between 2015 to 2019	30	55%

Table 1:Paper Review Summary

2.2 ITSM Agility Assessment

Emphasizing that agility of an Enterprise Information System can be considered as a primary objective of an enterprise, (Imache, Izza and Ahmed-Nacer, 2012) developed an agility evaluation approach based on the POIRE framework which is primarily developed by (Izza and Imache, 2008) for assessing Agility from the context of enterprise interoperability with five main pillars - Processes, Organization, Information, Resources and Environments. In this paper, the "General Agility" is designed to be obtained through combining Process Agility, Organizational Agility, Information Agility, Resource Agility, Environment Agility, and Mutual Agility dimensions. However, the enterprise information system agility assessment model, that they attempted to develop scoped within enterprise information system not at its full scope considering IT as a service nor end-to-end management of IT services. It requires alignment with the current developments in IT service Management with the objectives of value co-creation while providing IT services to customer. Furthermore, it uses urbanization and continuous improvement perspectives in a tour operator company which should be studied further for its alignment in technology intensive banking sectors and towards efficient and effective IT service delivery.

Wendler developed organizational agility maturity model consisting of three main dimensions – Agility Prerequisites, Agility of People, and Structures enhancing agility to help assessing the maturity of organizational agility. Wendler's "Agility Prerequisite" dimension consists of Agile values and Technology sub dimensions that focuses on organizational culture and an available technology that could support organizational agility by facilitating efficient communications within an organization. The second dimension, Agility of people, has two sub dimensions – "Workforce" that consists employee capability and the other sub dimension "Management of change" that checks the quick response capability of the organization for changes. Under Wendler's "Structures Enhancing Agility" dimension, there are two sub dimensions "Collaboration and cooperation" and "Flexible Structure" both focusing on the ability of the organization's different functional units' collaboration and quick adaptation of process and organizational structure. As Wendler's focus was on developing Organizational Agility at its full

scope in an organization, the focus on IT Service Management perspectives and IT service delivery parts are less emphasized and untouched on some aspects.

In an attempt to develop process Flexibility and Agility measurement tool, (Gong and Janssen, 2010) argued that performance and cost can be considered as factors reflecting Flexibility and Agility of a system. They have used the contexts such as throughput (workload of a system), response time, case handling time, low implementation time, operational cost, Low implementation cost, and quality. So, the general ability to respond to changes and the speed in responding to different changes in the business process and IT systems. However, this paper neither takes the general scope of IT Service Management nor focuses on available and relevant processes while managing IT systems and services.

2.3 Related works on ITSM Assessment

There are researches made on benefits of ITSM, ITSM Measurement In a sturdy to develop a Performance Management Framework for ITSM, (Gacenga, 2013) aiming to overcomes the measuring and reporting challenges, developed a framework that encompasses process metrics to assist organizations to integrate the reporting of ITSM performance along the Balanced Scorecard (BSC) perspectives. Gacenga's work aggregates IT service performance metrics and help and facilitate report to the strategic management. So, this work and all other prior coauthored related publications of Gacenga on "Information Systems Measuring the Performance of Service Orientated IT Management (Gacenga *et al.*, 2011)"and "Measuring the performance of service orientated IT management"

2.4 Related Works ITSM and Agility

As Agile concept is an emerging topic in recent years, researchers on IT Service Management are also focusing on this concept to use it with other existing ITSM frameworks. (Borangiu, Drăgoicea and Nóvoa, 2016) attempted to answer how to adapt ITIL V3 together with SCRUM agile approach. However, SCRUM is suitable for software projects and further work required to prove that its applicability on Infrastructure intensive projects and other aspects of ITSM as ITSM covers all aspects in IT – Processes, Customers & Users, Technology, Suppliers and Partners.

On another attempt towards an agile IT Service Management, (Sahid, Maleh and Belaissaoui, 2017) tried to produce a strategic framework to improve ITSM service management processes with the additions of two drivers Agility management based on DevOps, and an agility Process Maturity Framework (APMF).

A study on the agile IT Service Management, (Verlaine, 2017) identified and defined an Agile Values and principles of ITSM based on the Agile Values and Principles of an Agile Theory. Although the identified and redefined values and principles of agile ITSM needs further refinement with practitioners in the area, it is also good to assess how organizations can transition from a structured process-based framework to an agile approach.

Agile Service Management (Agile SM) ensures that ITSM processes reflect Agile values and are designed with "just enough" control and structure in order to effectively and efficiently deliver services that facilitate customer outcomes when and how they are needed (Groll, 2015).

Local related Studies

From local context, there are limited number of thesis works done with the main target on IT Service Management from broader context, but none so far that I searched and reviewed has attempted a research on Agility within IT Service Management or Agility within IT Organizations.

There is an attempt made in the development of a Tailored ITSM framework for Commercial Banks in Ethiopia in the case of Buna Bank share company by (Dabi, 2017). This thesis work was done mainly focusing on the processes in ITIL v3 IT Service Management framework and tailoring it to suit to the targeted organization (Buna Bank). ITIL v3 for this context, is considered as bureaucratic and procedural (Borangiu, Drăgoicea and Nóvoa, 2016) however successful IT must be efficient and agile to promote the traditional company transformation to a digital enterprise (Sahid, Maleh and Belaissaoui, 2017). Organizations need to tailor the IT Service Management (ITSM) framework that they choose to adopt to suit for their specific requirements and meeting the objectives and envisioned benefits that could be gained through the adoption of such frameworks. But in this dynamically changing business environment, organizations need to be ready to quickly respond to changes as well. So, this specific research

misses the agility perspectives of IT Service Management. And, on the other hand, it just focuses on the processes and process adoptions and not in developing IT Service Management maturity assessment or assessment models.

The other local thesis work that could be mentioned is an attempt done by (SEIFE, 2014) on exploring factors influencing the successful implementation of IT Service Management Framework in Ethio Telecom. Similar to the work of Tadesse Dabi, this thesis also focuses on ITIL v3 and checks the implementation of the ITIL outlined process within the organization and finally recommends the critical success factors for successful adoption and implementation of ITIL process seeking improvement in the IT Service Management of the case organization (Ethio Telecom).

2.5 IT Services and IT Service Management

Service oriented IT management was very popular together with the need for more customer focus in IT service delivery (Pedersen and Bjørn-Andersen, 2011). Researchers were focusing on developing frameworks and models that help organizations to assume and manage IT as a service and transition from Technology Oriented IT management to Service Oriented IT management.

An IT Service is a service based on the use of Information Technology. In ITIL v3, Service is defined as "*a means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks*" *however in preceding version (*ITIL 4) the concept is shifted from "delivering value to the customer" to "Value co-creation". In the 2019 ITIL publication Service is defined as "*a means of enabling value co-creation by facilitating outcomes that customers want to achieve, without the customer having to manage specific costs and risks."*

Gacenga has defined IT Service Management as customer-oriented approach by IT practitioners to manage IT operations organized around IT services (Gacenga, 2013). This of the authors definition is based on combining concepts from different other authors ways of defining the IT Service Management. So, managing IT in a way that leads in bring the efficiency, effectiveness,

compliance to the standards and regulations while executing the day to day operational activities in delivering IT services will be the focus of IT Service Management.

The primary focus of ITSM is to provide specific processes, metrics, and guidance to enable and manage assessment, planning, and implementation of IT service processes to optimize tactical and strategic IT asset use (Ahmed and Assad, 2015). The aim is an improvement in their IT Service Delivery with its primary focus to provide specific processes, metrics, and guidance to enable and manage assessment, planning, and implementation of IT service processes to optimize tactical and strategic IT asset use (Cater-Steel and Tan, 2005).

ITSM is an approach for managing information systems, it represents the information system as a set of capabilities that bring value to customers in the form of services(EL et al., 2017). This definition is also similar with ITIL's definition. It also defines Service Management as "*a set of specialized organizational capabilities for enabling value for customers in the form of services".*

2.6 Agility and Agile Approaches

It is important to understand what we mean by agility. Agility is the ability to remain flexible in facing new developments, to continuously adjust the company's strategic direction, and to develop innovative ways to create value (Chan *et al.*, 2019). Agility in IT is introduced as part of a software development methodology. The agile manifesto has four key components underpinned by 12 key principles as well. The concept is also adopted in other disciplines including project management and IT Service Management domains. There is much similarity between the principles under agile manifesto with what is documented in IT Service Management by ITIL.

With a broader organization wide context, Wendler defined Agility as "*an effective integration of response ability and knowledge management in order to rapidly, efficiently and accurately adapt to any unexpected (or unpredictable) change in both proactive and reactive business/customer needs and opportunities without compromising unpredictable) change in both proactive and reactive business/customer needs and opportunities without compromising with the cost or the quality of the product/process* (Wendler, 2014)"

The Agile methodology is pretty simple where you keep things small enough to manage and large enough to be rendered meaningful (Kaiser, 2018). For an Organization to be agile, it must also be customer-centric, adaptive, and it should also be lean and consistent in the daily operations. Agility in IT is the ability to provide new services and IT solutions to support the innovative business processes (Sahid, Maleh and Belaissaoui, 2017).

2.6.1 Why Agility In ITSM?

Almost all services today are IT-enabled and this has a tremendous benefit for organizations in creating, expanding, and improving their IT service management capability(AXELOS, 2019). There is a very rapidly changing strategic decisions by the business in the organizations that provides an IT enabled services. This very rapidly changing requirements by the business requires a very rapidly changing capabilities which results in requiring new ways of performing the day to day routines. This could be achieved by allowing the organization to learn how to be agile in each activity that it carryout to satisfy the everchanging business requirements. With the strategic changes that companies are currently experiencing, agility is more a strategic choice than a simple development method, and it affects all business activities (Abdelkebir, Maleh and Belaissaoui, 2018).

2.6.2 Organizational Agility

In this dynamically changing technological advancements and with its respective need for quickly changing business models, Organizational agility is a very crucial concept to deal with. Organizational agility is the ability of an organization to move and adapt quickly, flexibly, and decisively to support internal changes(AXELOS, 2019). This requires a carefully managed organizational resilience. Organizational resilience is the ability of an organization to anticipate, prepare for, respond to, and adapt to both incremental changes and sudden disruptions from an external perspective (AXELOS, 2019).

(Wendler, 2014) argues that the management of an organization must understand that the organization itself cannot be agile, but its employees can be. This implies that more focus must be exerted on the organizational culture, processes, and other resources that the employees use in performing their routines.

2.6.3 Agile ITSM Approach

Agile Service Management encourages a continuous learning environment and promotes better collaboration between development and operational teams (Groll, 2015) and this close collaboration between the two teams will help in minimizing the Time To Market (TTM) of the products and services by the organization with an improved performance from initiation to delivery.

2.7 ITSM Frameworks, Standards and Best Practices

ITIL, COBIT, ISO/IEC 20000, DevOps are some of the available and widely adopted ITSM Frameworks, Practices and Standards that could be referred, and they will be reviewed in this thesis in detail.

2.7.1 Information Technology Infrastructure Library (ITIL)

ITIL defines processes that enable IT organizations to efficiently and reliably manage services and to satisfy performance, availability, and cost objectives (Johnson *et al.*, 2007).

ITIL has different versions that were released since its initial release of a series of books in the end of 1980 by Office of Government Commerce (OGC) United Kingdom aiming in an improvement on the quality of IT Service Provisioning. Later in 2001, OGC released ITIL v2 with a consolidated 9 books that includes Service Delivery and Service Support. In 2007 with an update later in 2011, OGC released ITIL V3 with a major change on its preceding version V2. In this version 3, they have introduced and adopted a lifecycle approach for IT Service Management and processes under each lifecycle stages. In 2014, Axelos has owned the intellectual property and the trademark. Now in 2019, Axelos has released ITIL 4 with major changes introducing Service Value System and The Four Dimension Model.

Let us see brief introduction and comparison on ITIL V3 and ITIL 4 to help for a complete understanding on the changes.

2.7.1.1 Overview of ITIL V3 and V4

ITIL V3 is shaped around 5 lifecycle stages - IT Service Strategy Management, IT Service Design, IT Service Transition, IT Service Operation and Continual Improvement. Those Lifecycles were much detailed in 5 core publications.

There are 26 defined processes within each of those 5 lifecycle stages.

ITIL 4 come up with the concept that considers Service Management as a system and introduced the Service Value System (SVS). The ITIL SVS represents how the various components and activities of the organization work together to facilitate value creation through IT-enabled services (AXELOS, 2019). The Key components of ITIL 4 are the **SVC** and the **Four Dimension Model**. Those two concepts are reviewed in this thesis with much detail.

2.7.1.2 Service Value system in ITIL 4 and comparisons with ITIL v3 concepts

The ITIL 4 SVS includes the Guiding Principles, Governance, Service Value Chain (SVC), Practices and continual Improvement. Fig 3 below shows the complete SVS framework.

Figure 1: ITIL 4 - The Service Value System (Source: Axelos)

Let us see a very brief highlights about the components of the SVS system based on ITIL 4.

Guiding principles

A guiding principle in ITIL 4 is a recommendation that guides an organization in all circumstances, regardless of changes in its goals, strategies, type of work, or management structure (AXELOS, 2019). There are 7 guiding principles in ITIL4, and they are:

- *Focusing on Value*
- *Start Where you are*
- *Progress iteratively with feedback*
- *Collaborate and promote visibility*
- *Think and work holistically*
- *Keep it simple and practical and optimize and automate.*

Governance

Organizational Governance is a system by which an organization is directed and controlled (AXELOS, 2019). Within this endeavor it involves Evaluation, Directing, and Monitoring activities on the strategy, portfolios, and relationships with other parties. This includes the IT Service Management activities as well and it is the responsibility of the governing body to maintain to correct any issues regarding the Service value System and should be continually improved to meet stakeholder satisfaction.

Service value chain

ITIL 4 defined Six value chain activities that the organization takes in the creation of value. The activities are plan, improve, engage, design and transition, obtain and build, deliver and support. Those lists of activities are almost similar with the 5 stages in ITIL V3 – Strategy, Design, Transition, Operation and CSI except some restructuring the concepts.

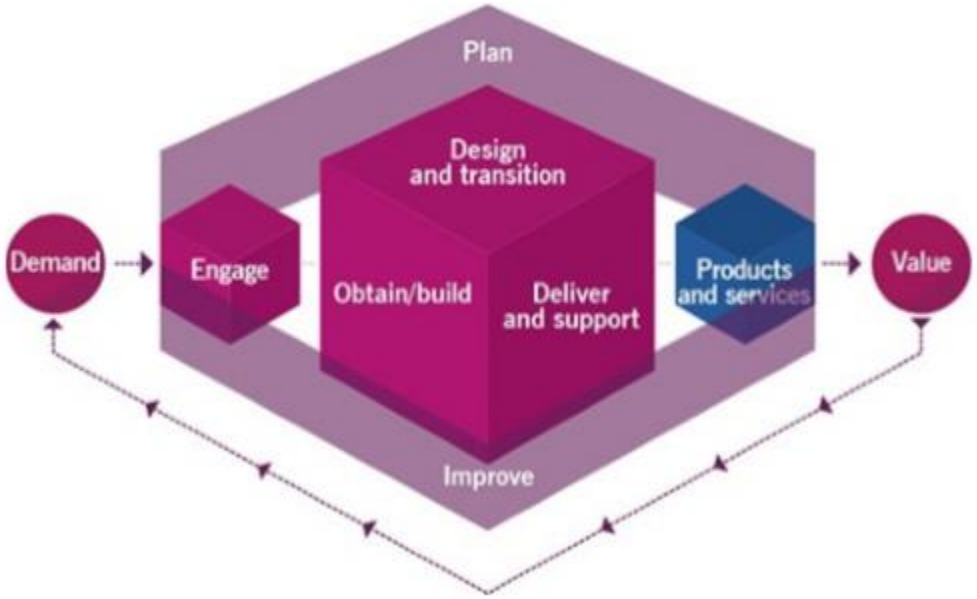

Figure 2: ITIL 4 - Service Value Chain (Source: Axelos)

Below is the high-level mapping of ITIL V3 Lifecycle stages with ITIL 4 SVC

ITIL V3 – Lifecycle stages	ITIL 4 – Service Value Chain
Strategy	Plan
	Engage
Design	Design and Transition
Transition	
	Obtain/Build
Operations	Deliver and support
Continua Service Improvement (CSI)	Improve

Figure 3: Mapping of ITIL V3 Lifecycle stages with ITIL 4 SVC

ITIL 4 SVC's "Plan" and "Engage" has similarity with ITIL V3 "Strategy" as the main focus of all those terminologies in both versions are creating plans at all levels (strategic, tactical, operational), service portfolios, policies and policy development, demands and opportunities, requirements, and project initiations/ Charter.

"Design and Transition" activity in ITIL 4 SVC includes the "Design" lifecycle stage activities in ITIL V3 and part of the activities of "Transition" as there is another Service Value Chain activity named "Obtain/Build". In the earlier version "Transition" includes build, deployment, testing, training, and release of new or changed services. So, we can say that In ITIL 4, part of the V3's Transition work is moved to "Design and Transition" and the remaining build, deploy, and release activities of the V3's "Transition" is considered as a separate activity as "Obtain/Build"

Outputs and details of "Deliver and Support" activities of the ITIL 4 SVC are similar or equivalent with "Operation" stages of the ITIL v3 Lifecycle. And similarly, the concepts of CSI in ITIL v3 is similar with the "Improve – Continual Improvement" activity of ITIL 4 SVC as both seek improvements in the IT Service Management though in the latest version of ITIL the term "Service" is removed from ITIL V3's Continual Service Improvement.

Practices

Sets of organizational resources designed for performing work or accomplishing an objective (AXELOS, 2019). In ITIL 3 those practices were named as processes and there were 26 process within process groups or lifecycle stages. In ITIL 4 those process and some other additions and

modifications together considered as practices. Practices in ITIL 4 are grouped with 3 practices grouped named as General management Practices, Service Management Practices, and Technical Management Practices. Within those 3 groups, there are 34 defined practices.

Continual improvement

Continual Improvement is part of the ITIL 4's Service Value System. In Version 3 the term being used was Continual Service Improvement (CSI). It seems that the authors of ITIL 4 want to consider the improvement approach in much wider concept than just focusing on Service Improvement. CSI is now change to Continual Improvement.

The idea of a continual improvement in ITIL4 is to perform a recurring organizational activity at all levels to ensure that an organization's performance continually meets stakeholders' expectations.

The figure beneath is to show the changes on the improvement approaches between ITIL V3 and ITIL 4.

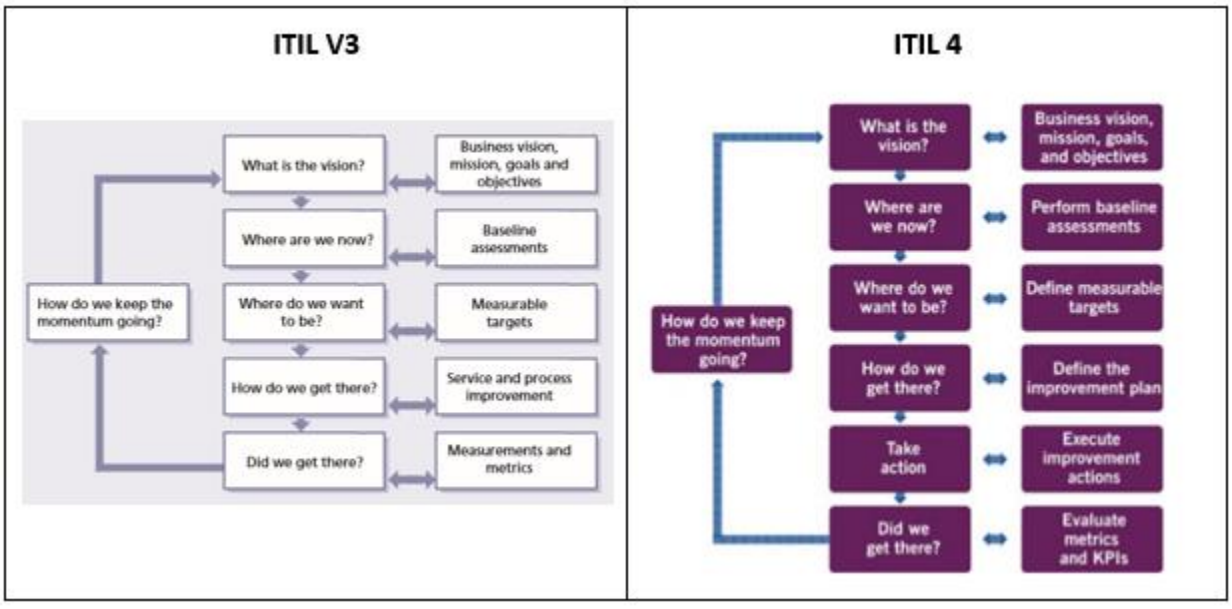

Figure 4: Comparison of Continual improvement approach in ITIL V3 and ITIL 4

In the continual improvement model, it always starts by identifying what the vision of the organization is to help the organization align initiatives and improvement actions with the overall strategy of an organization. Here documents related to business vision, mission, goals,

and objectives are checked. This provides context for all subsequent decisions and links individual actions to the organization's vision for the future (AXELOS, 2019).

Once the vision of the organization has been identified, the next step in the continual improvement approach is to do an assessment to understand the current organizational statuses. This is an important step in the improvement process as it helps for the comparison and identifying the changes/benefits gained through any improvement initiatives in the later stages. If baseline is not known, it would be difficult for one to tell progress/changes or benefits gained. The success of an improvement initiative depends on a clear and accurate understanding of the starting point and the impact of the initiative (AXELOS, 2019).

Having the vision of the organization understood and the baseline created, then the next step in the improvement process is to decide where the organization want to be in a certain defined period of time by creating a measurable target compared with the baseline assessment done in the earlier stage. A journey cannot be mapped out if the destination is not clear (AXELOS, 2019).

Now, at this stage, the question of how those defined measurable targets could be achieved comes on to the table for the purpose of a complete and feasible planning. This step helps in achieving the target and, therefore, needs to be carefully considered not to fail as failing in one initiative will impact reliability of any upcoming improvements. Failed improvements erode confidence and can make it difficult to get support for future improvements (AXELOS, 2019).

The 5th stage in the improvement model is "Take action". This stage is new which were not part of CSI model in ITIL V3. This is an actual implementation of the planned improvement initiatives. While executing this stage, ITIL recommends that it could be more appropriate to follow an Agile approach by experimenting, iterating, changing directions, or even going back to previous steps as well.

Once executed, the next stage in the model is to check whether the target defined in the earlier stages has been achieved or not. ITIL 4 states that, the path to improvement I filled with various obstacles, so the success must be validated. In this endeavor, both the progress and values

needs to be checked and confirmed (AXELOS, 2019). The defined metrices and KPIs shall be assessed to assure that the target is achieved.

Finally, the question of "How do we keep the momentum going?" needs to be answered.

2.7.1.3 The Four Dimensions in ITIL 4 and its comparison with 4 P's in ITIL V3

The Four Dimension Model, as outlined in ITIL 4, helps to ensure a holistic approach in Service management. The four dimensions are - organizations and people, information and technology, partners and suppliers, value streams and processes. With the Same concept, those were included in ITIL V3. The term being used in ITIL 3 was 4P's that includes People, Process, Partners, and Products.

ITIL V3 – 4 P's	**ITIL 4 – the Four Dimensions**
People	Organization and People
Process	Value Streams and processes
Partners/Suppliers	Partners and Suppliers
Products/Technology	Information and Technology

Table 2: Comparison of ITIL V3 the 4 P's and ITIL 4 the Four Dimensions

Here both ITIL V3 and ITIL 4 speaks the concept in those terminologies. For example, "People" in ITIL 4, now named "Organization and People" are almost the same except that Organization aspect is explicitly mentioned in ITIL 4. "Process" in ITIL 3 is come up in ITIL 4 as "Value Stream and Processes" with a broader concept and explanations.

2.7.1.4 Comparison of ITIL4 practices with V3 processes

The table beneath shows the comparisons and mapping of ITIL V3 processes with ITIL 4 Practices. It is good to note the similarities and differences between practice and process. ITIL defines practice as "*A set of organizational resources designed for performing work or accomplishing an objective*" whereas processes are "*A set of interrelated or interacting activities that transform inputs into outputs*". Those definitions tell as both processes and practices are designed to accomplish a certain objective.

ITIL 4 Category	Practices in ITIL 4	Processes in ITIL V3	ITIL V3 Process Group
General Management Practices	Architecture management	Strategy Management for IT Services	IT Service Strategy
	Continual improvement	Portfolio Management	
	Information security management	Financial Management for IT Services	
	Knowledge management	Demand Management	
	Measurement and reporting	Business Relationship Management	
	Organizational change management	Service Catalog Management	IT Service Design
	Portfolio management	Service Level Management	
	Project management	Availability Management	
	Relationship management	Capacity Management	
	Risk management	IT Service Continuity Management	
	Service financial management	Information Security Management	
	Strategy management	Supplier Management	
	Supplier management	Design Coordination	
	Workforce and talent management	Change Management	IT Service Transition
Service Management Practices	Availability Management	Release and Deployment Management	
	Business analysis	Service Asset and Configurations Management	
	Capacity and performance management	Service Validation and Testing	
	Change control	Knowledge Management	
	IT asset management	Transition Planning and Support	
	Monitoring and event management	Change evaluation	
	Problem management	Change Management	
	Service design	Event Management	IT Service Operation
	Service desk	Incident Management	
	Service level management	Problem Management	
	Service request management	Access Management	
	Service validation and testing	Request Management	
	Service catalogue management	7 Step Improvement Process	CSI
	Service configuration		

	management	Labeled in white under ITIL 4 column are practices that are new and introduced in ITIL4 and whereas those under ITIL v3 are those omitted in ITIL 3 to stand alone.
	Service continuity management	
	Incident management	
	Release management	
Technical Management Practices	Development management	
	Infrastructure and platform management	
	Software development and management	

Table 3: Comparison of ITIL 4 Practices and ITIL v3 Processes

There is coloring made under each process/practice to match between the two versions. The process/practices in white color are those that does not match.

There are new practices introduced in ITIL 4 and there are also mergers and splits of processes from ITIL v3. The new practices introduced in ITIL 4 are Architecture management, Organizational change management, Project management, Measurement and reporting, Risk management, Workforce and talent management, Workforce and talent management, Business analysis, Service design, Service desk, Infrastructure and platform management, Software development and management.

Architecture management is a new practice separately defined in ITIL4 which comprises all components in an organization that includes business architecture, service architecture, information architecture, technology architecture, and environmental architectures. Even though there was no specific process in ITIL V3 related to architecture management, but the concepts were included in IT Service Design Lifecycles the different architectures are mentioned as well as the "Design Aspects" are included. "… an integrated approach should be adopted for the design activities and those integrated activities include" - Service solutions, Service Management systems and tools, Technology architectures and management architectures and tools required to provide the services, Processes, and Measurement systems(OGC, 2011b).

Organizational change management is a practice totally new in ITIL 4. In ITIL v3 there was a Change Management process which explicitly excludes activities related to organizational changes. The Change Management process in ITIL 3 manages only changes within IT Service management like the "Change Control" practice in ITIL4.

Project Management is another practice that is introduced in ITIL 4. In ITIL V3, it of course advocates the importance of use of project management methodology such as Projects IN a Controlled Environment (PRINCE2®) or Project Management Body Of Knowledge (PMBOK®) and there are also process under Design and Transition phase with a closer objectives called "Design Coordination" and "Transition Planning and Support".

Service design were not recognized as a process in ITIL V3 rather it is just one of the phases in the IT Service Management Lifecycle but now in ITIL 4 it is considered as a separate practice.

Service desk in ITIL V3 was considered as a function as a structural grouping of resources that help to manage service requests and incidents that aims to "fulfill service requests" and "restore services as quickly as possible" respectively. But in ITIL 4 service desk stand out as a separate practice. Similarly, Infrastructure and platform management, Software development and management are practices in ITIL 4 which will correspond with Technical Management and Applications Management Functions in ITIL V3.

2.7.2 Control Objectives for Information and related Technology (COBIT)

COBIT is developed by ISACA (Information Systems Audit and Control Association) and its first version of COBIT is released in 1996 as per the information gained from the official ISACA website. COBIT was initially developed as a framework for executing IT audit assignments, built around a comprehensive set of Control Objectives for IT processes(De Haes and Van Grembergen, 2009). Over successive versions, COBIT transitioned toward a broader IT governance and management framework with management tools including metrics, critical success factors, maturity models, and tools for the assignment of roles and responsibilities for IT processes (De Haes, Van Grembergen and Debreceny, 2013).

COBIT 5 overview

COBIT provides best practices and tools for monitoring and managing IT activities (Hardy and Hesch, 2008). And it also provides a common language for business executives to communicate goals, objectives and results with audit, IT and other professionals (Hardy and Hesch, 2008). IT helps enterprises create optimal value from IT by maintaining a balance between realizing benefits and optimizing risk levels and resource use (ISACA, 2012)

COBIT 5 released in 2012 with a concept of Enterprise Governance of IT. COBIT 5 enables IT to be governed and managed in a holistic manner for the whole enterprise, taking in the full end-to-end business and IT functional areas of responsibility, considering the IT-related interests of internal and external stakeholders (ISACA, 2012).

COBIT provides good practice guidance for the complete lifecycle of IT investment (De Haes, Van Grembergen and Debreceny, 2013)

COBIT 5 Principles

In COBIT 5 there are Five Principles and those principle's high-level description is shown below as obtained from ISACA book – COBIT 5 - A Business Framework for the Governance and Management of Enterprise IT.

- Meeting Stakeholder Needs
- Covering the Enterprise End-to-end
- Applying a Single, Integrated Framework
- Enabling a Holistic Approach
- Separating Governance from Management
-

COBIT 5 Enablers

According to BOBIT 5, to achieve IT related goals it requires an application and use of "Enabler goals". Those Enabler goals are grouped in to 7 as shown below:

- Principles, policies, and frameworks.
- Processes.
- Organizational structures.
- Culture, ethics, and behavior.
- Information.
- Services, infrastructure, and applications.
- People, skills, and competencies.

The COBIT 5 Process Reference Model

The COBIT 5 Process Reference Model consists of 37 processes within 5 process groups aimed for the effective management of governance and Enterprise IT. The five process groups are:

- Evaluate Direct and Monitor (EDM)
- Align, Plan and Organize (APO)
- Build, Acquire and Implement (BAI)
- Deliver, Service and Support (DSS)
- Monitor, Evaluate and Assess (MEA)

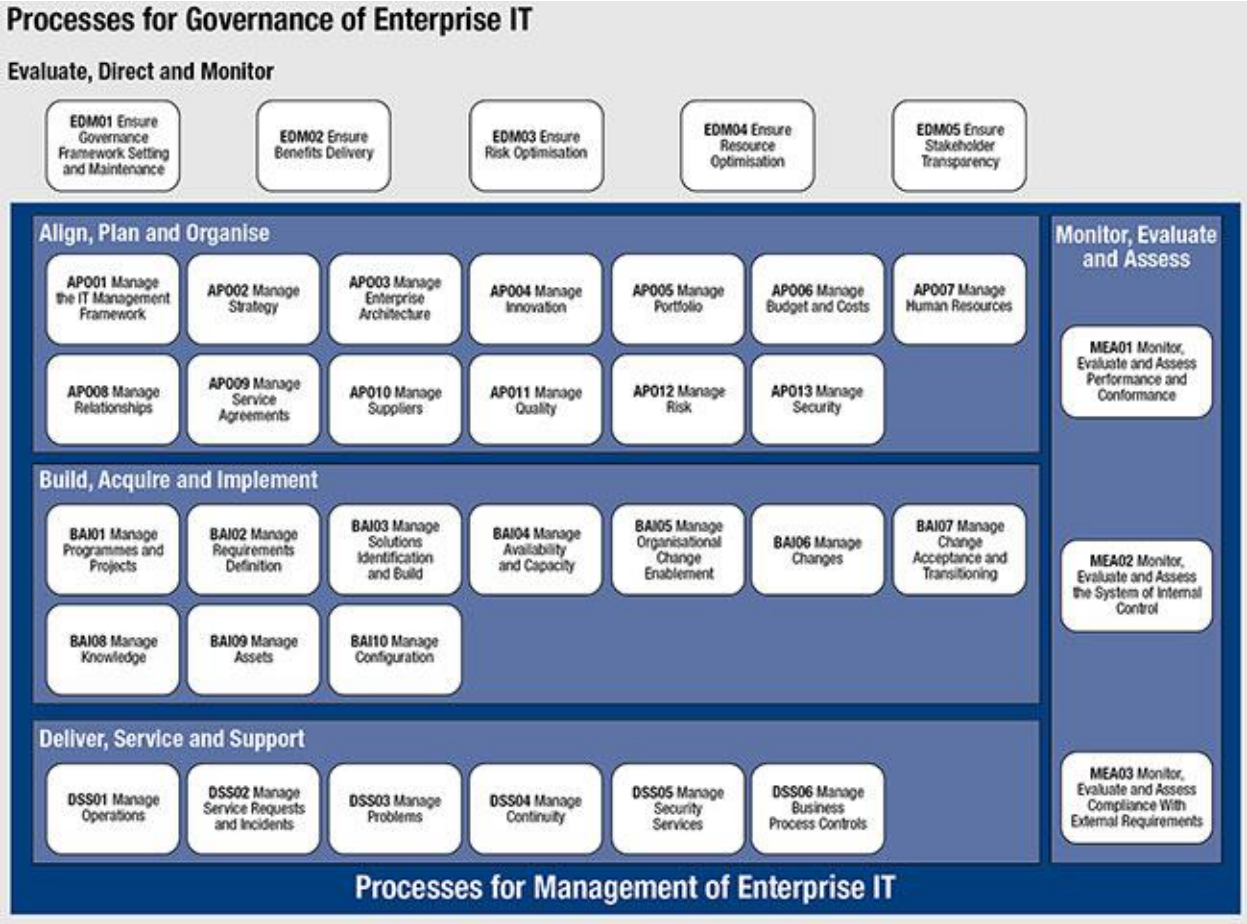

Figure 5: COBIT 5 Process Reference Model (source: ISACA)

2.7.3 DevOps

The main intention of DevOps is to remove the barriers between development and operations (Elberzhager *et al.*, 2017) while managing IT solutions. Efficiency is achieved when there exist a tight collaboration between the system development team - who are involved in the analysis,

design, and implementation of IT solutions with the IT Operations team who are highly involved in efficient and effective delivery of the IT Services.

For service management to be effective, it needs to be more adaptive and respond quickly to rapid changes (Kaiser, 2018) and this could be achieved by adopting the principles of DevOps. Based on studies made in the year between 2013 to 2016, there is an empirical evidence that shows using DevOps increases reliability as well as improves Organizational performance (Kim *et al.*, 2016). The book reveals that there is 60 times higher change success rate and the Mean Time to Restore Service (MTTRS) is 168 times faster as well by organizations adopted DevOps. Similarly, productivity, market share, and profitability goals are also 2 times more likely to exceed. This shows there is a better organizational performance that could be gained by those organizations adopted DevOps.

2.8 ITSM Standard

ISO/IEC 20000 is the standard for IT Service Management, which was initially developed in 2005 with revisions in 2011 and 2018. It has a series of publications that guides IT Service Management. Those publications are developed and published by ISO/IEC JTC1/SC7 – the sub standardization committee for Software and systems engineering. The latest version of the standard is comprised of publication of ISO/IEC 20000-1: 2018, ISO/IEC 20000-2: 2019, ISO/IEC 20000-3:2019, ISO/IEC 20000-5:2013, ISO/IEC 20000-6:2017, ISO/IEC 20000-7:2019, ISO/IEC 20000-10:2018, ISO/IEC 20000-11:2015, ISO/IEC 20000-12:2016.

With its revised version in 2018, ISO/IEEC 20001-1:2018 is the “Service Management” standard document. This document specifies the requirements for “establishing, implementing, maintaining, and continually improving a Service Management System. This standard document helps IT organizations to support the IT Service Management activities. Those IT Service management activities include all from the inception of service planning to delivery and improvement activities.

ISO/IEC 20000-2: 2019 has the Guidance for the application of Service Management System as documented and outlined in ISO/IEC 20000-1 publication. The requirements of the Service

Management System are documented in ISO/IEC 20000-1 and the guidance on how to apply those service management requirements are documented in ISO/IEC 20000-2.

Guidance on the scope definition and applicability of the Service Management System standard is described in ISO/IEC 20000-3. As described above, the requirements for Service Management System is documented on ISO/IEC 20000-1 and organizations who would like to apply or use this Service Management Standard should follow the guidance documented in ISO/IEC 20000-2 which provides the guidance for implementing it.

The exemplar implementation plan is documented under ISO/IEC 20000-5. This outlines how the organizations seeking to apply the standard best achieve the requirements of Service Management System as outlined under ISO/IEC 20000-1.

2.9 Chapter Summary

In this chapter both Industry ITSM frameworks, ITSM standard, and papers related to ITSM and Agility were reviewed to create a complete understanding to support this research.

As a best practice approach for IT Service Management, ITIL is highly aligned with ISO/IEC 20000 standard. ISO/IEC does also suggest that application of widely adopted IT Service Management framework or practices like ITIL will help much on the attempt to comply the Service Management System Requirements specified in ISO/IEC 20000-1. The most common route to achieving the requirements of ISO/ IEC 20000 is via the use of ITIL advice (Dugmore and Taylor, 2008) this, of course, requires further research at this point in time as both ITIL and ISO has gone through different versions that changed much on the structure, content and approach as well.

On the other hand, COBIT is also recognized as a framework for IT Service Management and governance. If we just take COBIT and ITIL alone, as clearly mentioned in this literature review, they both have a lot of practices/processes that overlap with a very slight differences in the context. There are also processes/practices that exist in one framework but not in the other. Furthermore, there is also frequent changes in their own structure and contexts that will demand organizations who already adopted those frameworks to keep aligned by making frequent changes as well.

ITIL is considered as non-prescriptive and it is up to the organization adopting the framework to decide which of the processes/practices are relevant to their own context and how to adopt/adapt them to fit for their purpose and objectives. So, this means organizations are left to decide by themselves on the decisions of defining, choosing, prioritizing, customizing, and implementing the practices from among the available framework. Not only the initial decision of which processes from adopted framework to apply within the organization but also flexibility in quickly changing when the best practice changes are the main and critical aspect.

Two or more frameworks can also be adopted in an organization. In such cases the alignment and realignment when changes required within internal processes or change requirements from any of the adopted framework should be anticipated and implemented as quick as possible without impacting the business customer satisfaction.

This literature reviewed different works that has been made available by different researchers on IT Service Management, IT Service Management Maturity Measurement, Agility, ITSM Agility, Organizational Agility but it is evident that there is no prior work that is made available with complete set for IT Service Management Agility Assessment Financial Sector nor suitable for all organizations considering the current advancements in the field.

3 Methodology

3.1 Overview

This chapter describes the Research Method adopted for this study, methodology used, sampling techniques, and pilot test result. The main purpose of research methodology is to show that the research was conducted with the right and suitable methodology to properly answer the research questions outlined in the problem statement. Hence, this chapter tries to clearly demonstrate how the research objective is achieved.

3.2 Research Design Overview

The 6 basic steps in developing a Structural Equation Modeling (SEM) Analysis by Rex B. Kline (2015) was adopted for developing and confirming ITSM Agility Assessment Model developed in this research with the aim of answering the "How to assess the ITSM agility?" research question. This is the steps used to develop the main artifact which is the primary question and objective of the research

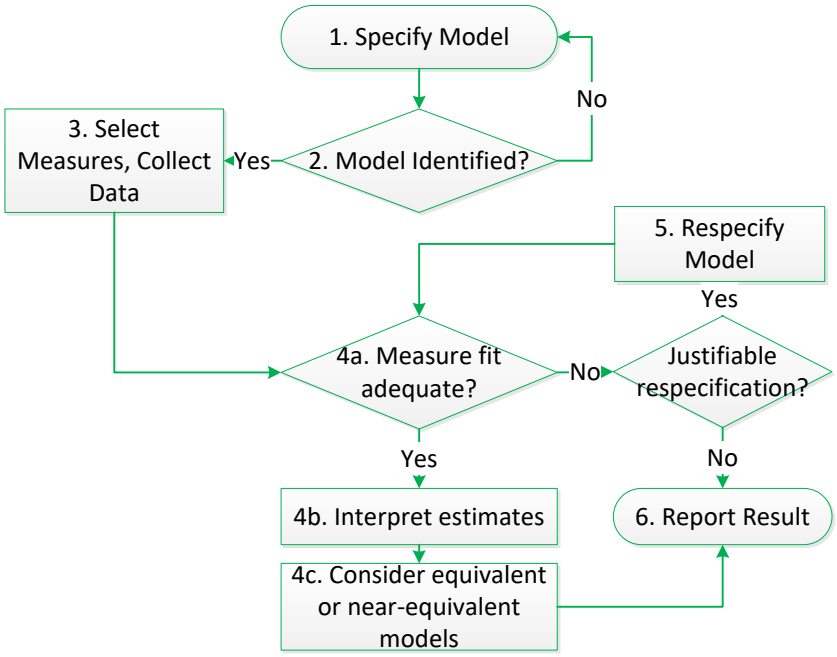

Figure 6: Flowchart of the basic steps of structural equation modeling (adopted from (Kline, 2015)

The complete steps of the research design aligned with the research questions is depicted in the diagram below to show a complete view on what was followed to achieve the research objectives.

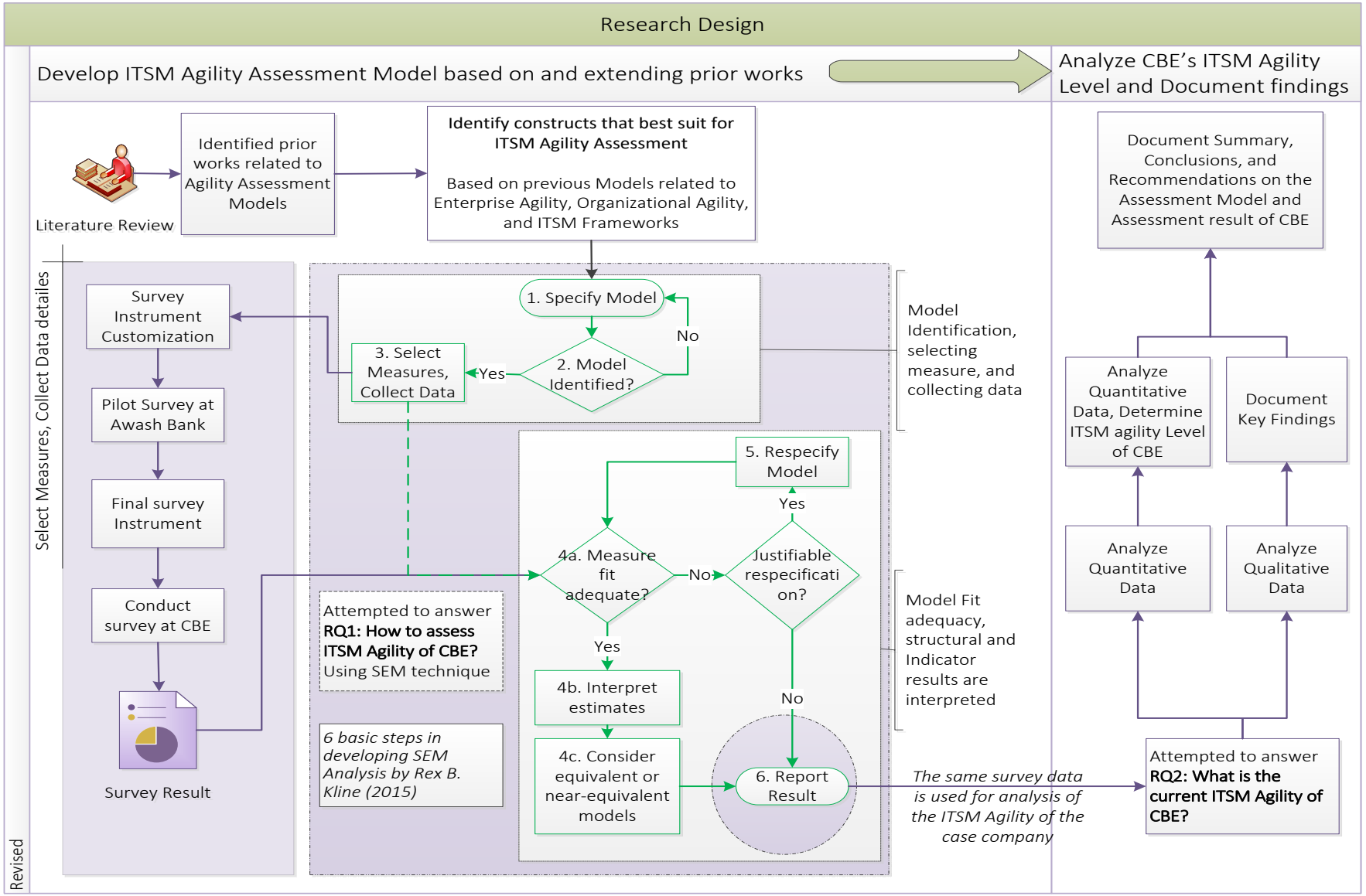

Figure 7: Research Design Process

3.3 Research Approach

The research main objective is to develop an ITTSM Agility Assessment Model to help in assessing the ITSM agility practice of Commercial Bank of Ethiopia. A case study research method is applied in this research to help in achieving this objective. As the form of the main research question (RQ1) is the "How?" type – "How to asses an ITSM Agility?" and as it also focuses on contemporary events, this work followed a Case Study type research as recommended by (Robert K. Yin, 2018).

A mixed method research approach using both Qualitative and Quantitative methods were employed to help answer the research questions.

- Quantitative method was used in this research to help answer all the Research Questions.
- A survey question was distributed to IT employees and responses were analyzed to
    - Develop and analyze the ITSM Agility assessment model using SEM technique
    - Understand the status of ITSM practices in the organization.
- Qualitative semi structured interview questions were also used to obtain some insights from participants to triangulate the ITSM Agility results obtained through survey. Qualitative methods are typically more flexible as they allow greater freedom with the study participant (Farr, 2008).

Sequential Exploratory Strategy adopted: The collection and analysis of quantitative data followed by the collection and analysis of qualitative data and the data is integrated during interpretation.

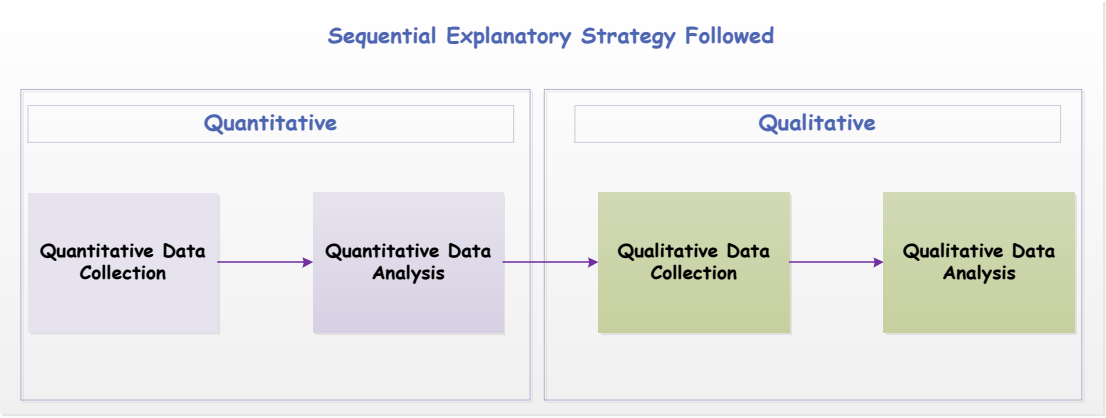

Figure 8: Research Approach Overview

3.4 Sampling and data collection Technique

The sampling method by Taherdoost (2018) were adopted in performing the sampling in this research. Clearly defining the target population, Selecting sample frame, choosing sample technique, determine sample size, collecting data, assess response rate (Taherdoost, 2018) are the stages followed while sampling data collections stage of this research.

3.4.1 Target Population

The total target population for this research is the whole IT staffs in CBE managed under the CIO. Based on the data obtained from the organization, there are around 490 IT staffs currently working for the unit.

3.4.2 Sampling frame

A sampling frame is a list of the actual cases from which sample will be drawn (Taherdoost, 2018). Within this research. those IT professionals with ITSM background are considered as they are true representative of the population and to help in achieving the research objective of developing an ITSM Agility Assessment Model.

3.4.3 Sampling Technique

Purposive or judgmental sampling is utilized to select participants for the survey. This non-probability sampling technique purposely utilized to select the group of participants with good understanding about the subject matter to obtain valuable information. IT professionals, Managers, and Directors with skill and experiences in ITSM frameworks, best practices, and the ISO standards were considered in the sampling.

All selected participants on the survey have full understanding about ITSM and has some level of Training and certification on one or more ITSM industry frameworks like ITIL and COBIT.

3.4.4 Sample size

To assist in generalization and to avoid sampling errors or biases, a random sample needs to be of adequate size (Taherdoost, 2018) and it is also important to review the background of the model, the distributional characteristics of the data, the psychometric properties of variables, and the magnitude of their relationships when determining sample size (Wong, 2013). In this

research a five-point likert scale were used to measure a continuous variable and a Partial Least Square based Structure Equation Model (PLS-SEM) approach applied.

The final Model being used contains 8 constructs, the maximum number of indicators for each construct in the model is 6, the largest number of inner model path in the model pointing to a construct is 3. As reflective indicators were used, 10 times the maximum number of paths pointing to a specific construct in the model (3) equals 30 and this is the minimum required sample (Hair *et al.*, 2014). Therefore, the sample size of 77 used in this research is adequate.

3.4.5 Data Collection Technique

Questionnaires were used to develop the ITSM Agility Assessment Model for Commercial bank of Ethiopia and to determine the ITSM Agility Levels of the organization. The same questionnaires were used to measure the contribution of ITSM Agility.

An online google form were used as a tool to perform the survey, and invitation to 190 IT professionals, with IT Service Management experience and understanding, were sent by email. Individuals assigned under CBE's IT Service Management (ITIL) Implementation team were also involved in the survey.

Open ended questions were also distributed online to collect insights about the overall ITSM practice in the company.

3.4.6 Response Rate Assessment

A total of 190 request to fill the survey were sent out via email and 77 responses were obtained and used for the data analysis, which makes it around 41% response rate. The 77 responses obtained is around 16% of the total population and it satisfies the minimum required size for PLS-SEM based data analysis.

3.5 Pilot Testing and Instrument Validation

The survey instrument was finalized after conducting a pilot survey in relatively similar company in the banking industry. The pilot survey was conducted using 10 ITSM trained professionals from Awash Bank, which is one of the largest and oldest Banking companies in Ethiopia. Those IT professionals are working in the Bank with different capacity including

management roles. They all have taken ITIL 4 foundation course and were with the capacity to fully understand ITSM best practices.

Participants in pilot survey has also extensive experience in IT within the bank industry relatively similar size and practice with the case company (CBE). An online google form were used to fill the survey to collect the feedbacks, and the collected feedback shows that the questions were clear, and they all understood the questions and responded minor comments.

The final survey was distributed after incorporating the comments from pilot survey, which is mainly corrected by rephrasing and using simple vocabularies.

3.6 Tools used for Data Analysis

In this research different tools were used for obtaining statistical results and conduct the necessary data analysis to help answer the research questions.

SmartPLS

SmartPLS version 3.2.9 were used for Structural Equation Modeling Analysis to measure the ITSM Agility Measurement Model

IBM SPSS

IBM SPSS Statistics version 23 were used for analyzing descriptive and frequencies of obtained data from each indicator for each Variable.

NVivo

NVivo version 12 was used for analyzing inputs collected from an open-ended question. Used to code the information, creating nods and relationships of from the sentences obtained from users as a response for the questions.

4 Model Development for assessing ITSM Agility

This chapter focuses on developing an ITSM Agility Assessment Model to answer the first research question (*RQ1: How IT Service Management Agility can be assessed?*). It provides an overview of prior related models and Industry Frameworks. The Identification, composition, and relationships of constructs with definitions of Agility levels are part parts of this chapter.

In this chapter, the 6 basic steps in developing a Structural Equation Modeling Analysis by Kline, 2015 as demonstrated in Research Design Overview section were followed for developing the ITSM Agility Assessment Model.

4.1 Overview

In an attempt to develop ITSM Agility assessment model, this research is based on and extends the works of (Izza and Imache, 2008), (Imache, Izza and Ahmed-Nacer, 2012), (Wendler, 2014), current development on the ITSM Framework by Axelos (AXELOS, 2019), and (Isaca, 2012). They are considered as a theoretical and conceptual base for this paper.

- **(Wendler, 2014) "Development of the organizational agility maturity model"**

  Wendler proposed a maturity model consisting of three main dimensions – Agility Prerequisites, Agility of People, and Structures enhancing agility to help assessing the maturity of organizational agility.

  Wendler's "Agility Prerequisite" dimension consists of Agile values and Technology sub dimensions that focuses on organizational culture and an available technology that could support organizational agility by facilitating efficient communications within an organization.

  The second dimension, agility of people, has two sub dimensions – "Workforce" that consists employee capability and the other sub dimension "Management of change" that checks the quick response capability of the organization for changes.

  Under Wendler's "Structures Enhancing Agility" dimension, there are two sub dimensions "Collaboration and cooperation" and "Flexible Structure" both focusing on the ability of the

organization's different functional units' collaboration and quick adaptation of process and organizational structure.

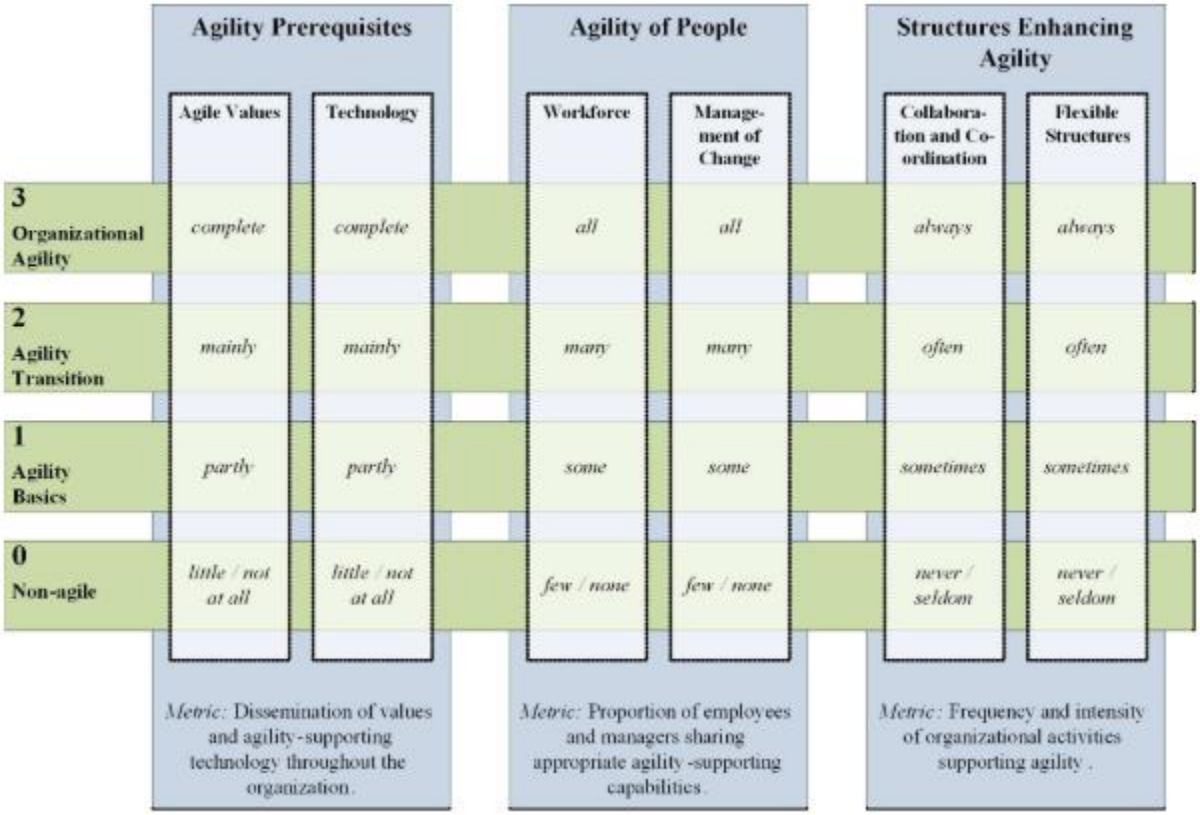

Figure 9: Structure of the Organizational Agility Maturity Model (Wendler, 2014)

- **(Izza and Imache, 2008) "An Approach for the Evaluation of the Agility in the Context of Enterprise Interoperability"**

  For assessing Agility from the context of enterprise interoperability, (Izza and Imache, 2008) suggested a framework called POIRE that comprises of Processes, Organization, Information, Resources and Environments.

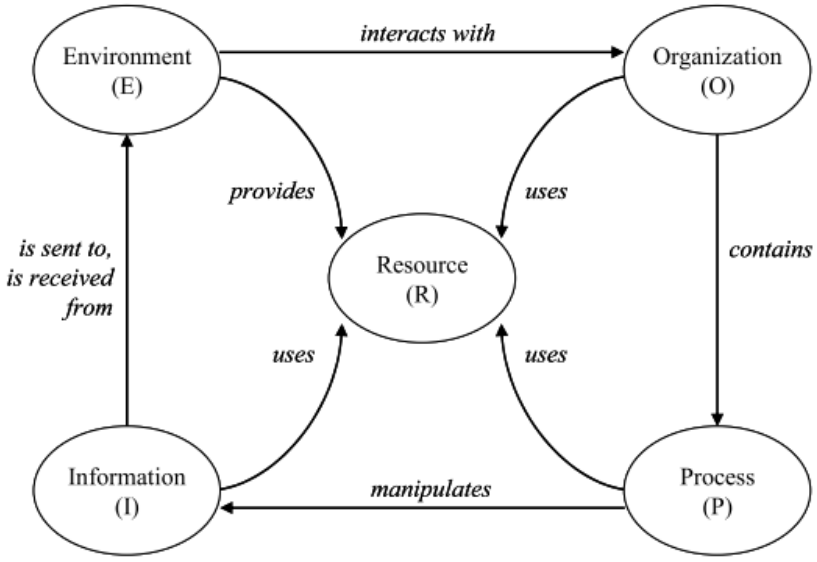

Figure 10: POIRE framework - taken from - (Izza and Imache, 2008)

- **Industry ITSM Frameworks: ITIL4 published in 2019.**

  ITIL 4 is discussed in detail under **Literature Review** Section. Two concepts taken from ITIL4 - "Four Dimension Model" and the Seven "Guiding Principles" from the Service Value System Framework. The Four Dimension Model is shown beneath.

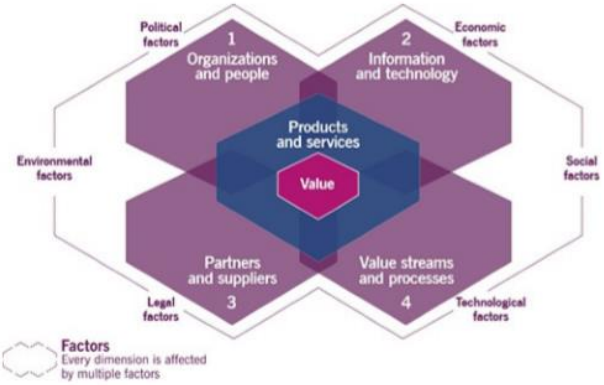

Figure 11: ITIL 4 - The Four Dimensions (Source: Axelos)

- **(Imache, Izza and Ahmed-Nacer, 2012) "An enterprise information system agility assessment model"**

  In this paper the authors developed an agility evaluation approach based on the POIRE framework from (Izza and Imache, 2008). In this paper, the "General Agility" is obtained by combining Process Agility, Organizational Agility, Information Agility, Resource Agility,

Environment Agility, and Mutual Agility. The Enterprise Information System Agility Evaluation is shown in the figure below.

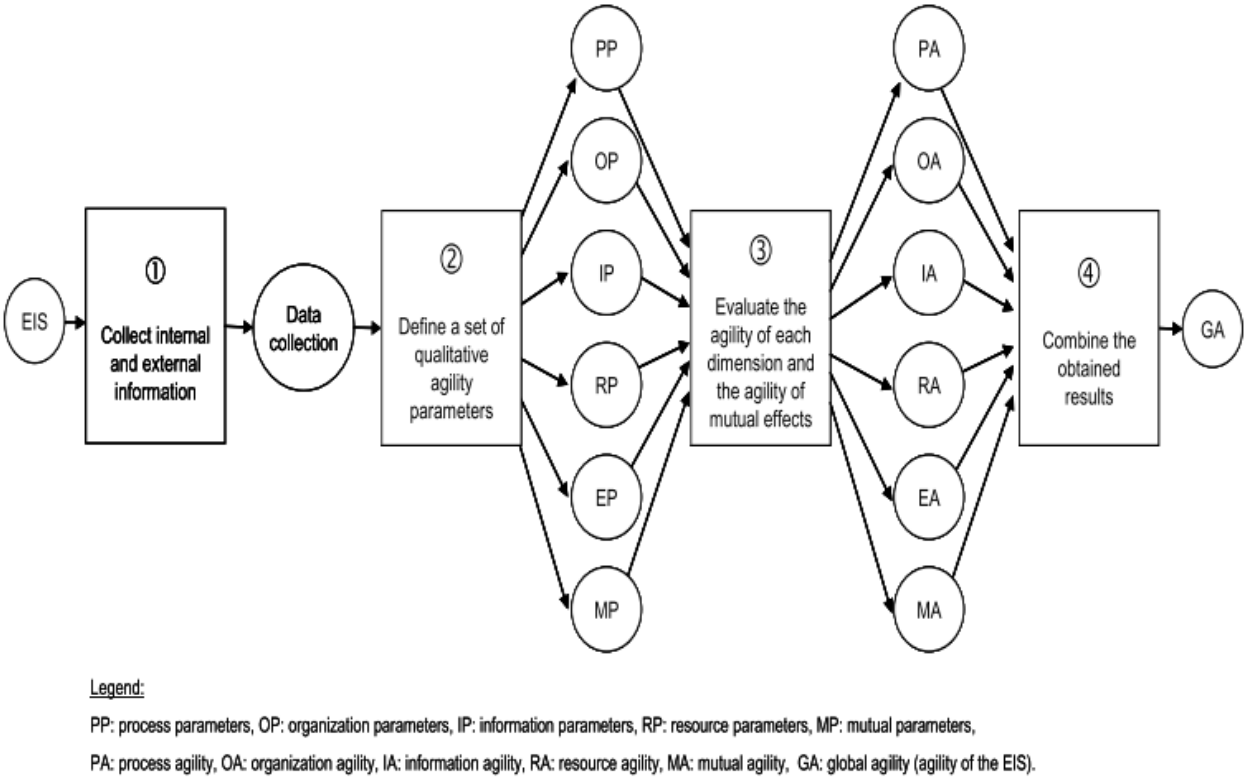

Figure 12: POIRE Agility Evaluation approach by (Imache, Izza and Ahmed-Nacer, 2012)

- **Industry ITSM Frameworks: COBIT5**

  COBIT 5 "Principles" and "Enablers" are considered here to conceptually back this research while developing the IT Service Management Agility Assessment Model. The principles, Enablers and Process Reference Models are described in much detail under Literature Review Section in Chapter Two.

4.2 New Model Specification

4.2.1 Description of Constructs

After studying and reviewing ITSM and Agility related research papers and other related ITSM best practice frameworks, 8 Latent Variables which are considered key for ITSM Agility Assessment within organization were Identified. They were extracted mainly from works of Organizational Agility Maturity Model by Wendler, The Four Dimension Model from ITIL 4 publication by Axelos, The POIRE framework of Izza and Imache and its preceding paper on Enterprise Agility. Below shows the extracted model and sources.

POIRE Framework (Izza and Imache, 2008)	Enterprise IS agility assessment model (Imache, Izza and Ahmed-Nacer, 2012)	The Four Dimensions Model and ITSM Principles in ITIL (AXELOS, 2019)	COBIT5 Enablers and Principles (ISACA, 2012)	Organizational agility maturity model **(Wendler, 2014)**	**New Proposed Model Composition**
Environment		Partners and Suppliers		-	**Partners & Suppliers Management**
Resources	Resource Agility	Organization and People	People, skills, and competencies.	Agility of people: Workforce	**Workforce and Skills**
Organization	Organization Agility		Organizational structures Culture, ethics, and behavior	Flexible Structure	**Organizational Environment Flexibility**
				Collaboration and cooperation	**Collaboration and Cooperation**
Environment	Mutual Agility			-	**Stakeholder Customer Management**
Resources and Information	Resource, Information Agility	Information and Technology	Information Services, infrastructure, and applications	Technology	**Information Systems and Technology Agility**
Process	Process Agility	Value Stream and Processes	Processes Principles, policies, and frameworks.	-	**Processes Implementation Maturity**
-		7 Guiding Principles		Agile Values	**ITSM Agility**

Table 4: Model Composition and comparison with relevant work

This section includes details about the new model with description and associated indicators for each construct - *Partners and Suppliers Management Practice, Workforce and Skills, Organizational Environment Flexibility, Collaboration and Cooperation, Stakeholder/Customer Management Practice, Information Systems and Technology Agility, Processes Implementation Maturity, ITSM Agility.*

Partners and Suppliers Management Practice

The process of engaging partners and suppliers and the proper management of the engaged suppliers and partners are two key activities that should be taken into consideration within this Supplier Management variable.

Quality should be the key criteria for selecting partners and suppliers instead of considering just cost perspectives. Organizations need to make sure that they are getting the most out of existing agreements and contracts with partners, suppliers and sub-contractors through a properly organized teams and supporting process. IT organizations should focus on regularly monitoring the performance of the supplier or partner according to the initial agreed contracts with close collaborations as well.

Information Systems and Technology Agility

The technology variable aims in taking into consideration both the IT infrastructures and applications - from the perspective of Service delivery supporting the corporate business objectives and ITSM domains. It supports operational activity for enhancing efficiency and effectiveness in IT Service Delivery. This includes making sure the existence of application systems in the organization that can support the business to be competent in the market. Up-to-datedness of the systems and IT infrastructure, well integration of different systems and platforms within different units in the organization, standardization of the technology in use throughout the organization for the sake of efficiency, interoperability of existing systems for maximum and efficient utilization, and most importantly easiness of the infrastructure for expansion.

Processes Implementation Maturity

This dimension deals with ITSM related processes and their implementation levels. Relevant and critical processes need to be defined in a very simple and easy to follow approach. All defined and existing processes shall be communicated among all stakeholders and process practitioners. Documentation of process definitions with all necessary contents shall also be made available. This includes, but not limited to, describing process objectives, process purpose, process scope, process activities with defined steps, and with necessary measurement methods including Critical Success Factors and Key Performance Indicators.

Processes should be reviewed to make them efficient enough to deliver the IT services with a goal of value creation/cocreation with stakeholders. To achieve this there should be a regular review period to continually take improvement inputs from different stakeholders.

Organizational Environment Flexibility

An organization should review its organizational structure, resource, and team setups regularly to keep itself as flexible as possible in adopting changes and ensure efficient support in delivering value to stakeholders.

There should be an organizational setup that could encourage and support managers to flexibly deploy the necessary resources to make use of opportunities. In doing so, the organization can easily avoid or minimize resulting threats.

On the other hand, an organization should make themselves ready to regularly assess their environment and systematically anticipate any upcoming changes that could be a result of many internal and external factors. And further, it should make sure its capability to make the necessary and quick application of changes taking the organizational, technological, customer and supplier related key factors into consideration.

Finally, in addition to the fact that assigning the right manager to the right unit is crucially important for the success, an organization should also be able to change them whenever the tasks within the unit changes for different reasons.

Workforce and Skills

Workforce and skills have impact on the delivery of services to customers. Employees in the organization should be equipped with a broad range of knowledge and skills that could be applied in an effective delivery of value through the IT services.

This variable measures the proper adoption of continuous improvement approach from the perspectives of staff's perception towards making a continual improvement on services, processes, procedures, etc. with an ultimate objective of keeping delivery of value to customers. Development and availability of a self-motivated staffs which are ready to continuously learn and update knowledge are another aspect to be measured under this variable.

Collaboration and Cooperation

Collaboration and Cooperation is a variable that is considered for measuring ITSM Agility. Staffs and other stakeholders in the value stream should jointly operate within different functional units of the organizational structure in delivering value as well as in the decision-making process. This pillar makes sure to measure whether the organization adopted a culture of participating all key stakeholders in new service development plans, throughout service developments or changes, and rolling out new service and products. Involvement of stakeholder as early as possible is one of the key topics that should be measured in this pillar.

Stakeholder/Customer Management Practice

Services are delivered for internal customers/stakeholders or external customers. Customers are the one who gets the value from the services. This variable makes sure that all parties in the service delivery chain can closely collaborate and encourage feedbacks from the customers and stakeholders for successful delivery and maximum satisfaction. An indicator that measures all task and activities throughout the IT unit/organization is aligned with the customer or stakeholder requirements and needs. It should also measure that everything that is being done within the organization should be mapped to the creation of value to stakeholder.

ITSM Agility

For measuring the overall Agility of ITSM in the organization, the principles from different ITSM frameworks and agile philosophy are used. Focusing on customer satisfaction is one measure that help to determine a good IT Service Management practice instead of sticking to a strict plan as responding to changes quickly is key indicator for agility in an organization.

The other measure within this variable is to check the approach used in new service development. Measuring the focus of an organization towards delivery of a working service is another important aspect. Instead of spending more time on the documentation part, it is considered important to focus on the working solutions that help deliver the true value to the customer. This is one of the principles in the Agile Manifesto and translated to the context of IT Service Management.

A measure that focuses on the ways of project planning and execution is another area that indicate ITSM agility in the organization. This can be seen from two angles – one is on the way that an organization plans new system introduction and the other is implementation approach. In the planning, an organization should consider already existing ones and focus on adding what is not available as it is important to protect existing investments by avoiding starting from scratch all the time. In addition to this, implanting projects with small, incremental, and iterative approach is another area to measure. In this metrics, collecting feedbacks throughout each iteration is important for success.

One of the indicators of maturity of an ITSM is consideration of all dimension while planning to deliver the IT Service rather than considering just the technology aspect only. In addition to the Information Technology and products dimension, organizations should also equally consider supporting processes, supplier or partners supporting the service, people, and organizational capability to deliver the service efficiently and effectively.

Finally, measuring the capability of the IT organization in quickly responding to changes and readiness to be flexible enough on processes.

4.2.2 Model Relationships and Hypothesis

The components of the new ITSM agility assessment model identified and descriptions with detailed prepositions of the components of the model were included in the above section. This section includes the hypothesized relationships between identified constructs (as endogenous and exogenous variables) with detailed descriptions on their hypothesized relationships. This step represents the hypotheses with graphical conceptual model. Graphical conceptual model provides a visual representation of theoretical variables of interest and expected relations among them (Kline, 2015).

In the model, as one of the main objectives of this research is to develop a model that helps to define the agility level of ITSM practice in an organization, the outer most endogenous variable is **ITSM Agility**. Following paragraphs explains the description and reasons for the hypothesized relationships among the variables of the proposed model.

Organizations should ensure that suppliers and their performances are managed appropriately to support the seamless provision of quality products and services (AXELOS, 2019). Delivery of quality products and services can be ensured by existence of a mature information systems and technology. This leads to the hypothesis that ***H1. Partners and Suppliers Management Practice has significant positive impact on Information Systems and Technology Maturity***. Creating a single point of visibility across all products, services, service components provided by suppliers ensures consistency and control (AXELOS, 2019). So, the more IT organizations work on management of their suppliers, then the more efficient their Information Systems.

Continual Service Improvement activities will require software tools and these tools will be used for data gathering, monitoring, analysis, reporting for services and will also assist in determining the efficiency and effectiveness of IT service management processes (OGC, 2011a). From this we can draw a hypothesis that ***H3. Information Systems and Technology Maturity has significant positive impact on Process Implementation Maturity.*** The more IT units work in maturating their information technology and utilization of information systems in automating processes then it assists improvement and maturity of IT Processes. Similarly, automation can also benefit the collaboration and cooperation activities and hence ***H2. Information Systems and Technology Maturity has significant positive impact on Collaboration and Cooperation***

Information Technology facilitates the communication and coordination of information required for organizational processing (Olson, 1993) and this improves the collaboration and cooperation of stakeholders in the organization. With this we can say that maturity of Information systems and Technology leads to an improved collaboration and cooperation drawing a hypothesis of ***H4. Information Systems and Technology Maturity has significant positive impact on Organizational Environment Flexibility***.

Activities of internal collaboration between departments and functions of the organization for decision making, new product/service development, etc. are summarized as collaboration and cooperation (Wendler, 2014) and it can be easier on the basis of shared practices and standards (OGC, 2011a). Those practices and standards are part of process. Processes are usually detailed in procedures, which outline who is involved in the process, and work instructions, which explain how they are carried out (AXELOS, 2019). This means that the more organizations work in maturing process implementation, the more enhanced collaboration and cooperation will be. Hence, **H5. Process Implementation Maturity has significant positive impact on Collaboration and Cooperation**. Similarly, the more mature processes like Change Management in an organization, the faster decision making in applying changes which could result in creating flexible organizational environment. Thus **H6. Process Implementation Maturity has significant positive impact on Organizational Environment Flexibility.**

Processes and procedures are followed and executed by individuals working in each function or organizational unit. The workforce in the organization should have skills to execute each activity in the processes that could result in a better collaboration and cooperation of the organization. This draws hypothesis that ***H7. Workforce and Skill has significant positive impact on Collaboration and Cooperation.*** On the other hand, the organizations workforce interacts with customers and stakeholders using their skills to deliver services. Mature the workforce and skills would result with better satisfaction to customer and stakeholder. This leads to a hypothesis of ***H8. Workforce and Skill has significant positive impact on Customer and Stakeholder Management practice.***

Organizational structure, resources, and team setups are parts of organizational environment. It describes the ability of the organization to quickly adapt organizational structures and

processes to implement changes and stay competitive(Wendler, 2014). Flexibility of organizational environment could be affected by existing workforce and their skills. This implies that ***H9. Workforce and Skill has significant positive impact on Organizational Environment Flexibility.***

The goal of ITSM is efficient and effective delivery of IT Services to its customers and/or stakeholders. For efficient and effective service delivery, collaborations of individuals and cooperation of different function within the organization are crucial. Agile ways of working include techniques such as timeboxing work, self-organizing and cross-functional teams, and ongoing collaboration and communication with customers and users (AXELOS, 2019). This helps to improve the customer and stakeholder practice in the organization which brings satisfaction on the service delivery. So, we can draw the hypothesis ***H10. Collaboration and Cooperation has significant positive impact on Customer and Stakeholder Management practice.*** The same could be true that the more flexible in responding changes in an organization, more satisfied the customer and stakeholders could be. With this we can have the hypothesis ***H11. Organizational Environment flexibility has significant positive impact on Customer and Stakeholder Management practice.***

Improving customers and stakeholder management practice in an organization involves satisfaction from the services being delivered for both internal and external customers. Quick and appropriate responses to customer requirements and efficient delivery of IT services could indicate and result with agility of ITSM practice in an organization which indeed is the cumulative effect of other practices like Supplier Management, Information systems and Technology, process maturity, workforce and skill management practices. From this we can say that better Customer and stakeholder management practice could indicate the agility of the ITSM practice in an organization. ***H13. Customer and Stakeholder Management practice has significant positive impact on ITSM Agility***.

Organizational agility is the ability of an organization to move and adapt quickly, flexibly, and decisively to support internal changes (AXELOS, 2019). The optimum level of agility is when the company has exactly the agility needed to cope with the variety of its environment (Desouza, 2007) and this could be determined by customer and stakeholder satisfaction together with the

IT units organizational flexibility in quickly responding to customers everchanging requirements and demand of the business ecosystem. Hence, we can draw the relationship of organizational environment flexibility to that of ITSM Agility - ***H14. Organizational Environment flexibility has significant positive impact on ITSM Agility***.

The hypotheses are graphically depicted in the diagram below.

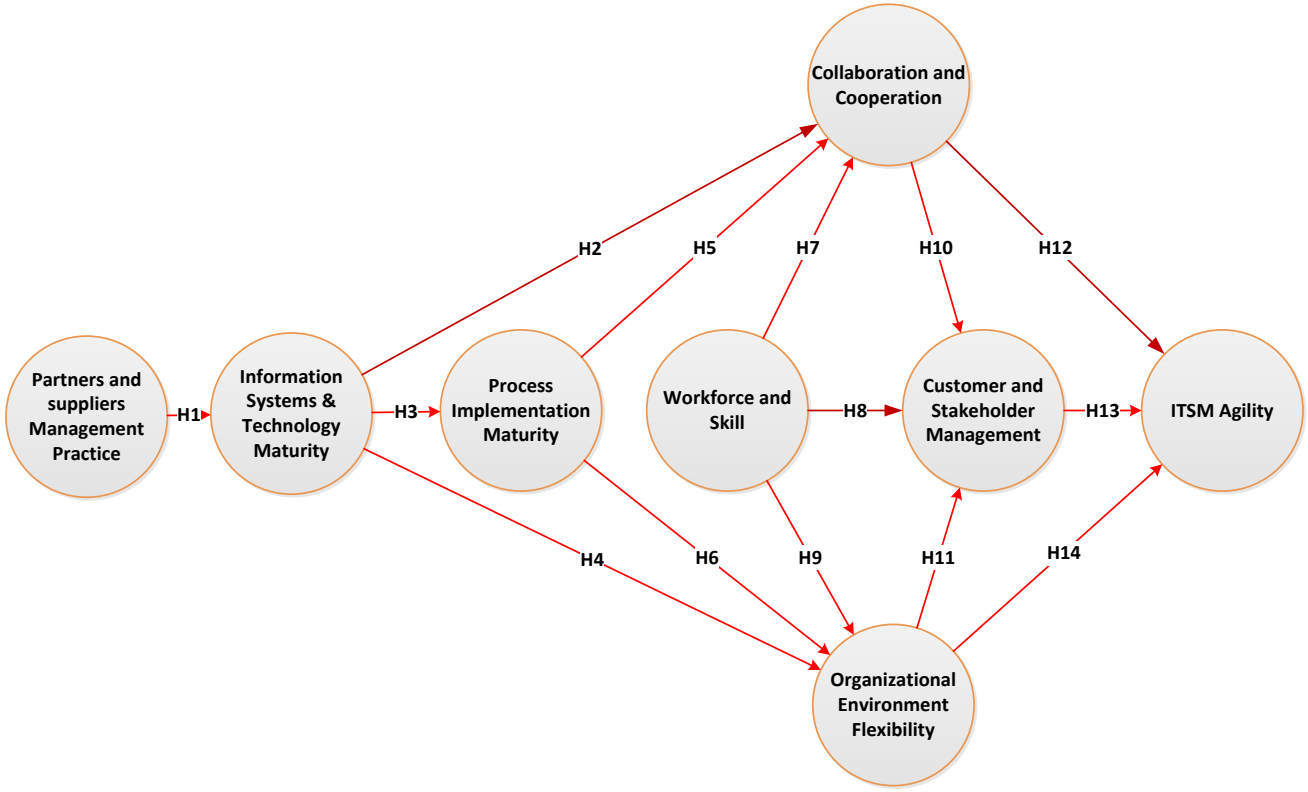

Figure 13:IT Service Management Agility Assessment Initial Hypothesized Model

(derived from Wendler,2014; Izza and Imache, 2008; Imache, Izza and Ahmed-Nacer, 2012; Axelos, 2019; Isaca, 2012, Desouza, 2007 as a source)

4.2.3 Indicators Summary

Indicators for each construct as explained in detail under description of constructs section are summarized in the grid below. The complete set is listed in **Annex i. Questionnaires.**

ID	Indicators	Sources
	Partners and suppliers	
SUP1	Monitor performance	(Wendler, 2014)
SUP2	Select by quality criteria	(Wendler, 2014)
	Information Systems and Technology	
TEC1	Competitive in the marketplace	(Wendler, 2014)
TEC2	Integrated systems	(Wendler, 2014), (Imache, Izza and Ahmed-Nacer, 2012)
TEC3	Standardized IT	(Wendler, 2014)
TEC4	Interoperability of components	(Imache, Izza and Ahmed-Nacer, 2012)
TEC5	Easily Expandable	(Imache, Izza and Ahmed-Nacer, 2012)
TEC6	Up-to-Date systems and technology	(Sahid, Maleh and Belaissaoui, 2018)
	Processes Implementation Maturity	
PRC1	Easy steps	(AXELOS, 2019)
PRC2	Process definition and communication	(OGC, 2007)
PRC3	Roles and responsibilities definition	(OGC, 2007)
PRC4	Continuous Process Improvement	(AXELOS, 2019)
	Organizational Environment Flexibility	
STR1	Systematically anticipate changes	(Wendler, 2014)
STR2	Quickly make appropriate decisions and changes	(Wendler, 2014)
STR3	Changing authorities when tasks change	(Wendler, 2014)
STR4	Flexibly deploy resources	(Wendler, 2014)
	Workforce and skills	
SKL1	Continuous improvement view	(Wendler, 2014)
SKL2	Use a broad range of skills	(Wendler, 2014)
SKL3	Ready to learn	(Wendler, 2014)
SKL4	self-motivated	(Wendler, 2014)
	Collaboration and Cooperation	
COL1	Jointly and intensively operate	(Wendler, 2014)
COL2	Early involvement of stakeholders	(Wendler, 2014)
	Customers and Stakeholders management	
STK1	Alignment	(Wendler, 2014)
STK2	Closely collaborate	(Wendler, 2014)
STK3	Always map value to stakeholders	(Wendler, 2014)
	Indicators for ITSM Agility	
AGV1	Value for stakeholders	(AXELOS, 2019), (Verlaine, 2017)
AGV2	Working IT Services	(AXELOS, 2019), (Verlaine, 2017)
AGV3	Responding to changes	(Verlaine, 2017)
AGV4	Incremental and Iterative approach	(AXELOS, 2019)
AGV5	Consider already Existing	(AXELOS, 2019)
AGV6	Holistic Approach	(AXELOS, 2019), (Wendler, 2014)

Table 5:Indicators

A total of 31 indicators were included to measure the 8 constructs. All Indicators are measured with a 5 scale Likert-Scale where 1 being “Strongly Disagree” and 5 being “Strongly Agree”.

Constructs	Construct Abbreviation	Indicator
Partners and Suppliers Management Practice	SuppMgt	SUP1, SUP2
Information Systems & Technology Maturity	TechMat	TEC1, TEC2, TEC3, TEC4, TEC5, TEC6
Process Implementation Maturity	ProcesMat	PRC1, PRC2, PRC3, PRC4
Collaboration and Cooperation	Collaboration	COL1, COL2
Workforce and Skill	Workforce	SKL1, SKL2, SKL3, SKL4
Organizational Environment Flexibility	OrgFlexibility	STR1, STR2, STR3, STR4
Customer and Stakeholder Management	StakeholderMgt	STK1, STK2, STK3
ITSM Agility	ITSMAgility	AGV1, AGV2, AGV3, AGV4, AGV5, AGV6

Table 6: Indicators Summary

4.2.4 Agility Level Definition

The Agility maturity levels and definitions by (Wendler, 2014) is fully considered in this research to assess the maturity levels of CBE's IT Unit with some rephrasing to fit it to this research context. To avoid the ambiguity of the meaning of each level, here is the brief explanation of the staged. Level **0: Non-agile**, Level **1: Agility Basics**, Level **2: Agility Transition**, and Level **3: Agile ITSM practice.**

Agility Level	Overall ITSM Agility Status of the Organization	Survey Result Range
Level 0: Non-agile	The ITSM practice in the Organization is non-agile	**Between 0 to 1.9**
Level 1: Agility Basics	The ITSM practice in the Organization share basic properties of agility	**Between 2 to 2.9**
Level 2: Agility Transition	The ITSM practice in the Organization is still in a transition phase towards a complete agile approach	**Between 3 to 3.9**
Level 3: Agile ITSM practice	The organization achieved complete ITSM agility	**Between 4 to 4.9**

Table 7: Maturity Level Summary

Maturity Level Description

Maturity Level Description is fully taken from Wendler's work and rephrased to this context to fit to the purpose of this work.

Level 0 - Obtained value from 0 to 1.99**: Non-agile ITSM Practice**

"The ITSM practice in the organization shows that there is no or only rare properties of Agile ITSM practices and "Only a minority of employees and managers share capabilities necessary to implement agile values and flexible structures do not take place at all"

Level 1 - Obtained value from 2 to 2.99**: The IT Unit share basic properties of ITSM agility**

"Organizations that fall within this category are those who have already realized and experienced the benefits but only in some departments, teams, or situations are being practiced. Some employees share agile capabilities regarding communication, learning,

responsibility, and customer-orientation, and some managers in the organization can manage change in an appropriate way."

Level 2 - Obtained value from 3 to 3.99**: The Organization is still in a transition phase towards a complete agile organization**

"Organizations within this category disseminate agile values to establish an appropriate technological basis in most parts of the organization and many employees and managers share the idea of agility and equipped with the necessary skill. In those organizations any change gets handled appropriately and, in many instances, teamwork is promoted and there is also a flexible organizational structure in the IT unit."

Level 3 - Obtained value from 4 to 5**: The Organization achieved a complete ITSM agility**

"Organizations within this category manage to establish a sufficient technological basis in IT and agile values are shared and accepted completely, too."

4.3 Initial Model Analysis and Amendments

Survey questionnaires were compiled from different sources as shown in the *Description of Model Variables with Indicators* section above. After compilation of indicators, a pilot survey was conducted at Awash Bank to test the data collection instrument clearness for the survey participants and completeness.

After making the necessary adjustments by taking inputs and findings obtained from the pilot survey, invitation to an online survey was sent out to IT professionals in the case company, Commercial Bank of Ethiopia, for conducting the final survey.

After collecting the data obtained from the final survey, an initial analysis was made to evaluate the hypothesized relationships using SEM technique. This section shows the structural adjustments made on the hypothesized model based on the initial analysis on path coefficients and *p* values.

Partial List Square (PLS) approach of SEM was chosen for this research as it is a combination of exploratory factor analysis and structural path analysis. PLS is a prediction-oriented approach to primarily used for exploratory research, but also appropriate for confirmatory research (Sarstedt *et al.*, 2014). PLS-SEM is recommended where there is a small number of sample (Wong, 2013) as bootstrapping treats the original data file as a pseudo-population with random selection as replacement to generate other data sets (Kline, 2015).

Inner model path coefficient sizes and significance with all hypotheses were initially reviewed. The results demonstrated in figure and consecutive tables below are obtained by running a Bootstrap with significance level of 0.05, 5000 subsamples, factor weighting with 300 iterations on SmartPLS. Bootstrapping involves a resampling that combines the cases in a data set in different ways to estimate statistical precision (Kline, 2015).

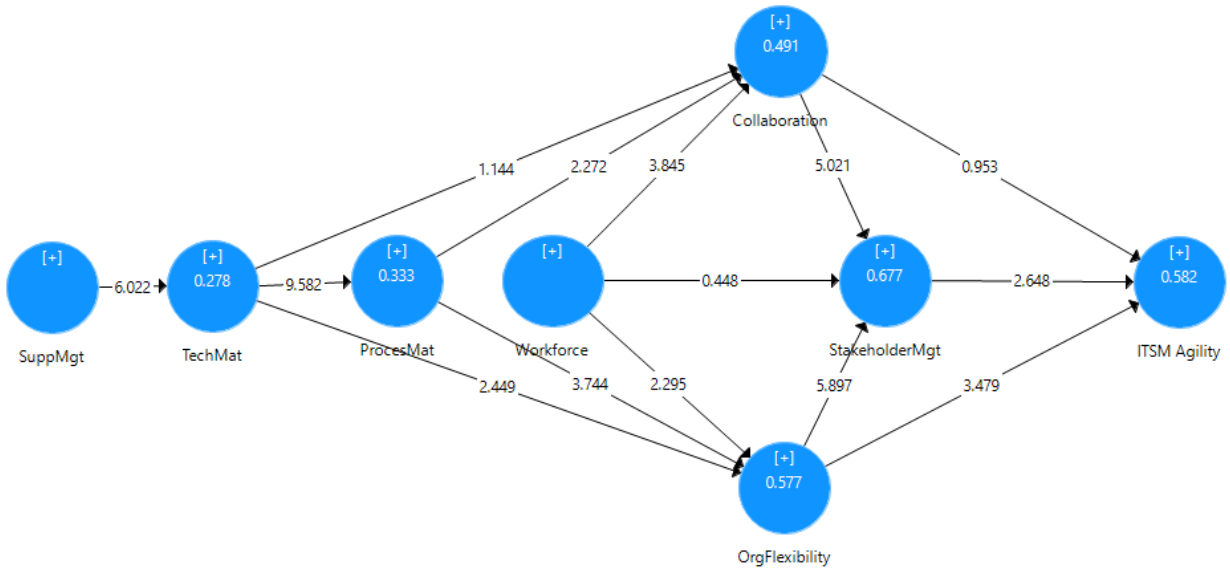

Figure 14:Bootstrapped Path Coefficients result of the hypothesized ITSM Agility Assessment Model

The SEM result of T-value (T Statistics |O/STDEV|) and P-values were checked for all hypothesized paths. As it can be seen from the result, 3 hypothesized paths – Path between *TechMat -> Collaboration, Collaboration -> ITSMAgility, and Workforce -> StakeholderMgt* - resulted a lower T-Value (1.144, 0.448, and 0.953 respectively) and P-Values greater than 0.05 (with values 0.247, 0.345, 0.653 respectively). The lower bound of bootstrap confidence interval for probability of 5% error (α=0.05) is 1.96 (Joseph F. Hair, Jr., G. Tomas M. Hult, 2015)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ITSMAgility -> ServiceDelivery	0.710	0.712	0.057	12.493	0.000
TechMat -> ProcesMat	0.577	0.588	0.059	9.737	0.000
SuppMgt -> TechMat	0.527	0.538	0.088	6.008	0.000
OrgFlexibility -> StakeholderMgt	0.435	0.442	0.074	5.887	0.000
Collaboration -> StakeholderMgt	0.457	0.454	0.092	4.991	0.000
Workforce -> Collaboration	0.423	0.410	0.110	3.833	0.000
ProcesMat -> OrgFlexibility	0.413	0.417	0.108	3.826	0.000
OrgFlexibility -> ITSMAgility	0.384	0.378	0.112	3.415	0.001
StakeholderMgt -> ITSMAgility	0.379	0.393	0.138	2.748	0.006
TechMat -> OrgFlexibility	0.268	0.272	0.108	2.473	0.013
Workforce -> OrgFlexibility	0.225	0.216	0.097	2.327	0.020
ProcesMat -> Collaboration	0.266	0.265	0.117	2.268	0.023
TechMat -> Collaboration	0.144	0.155	0.127	1.131	0.258
Collaboration -> ITSMAgility	0.069	0.067	0.122	0.566	0.571
Workforce -> StakeholderMgt	0.043	0.045	0.098	0.443	0.658

Table 8: Bootstrapped path coefficients

		Confidence Interval			Confidence Interval Bias Corrected			
	Original Sample (O)	Sample Mean (M)	2.5%	97.5%	Sample Mean (M)	Bias	2.5%	97.5%
Collaboration -> ITSMAgility	0.069	0.070	-0.178	0.295	0.070	0.001	-0.186	0.288
Collaboration -> StakeholderMgt	0.457	0.456	0.277	0.634	0.456	-0.001	0.279	0.636
ITSMAgility -> ServiceDelivery	0.710	0.716	0.599	0.813	0.716	0.006	0.576	0.800
OrgFlexibility -> ITSMAgility	0.384	0.379	0.144	0.576	0.379	-0.005	0.143	0.575
OrgFlexibility -> StakeholderMgt	0.435	0.441	0.288	0.578	0.441	0.006	0.258	0.560
ProcesMat -> Collaboration	0.266	0.266	0.027	0.487	0.266	0.001	0.018	0.478
ProcesMat -> OrgFlexibility	0.413	0.418	0.210	0.629	0.418	0.005	0.202	0.621
StakeholderMgt -> ITSMAgility	0.379	0.392	0.135	0.680	0.392	0.013	0.126	0.669
SuppMgt -> TechMat	0.527	0.537	0.353	0.693	0.537	0.010	0.317	0.672
TechMat -> Collaboration	0.144	0.157	-0.087	0.405	0.157	0.013	-0.107	0.381
TechMat -> OrgFlexibility	0.268	0.271	0.050	0.480	0.271	0.002	0.041	0.471
TechMat -> ProcesMat	0.577	0.588	0.459	0.699	0.588	0.011	0.427	0.677
Workforce -> Collaboration	0.423	0.409	0.189	0.609	0.409	-0.014	0.212	0.629
Workforce -> OrgFlexibility	0.225	0.218	0.021	0.404	0.218	-0.008	0.035	0.416
Workforce -> StakeholderMgt	0.043	0.043	-0.155	0.234	0.043	-0.001	-0.153	0.236

Table 9: Bootstrapped path coefficients with Confidence Interval

Hence, 3 hypotheses H2, H8, and H12 are rejected from among 15 hypothesized correlations as there is no statistical significance between the variables in the hypothesis based on the collected sample data from CBE.

H2: Information Systems and Technology Maturity has significant positive impact on Collaboration and Cooperation

H8: Workforce and Skill has significant positive impact on Customer and Stakeholder Management

H12: Collaboration and Cooperation has significant positive impact on Customer and ITSM Agility

The remaining 12 hypotheses are retained for further analysis.

Based on the data obtained and initial analysis made, the final model used in assessing ITSM agility of CBE is adjusted by removing those three relationships from the model.

4.4 Final Model with SEM result

All the constructs in the path model utilizes a reflective type. As shown in this diagram, all the arrows are pointing from the latent variable to respective measured indicators.

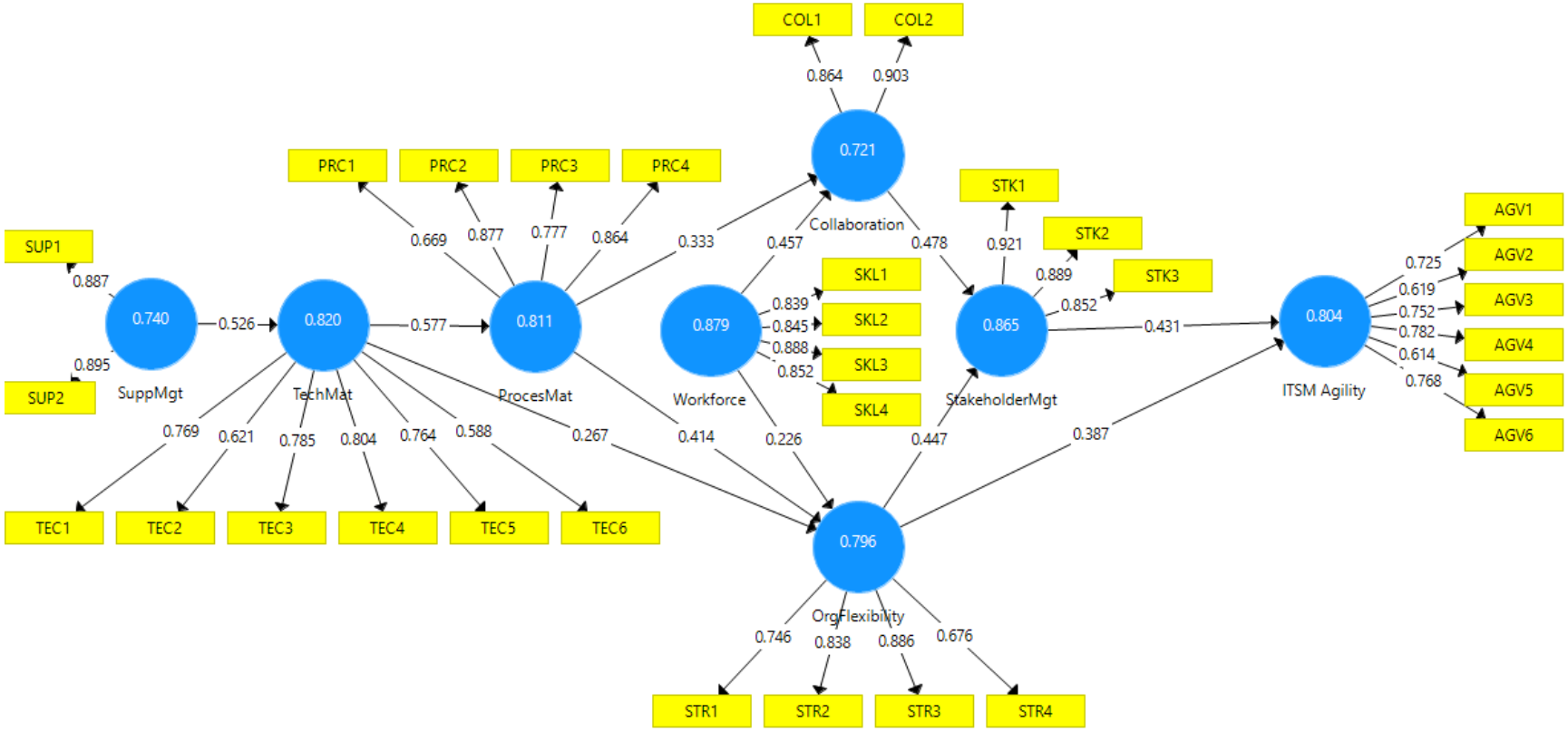

Figure 15: ITSM Agility Assessment final Model with complete set of Indicators and values

The figure depicts the complete final model with indicators and the obtained result using PLS Algorithm in SmartPLS run with maximum iteration of 600.

4.5 Reliability and Validity Check

For testing the construct reliability and validity the below reliability and validity measures were considered

- **Internal Consistency Reliability:** Cronbach's alpha reliability
- **Convergent Validity:** AVE for convergent validity in testing the validity of the construct indicators
- **Discriminant Validity** to test the constructs are not highly related to one another

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Collaboration	0.721	0.734	0.877	0.781
ITSMAgility	0.804	0.812	0.860	0.509
OrgFlexibility	0.796	0.810	0.868	0.625
ProcesMat	0.811	0.839	0.876	0.642
StakeholderMgt	0.865	0.869	0.918	0.788
SuppMgt	0.740	0.740	0.885	0.793
TechMat	0.820	0.841	0.869	0.528
Workforce	0.879	0.879	0.917	0.733

Table 10: Reliability and Validity result summary

4.5.1 Internal Consistency Reliability

The Cronbach's alpha reliability test was used to test the internal consistency of each construct indicators. The result shows Cronbach alpha of 0.7 and above was obtained for all 8 latent variables. This indicated that the internal consistency of the model is also achieved as acceptable reliability statistics is obtained. Results of Collaboration, Organizational Flexibility, and Supplier Management indicates an acceptable level of reliability and all other remaining ITSM Agility, Process Maturity, Information Systems & Technology Maturity, and Workforce has a value of greater than 0.8 a very good level of reliability (Ursachi, Horodnic and Zait, 2015)

The table below shows the full grid of the Cronbach's alpha result.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Collaboration	0.721	0.711	0.067	10.690	0.000
ITSMAgility	0.804	0.800	0.042	19.183	0.000
OrgFlexibility	0.796	0.789	0.038	20.698	0.000
ProcesMat	0.811	0.809	0.044	18.344	0.000
StakeholderMgt	0.865	0.862	0.028	31.023	0.000
SuppMgt	0.740	0.739	0.055	13.485	0.000
TechMat	0.820	0.817	0.032	25.255	0.000
Workforce	0.879	0.874	0.028	31.839	0.000

Table 11: Cronbach alpha result grid

For better visibility, the Cronbach's alpha graph result is shown below

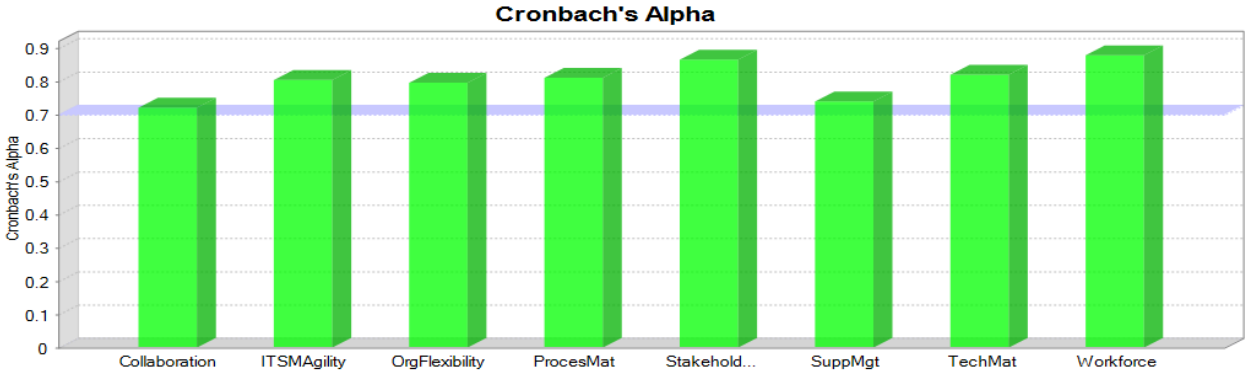

Figure 16: Cronbach's alpha graph

4.5.2 Convergent validity

Average Variance Extracted (AVE) is used to evaluate the Convergent Validity of the instrument. The AVE represents the average amount of variance that a construct explains in its indicator variables relative to the overall variance of its indicators (Henseler, Ringle and Sarstedt, 2014).

The AVE value of all constructs shows above the minimum threshold of 0.5 which confirms the convergent validity (Beckett *et al.*, 2014). *Supplier Management has the highest value of 0.836* among all other constructs followed by Supplier Management, Stakeholder Management, and Collaboration constructs with above 0.7 AVE and ITSM Agility has the least AVE among all others.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Collaboration	0.781	0.777	0.040	19.292	0.000
ITSMAgility	0.509	0.510	0.050	10.222	0.000
OrgFlexibility	0.625	0.622	0.040	15.750	0.000
ProcesMat	0.642	0.644	0.050	12.852	0.000
StakeholderMgt	0.788	0.786	0.033	23.635	0.000
SuppMgt	0.793	0.793	0.035	22.972	0.000
TechMat	0.528	0.530	0.044	12.088	0.000
Workforce	0.733	0.728	0.043	17.069	0.000

Table 12:AVE result grid

The graph below also shows the values of the AVE where all are above the threshold (0.5)

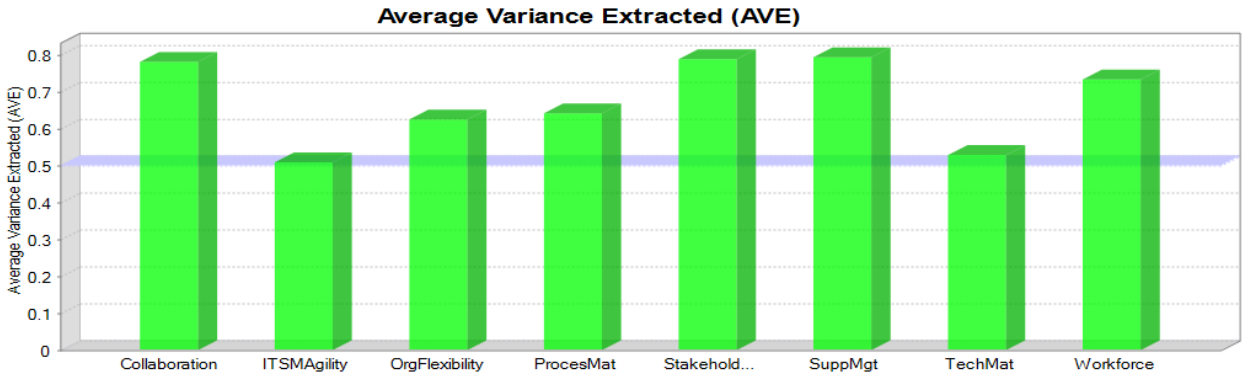

Figure 17: AVE result graph

4.5.3 Discriminant validity

Fornell-Larcker criterion, Cross loadings, and Heterotrait-Monotrait (HTMT) Ratio is used to show the discriminant validity.

The square root of AVE in each latent variable can be used to establish discriminant validity as suggested by (Fornell and Larcker, 1981) and the values of the square root of AVE of each latent variable as shown in the below table is all greater than the correlations with others.

The square root of AVE of collaboration is 0.884 and which is greater than the correlation of Collaboration with all others latent variables (ITSM Agility: 0.592, Organizational Flexibility: 0.581, Process Maturity: 0.571, Stakeholder Management: 0.737, Supplier Management: 0.504, TechMat: 0.498, and Workforce: 0.631). Similarly, the square root of AVE of ITSM Agility (0.509) equals to 0.713 and which is greater than the correlation result of ITSM Agility with all other latent variables (collaboration: 0.592, Organizational Flexibility: 0.700, Process Maturity: 0.630,

Stakeholder Management: 0.712, Supplier Management: 0.484, Technology Maturity: 0.582, and Workforce:0. 471). All others also comply to the discriminant validity checks as well. Therefore, the result illustrates that the discriminant validity is well established in the model.

	Collaboration	ITSMAgility	OrgFlexibility	ProcesMat	StakeholderMgt	SuppMgt	TechMat	Workforce
Collaboration	0.884							
ITSMAgility	0.592	0.713						
OrgFlexibility	0.581	0.700	0.791					
ProcesMat	0.571	0.630	0.686	0.801				
StakeholderMgt	0.737	0.712	0.725	0.615	0.888			
SuppMgt	0.504	0.484	0.619	0.465	0.612	0.891		
TechMat	0.498	0.582	0.614	0.577	0.607	0.526	0.727	
Workforce	0.631	0.471	0.570	0.522	0.577	0.427	0.479	0.856

Table 13: Discriminant Validity result grid

The Heterotrait-Monotrait (HTMT) Ratio results were also reviewed to see the discriminant validity. As shown in the diagram below, all values resulted an acceptable HTMT correlations with a value less than 0.9 except the HTMT correlation between Collaboration and Stakeholder Management (which is 0.921) All obtained values with 0.9 and less are acceptable (Henseler, Ringle and Sarstedt, 2014)

	Collaboration	ITSMAgility	OrgFlexibility	ProcesMat	StakeholderMgt	SuppMgt	TechMat	Workforce
Collaboration								
ITSMAgility	0.779							
OrgFlexibility	0.755	0.868						
ProcesMat	0.719	0.771	0.839					
StakeholderMgt	0.921	0.854	0.870	0.708				
SuppMgt	0.685	0.621	0.802	0.581	0.768			
TechMat	0.615	0.669	0.733	0.682	0.689	0.666		
Workforce	0.797	0.562	0.671	0.593	0.657	0.526	0.531	

Table 14: Heterotrait-Monotrait grid

4.6 Model Structural Assessment

Once the reliability and validity of the outer models is established, several steps need to be taken to evaluate the hypothesized relationships within the inner model (Hair *et al.*, 2014)

In this section, Coefficient of determination (R^2), the blindfolding-based cross-validated redundancy measure Q^2, and the statistical significance and relevance of the path coefficients will be reviewed to confirm the ITSM Agility Assessment model.

4.6.1 Collinearity Check

Before proceeding to the structural Model assessment, the collinearity formative measures were checked using Variance Inflation Factor (VIF). VIF is often used to evaluate collinearity of the formative indicators and values should be close to 3 and lower (Hair et al., 2019)

The table below shows the collinearity statistics result and all the values shows that there is no collinearity issue among the indicators of all 8 constructs (ITSMAgility, Collaboration, ProcesMat, Workforce, StakeholderMgt, SuppMgt, OrgFlexibility, TechMat)

Construct	Indicator	VIF	Construct	Indicator	VIF	Construct	Indicator	VIF
ITSMAgility	AGV1	1.721	Workforce	SKL1	1.993	OrgFlexibility	STR1	1.532
	AGV2	1.367		SKL2	2.067		STR2	1.916
	AGV3	1.718		SKL3	2.854		STR3	2.390
	AGV4	1.850		SKL4	2.405		STR4	1.381
	AGV5	1.510	SuppMgt	SUP1	1.525	TechMat	TEC1	2.103
	AGV6	1.797		SUP2	1.525		TEC2	1.769
Collaboration	COL1	1.465	StakeholderMgt	STK1	2.872		TEC3	1.897
	COL2	1.465		STK2	2.453		TEC4	1.773
ProcesMat	PRC1	1.314		STK3	1.921		TEC5	1.741
	PRC2	2.387					TEC6	1.415
	PRC3	1.807						
	PRC4	1.969						

Table 15:Collinearity Statistics result

4.6.2 Endogenous Latent Variable Variance Explanation

The bootstrapped R^2 value of the endogenous constructs was used to measure the Model's explanatory power. In the overall model there are 2 exogenous latent variables (SuppMgt and Workforce) and 6 endogenous latent variables (Collaboration, ITSMAgility, OrgFlexibility, ProcesMat, StakeholderMgt, and TechMat) and all tested to see their explanatory power in the model. All the variables in the model demonstrated that they are significant determinants of the endogenous variables.

R^2 values of 0.67, 0.33, or 0.19 for endogenous latent variables in the inner path model are described as substantial, moderate, or weak (Chin, 1998) and the 6 endogenous latent variables in the model obtained coefficient of determination (R^2) value of ranging from 0.277 to 0.676 as shown in the table below and this is considered explanatory power from moderate to substantial (Chin, 1998) and with classification of 0.75, 0.50 and 0.25 can be considered substantial, moderate and weak by (Henseler, Ringle and Sinkovics, 2009) most of them fall within moderate levels.

	Original Sample (O)	Sample Mean (M)	Standard Devia...	T Statistics (|O/STDEV|)	P Values
Collaboration	0.479	0.487	0.079	6.094	0.000
ITSMAgility	0.578	0.598	0.082	7.086	0.000
OrgFlexibility	0.577	0.597	0.068	8.522	0.000
ProcesMat	0.333	0.351	0.069	4.808	0.000
StakeholderMgt	0.676	0.686	0.056	12.024	0.000
TechMat	0.277	0.300	0.092	3.013	0.003

Table 16: R^2 result for Endogenous Latent Variables

The endogenous variable **ITSMAgility** has an obtained coefficient of determination (R^2) value of 0.566 and this shows that Organization Flexibility and Stakeholder Management practice together explain 56.6% of the variance in ITSM Agility. **Collaboration** and OrgFlexibility together significantly explain 66.7% of the variance of **StakeholderMgt** with an obtained R^2 value of 0.667. **OrgFlexibility** has an R^2 value of 0.559 and this shows that the 55.9% of the variance of OrgFlexibility is explained by the three latent variables (TechMaturity, ProcesMat, and workforce) all together which is considered Moderate as per (Chin, 1998) (Henseler, Ringle and

Sinkovics, 2009). **Collaboration** was found to be moderately determined by workforce and ProcesMat with obtained R^2 value of 0.469, and which shows that both Workforce and ProcesMat explain 46.9 % of the variance of Collaboration variable. ProcesMat found to be moderately **TechMat** resulting an R^2 value of 0.324, which means TechMat accounted 32.4% of the variance of ProcesMat. Finally, a coefficient of determination (R^2) of endogenous variable **TechMat** has an observed value of 0.267 and this shows that the variance of TechMaturity is weakly 26.7% explained by SupplierMgt exogeneous latent variable.

	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
Collaboration	0.479	0.487	0.008	0.277	0.599
ITSMAgility	0.578	0.598	0.020	0.398	0.710
OrgFlexibility	0.577	0.597	0.020	0.384	0.680
ProcesMat	0.333	0.351	0.018	0.179	0.453
StakeholderMgt	0.676	0.686	0.009	0.542	0.767
TechMat	0.277	0.300	0.023	0.099	0.434

Table 17: R^2 result for Endogenous Latent Variables confidence interval bias corrected

4.6.3 Inner model path coefficient sizes and significance

The regression weights, which shows the direct effect that the determinant has on an endogenous variable, of each of the paths are shown in figure beneath demonstrated to show the Inner Model Path Coefficients.

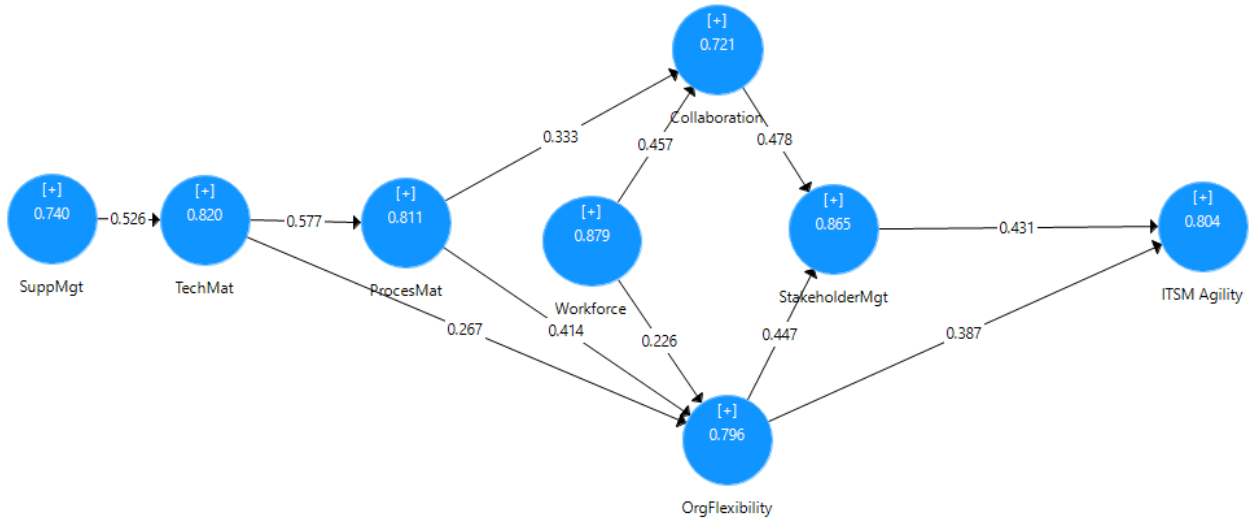

Figure 18: Inner Model path Coefficient for Final ITSM Agility Assessment Model for CBE

The path coefficients for direct effect result are detailed beneath with corresponding p values and T statistics.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Collaboration -> StakeholderMgt	0.478	0.473	0.072	6.674	0.000
OrgFlexibility -> ITSMAgility	0.387	0.379	0.110	3.509	0.000
OrgFlexibility -> StakeholderMgt	0.447	0.454	0.068	6.562	0.000
ProcesMat -> Collaboration	0.333	0.335	0.093	3.563	0.000
ProcesMat -> OrgFlexibility	0.414	0.416	0.113	3.656	0.000
StakeholderMgt -> ITSMAgility	0.431	0.446	0.110	3.918	0.000
SuppMgt -> TechMat	0.526	0.540	0.087	6.046	0.000
TechMat -> OrgFlexibility	0.267	0.270	0.105	2.551	0.011
TechMat -> ProcesMat	0.577	0.589	0.059	9.723	0.000
Workforce -> Collaboration	0.457	0.451	0.107	4.282	0.000
Workforce -> OrgFlexibility	0.226	0.220	0.099	2.281	0.023

Table 18: Inner Model Path Coefficient for final ITSM Agility Assessment Model for CBE

Based on Cohen's (1988) recommendations the path coefficient values greater than 0.1 are acceptable and values of 0.5 and greater are considered as high. On ITSMAgility, both paths from OrgFlexibility and StakeholderMgt has statistically significant and moderate to high effect on ITSMAgility, with path coefficient values of 0.433 and 0.385, respectively. Both variables predict ITSMAgility in CBE but, with relative comparison, OrgFlexibility is relatively high predictor of ITSMAgility compared with the StakeholderMgt. This proves that two hypotheses H10and H11.

> *H13: Customer and Stakeholder Management practice has significant positive impact on ITSM Agility* - Supported with medium effect
>
> *H14: Organizational Environment flexibility has significant positive impact on ITSM Agility* - Supported with medium effect

Collaboration and OrgFlexibility are high predictors of StakeholderMgt. Both paths to StakeholderMgt, path Collaboration -> StakeholderMgt with path coefficient value of 0. 478 and OrgFlexibility -> StakeholderMgt with path coefficient value of 0.447 are statistically significant and highly predict StakeholderMgt practice in CBE. With this we can conclude that two hypotheses H8 and H9 are proved.

> *H10: Collaboration and Cooperation has significant positive impact on Customer and Stakeholder Management practice* - **Supported with high effect**
>
> *H11: Organizational Environment flexibility has significant positive impact on Customer and Stakeholder Management practice* - **Supported with medium effect**

For OrgFlexibility three predictors (Workforce, ProcesMat, and TechMat) were hypothesized and the path coefficient values obtained indicate that all are predictors. The path between ProcesMat -> OrgFlexibilitiy has the highest path coefficient of 0.414 from the other two paths (TechMat -> OrgFlexibilitiy and Workforce-> OrgFlexibilitiy) with this we can say that Process Maturity is the highest predictor of organizational Flexibility compared with Workforce and Technology maturity in CBE. In comparison, still Workforce and TechMat moderately predict OrgFlexibility with path coefficient value of 0.226 and 0.267. Hence, with those values, three hypotheses (H3, H5, H7) are proved.

H4: Information Systems and Technology Maturity has significant positive impact on Organizational Environment Flexibility – Supported with medium effect

H6: Process Implementation Maturity has significant positive impact on Organizational Environment Flexibility - Supported with medium effect

H9: Workforce and Skill has significant positive impact on Organizational Environment Flexibility - Supported with medium effect

Workforce was the highest predictor of Collaboration compared with ProcesMat but both (Workforce and ProcesMat) have significant direct effect on collaboration with respective path coefficient of 0.457 and 0.333. So, the hypothesized path between Workforce -> Collaboration (H6) and ProcesMat -> Collaboration (H4) is accepted

H5: Process Implementation Maturity has significant positive impact on Collaboration and Cooperation - Supported with medium effect

H7: Workforce and Skill has significant positive impact on Collaboration and Cooperation - Supported with high effect

The Inner Model path coefficient suggests that Technology Maturity has significant direct effect on Efficient Service Delivery with value of 0.577. This proves that the hypothesized path between TechMat -> ProcesMat (H2) supported with high effect and thus TechMat is a good determinant of ProcesMat.

H3: Information Systems and Technology Maturity has significant positive impact on Process Implementation Maturity - Supported with high effect

Supplier management approach in CBE has also significant impact on Information Systems and Technology Maturity. The Inner Model path coefficient between SuppMgt -> TechMat was obtained value of 0.526 and this shows that SuppMgt has high impact on TechMat. Thus, the hypothesis (H1) is also proved.

H1. Partners and Suppliers Management Practice has significant positive impact on Information Systems and Technology Maturity - Supported with high effect

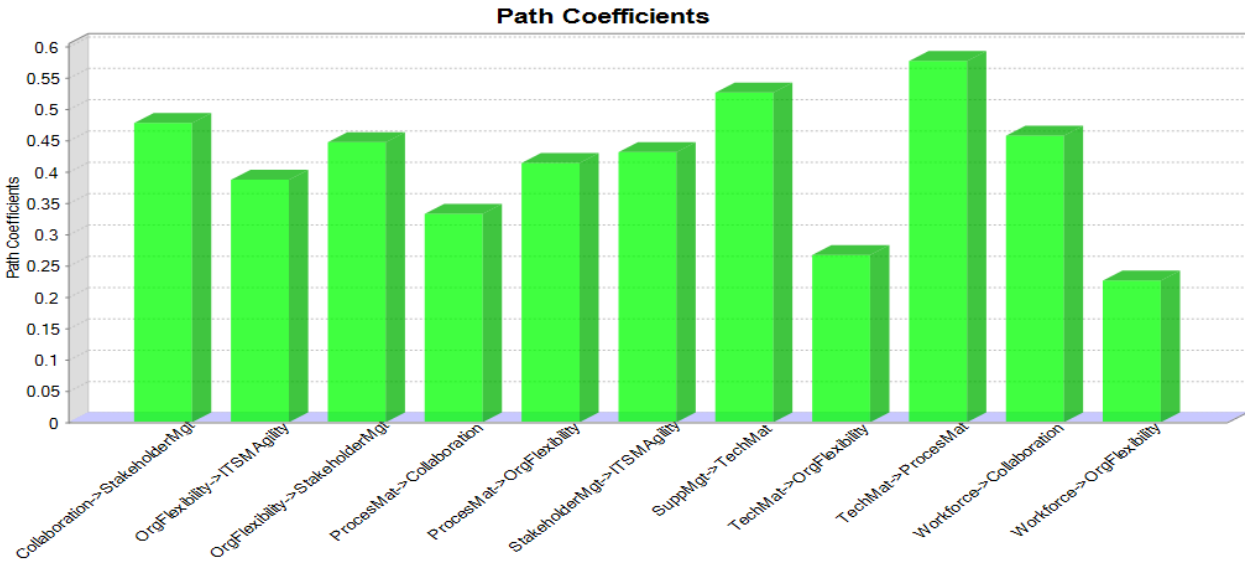

Figure 19: Inner Model path Coefficient graph

4.6.4 Mediation Analysis

Direct effects were discussed above while analyzing the inner model path coefficients. To determine the effect of mediation, it is also necessary to evaluate the size and the significance of the indirect effect (Sheko and Spaho, 2018). Bootstrapped total indirect effect generated using SmartPLS are as shown in the table below.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ProcesMat -> StakeholderMgt	0.344	0.348	0.081	4.230	0.000
StakeholderMgt -> ITSMAgility					
SuppMgt -> Collaboration	0.101	0.105	0.032	3.144	0.002
SuppMgt -> ITSMAgility	0.175	0.184	0.040	4.381	0.000
SuppMgt -> OrgFlexibility	0.266	0.279	0.061	4.382	0.000
SuppMgt -> ProcesMat	0.304	0.319	0.062	4.884	0.000
SuppMgt -> StakeholderMgt	0.167	0.177	0.040	4.181	0.000
SuppMgt -> TechMat					
TechMat -> Collaboration	0.192	0.197	0.057	3.385	0.001
TechMat -> ITSMAgility	0.333	0.342	0.060	5.532	0.000
TechMat -> OrgFlexibility	0.239	0.246	0.075	3.167	0.002
TechMat -> ProcesMat					
TechMat -> StakeholderMgt	0.318	0.328	0.058	5.504	0.000
Workforce -> Collaboration					
Workforce -> ITSMAgility	0.225	0.223	0.072	3.115	0.002
Workforce -> OrgFlexibility					
Workforce -> StakeholderMgt	0.320	0.312	0.082	3.915	0.000

Table 19: Bootstrapped Total Indirect Effects for all construct

The obtained indirect effects were also statistically significant for all indirect relationships within the Model with acceptable t statistics and p values.

4.6.5 Model Predictive Accuracy

Blindfolding-based cross-validated redundancy measure Q^2 was used to measure the new model's predictive accuracy. Construct cross-validated redundancy will usually be the blindfolding output of greatest interest since it speaks to model fit of the PLS latent variable model(Garson, 2016)

The datafile settings shown in the table beneath is used while running blindfolding result in SmartPLS. Blindfolding with an omission distance (D) of 5 is used.

Data file Settings	
Data file	CBESurvey [77 records]
Missing value marker	none
Data Setup Settings	
Algorithm to handle missing data	Mean Replacement
Weighting Vector	-
PLS Algorithm Settings	
Data metric	Mean 0, Var 1
Initial Weights	1.0
Max. number of iterations	300
Stop criterion	7

Construct cross-validated redundancy shown below table demonstrated values of Q^2 together with the SSE - Sum of Squares of Prediction Errors, and SSO is the Sum of squares of observation. All the Q^2 values of the endogenous constructs (Collaboration with Q^2 value equals to 0.341, ITSMAgility with Q^2 value equals to 0.261, OrgFlexibility with Q^2 value equals to 0.338, ProcesMat with Q^2 value equals to 0.204, StakeholderMgt with Q^2 value equals to 0.518, and TechMat with Q^2 value equals to 0.124) are all significant in deciding that the model is fit as all the values (Q^2) is greater than 0. Q^2 greater than 0 shows that PLS-SEM model is predictive of the given endogenous variables under study (Garson, 2016).

Among all results, StakeholderMgt obtained high effect size as its value is 0.518 respectively - as per Cohen (1988) recommendation. Similarly, with value 0.15 and above, the Q^2 values of Collaboration, ITSMAgility, OrgFlexibility and ProcesMat fall with in Medium Effect size. ProcesMat on the other hand obtained a small effect size but still acceptable.

	SSO	SSE	Q^2 (=1-SSE/SSO)
Collaboration	154.000	101.513	0.341
ITSMAgility	462.000	342.052	0.260
OrgFlexibility	308.000	203.933	0.338
ProcesMat	308.000	245.205	0.204
StakeholderMgt	231.000	111.412	0.518
SuppMgt	154.000	154.000	
TechMat	462.000	404.583	0.124
Workforce	308.000	308.000	

Table 20: Predictive relevance (Q^2) Construct cross-validated redundancy result

Construct **cross-validated communality** was also checked and obtained a higher values as it is expected as the calculation is done without knowledge of the path model and it is based only on construct scores (Garson, 2016). The redundancy calculation of Q^2 is more consistent with the PLS approach, which focuses on paths involving the endogenous variables (Leguina, 2015) and therefore, further discussions were not that necessary for this paper.

	SSO	SSE	Q^2 (=1-SSE/SSO)
Collaboration	154.000	103.325	0.329
ITSMAgility	462.000	328.918	0.288
OrgFlexibility	308.000	191.644	0.378
ProcesMat	308.000	182.451	0.408
StakeholderMgt	231.000	102.927	0.554
SuppMgt	154.000	100.392	0.348
TechMat	462.000	305.450	0.339
Workforce	308.000	141.010	0.542

Table 21: Construct cross-validated communality result

4.7 Outer Model (Indicators) Result

Evaluating the reliability and validity of the construct measures in the outer models (Hair et al., 2014)

The table below shows the outer loadings of all indicators. While reviewing indicators loadings, all except 6 indicators out of the 31 retained indicators has obtained values above 0.7 and is acceptable (Hair et al., 2019) and the for research purposes values 0.6 and above are also acceptable. From this, we can conclude that all indicators are within acceptable value.

Construct	Indicator	Outer Loading
ITSMAgility	AGV1	**0.729**
	AGV2	0.614
	AGV3	**0.750**
	AGV4	**0.782**
	AGV5	0.615
	AGV6	**0.769**
Collaboration	COL1	**0.864**
	COL2	**0.903**
ProcesMat	PRC1	0.669
	PRC2	**0.877**
	PRC3	**0.777**
	PRC4	**0.864**
Workforce	SKL1	**0.839**
	SKL2	**0.845**
	SKL3	**0.888**
	SKL4	**0.852**
ServiceDelivery	SRV1	**0.920**
	SRV2	**0.908**
StakeholderMgt	STK1	**0.921**
	STK2	**0.889**
	STK3	**0.852**
OrgFlexibility	STR1	**0.746**
	STR2	**0.838**
	STR3	**0.886**
	STR4	0.676
SuppMgt	SUP1	**0.887**
	SUP2	**0.895**
TechMat	TEC1	**0.769**
	TEC2	0.624
	TEC3	**0.785**
	TEC4	**0.804**
	TEC5	**0.764**
	TEC6	0.588

Table 22:Outer Loading of Indicators

4.8 Hypothesis summary

Hypothesis	**Status**
H1. Partners and Suppliers Management Practice has significant positive impact on Information Systems and Technology Maturity	Supported with **high** effect
H2: Information Systems and Technology Maturity has significant positive impact on Collaboration and Cooperation	Rejected
H3: Information Systems and Technology Maturity has significant positive impact on Process Implementation Maturity	Supported with **high** effect
H4: Information Systems and Technology Maturity has significant positive impact on Organizational Environment Flexibility	Supported with **medium** effect
H5: Process Implementation Maturity has significant positive impact on Collaboration and Cooperation	Supported with **medium** effect
H6: Process Implementation Maturity has significant positive impact on Organizational Environment Flexibility	Supported with **medium** effect
H7: Workforce and Skill has significant positive impact on Collaboration and Cooperation	Supported with **high** effect
H8: Workforce and Skill has significant positive impact on Customer and Stakeholder Management	Rejected
H9: Workforce and Skill has significant positive impact on Organizational Environment Flexibility	Supported with **medium** effect
H10: Collaboration and Cooperation has significant positive impact on Customer and Stakeholder Management practice	Supported with **high** effect
H11: Organizational Environment flexibility has significant positive impact on Customer and Stakeholder Management practice	Supported with medium effect
H12: Collaboration and Cooperation has significant positive impact on Customer and ITSM Agility	Rejected
H13: Customer and Stakeholder Management practice has significant positive impact on ITSM Agility	Supported with **medium** effect
H14: Organizational Environment flexibility has significant positive impact on ITSM Agility	Supported with **medium** effect

Table 23:Hypothesis Summary

4.9 Chapter Summary

This chapter covered development of the hypothesized model for assessing ITSM Agility. The model was developed by including suitable indicators from different prior works and industry frameworks. The Model compositions and descriptions with indicators were included in the chapter. The contributing sources and prior works together with detailed explanations about the hypothesized relationships among indicators were included. Maturity levels and level descriptions were also incorporated.

The initial structural assessment using SEM were performed based on the data collected from CBE. Following the initial assessment, three hypothesized structural relationships were removed as they obtained statistically insignificant values.

The final Model was defined, and validity and reliability of the model was also conducted. From all findings of quality checks conducted and analyzed in this section, we can conclude that all constructs of ITSM Agility Assessment Model for the bank in this study showed significant evidence of reliability, convergent and discriminant validity.

The validity and reliability of model result confirmed the fitness of the model for assessing Agility of ITSM practice in CBE. Further structural and indicator analysis using SEM were performed and the respective results were demonstrated.

5 CBE's ITSM Agility Result Analysis and Discussion

The previous chapter focused on answering how to answer the first research question. In this chapter, the results obtained from the survey and open ended question responses are analyzed and summarized.

5.1 Quantitative Data Analysis

This section includes the analysis obtained results from survey for each pillar used in assessing the ITSM Agility Asessment and an overall efficiency and effectiveness of IT Service Delivery in CBE.

5.1.1 Information System and Technology Maturity in CBE Result Analysis

Information Systems and Technology Maturity is one of the determinants of ITSM Agility as indicated in the previous chapters (in the ITSM Agility Assessment Model Development stages). To identify the overall Information Systems and Technology Maturity of an organization, 6 indicators were used to be answered by the respondants. The discriptive statistics and frequencies are shown in the table below.

As shown in the table, around 75% of survey respondents believe that CBE has the right Applications and Systems that makes the organization competitive enough in the marketplace where "Agree" and "Strongly agree" accounts 49% and 26% respectively out of the total 77 responses. The mean value of 3.93 were obtained for for this indicator which is the highest among all other indicators of the Information Systems and Technology Maturity variable. Only 6.5% of participants dissagree on the existance of applications and systems that makes CBE competative in the market.

The obtained response for the question that checks existance of an Up-to-Date systems and technology in the organization satisfying current and future demand obtaned a mean value of 3.5 where 58% of survey participants Agree and Strongly Agree on this. Although 13% participants Disagree and Strongly Disagree and 30% kept newtral, the mean tels the existance of up-to-date systems and technology in the organization.

Survey Question			Response percentage 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree				
	Mean	SD	1	2	3	4	5
TEC1: Our organization has the right applications and systems to be competitive in the marketplace	3.93	0.873	1.3%	5.2%	18.2%	49.4%	26.0%
TEC2: There is an Up-to-Date systems and technology in our organization satisfying our current and future demand	3.51	0.862	1.3%	11.7%	29.9%	48.1%	9.1%
TEC3: We have well integrated systems supporting different business units in the organization	3.42	0.986	2.6%	18.2%	23.4%	45.5%	10.4%
TEC4: We have standardized our Information Technology and System throughout the organization	3.05	0.866	3.9%	20.8%	44.2%	28.6%	2.6%
TEC5: Interoperability is considered while introducing new systems and technologies	3.27	0.948	2.6%	16.9%	41.6%	28.6%	10.4%
TEC6: Our infrastructure can easily be Expandable (scaled up and scaled out) with minimum effect on the operation	3.37	1.007	3.9%	18.2%	23.4%	45.5%	9.1%
Valid N (listwise) = 77							

Table 24: Survey result on Information systems and Technology in CBE

Checking existance of Integrated systems supporting different business units in the organization was another indicator used for Infrormation System and Technology Maturity variable. On this question 56% agree (adding both “Agree” and “Strongly Agree responses”), 21% disagree (Adding “Disagree” and “Strongly Disagree results” responses) and 23% remained neutral. With an obtained 3.4 mean for this specific indicator, we can say that majority believe the existance of a well integrated system among different departments in CBE.

Only 31% of the participants agree, 25% disagree, and 44% are neutral for the question that checks whether CBE has already standardized its Information Technology and System throughout the organization. With a mean value of 3.05, this is smallest obtained result from among all other indicators for the Information System and Technology Maturity variable.

Interoperability of technology is another indicator considered for the Information Systems and Technology Maturity variable. 39% of participants believe that the interoperablity aspect is

concidered while introducing new systems and technology in the company whereas 19.5% of dissagree and 42% have neutral response. The mean value of the indicator is 3.27 for this shows that the majority of participants aggree that interoperablity is something that is being considered while planning introduction of new information systems and technology.

The last, but no the least, indicator used is scalability of the systems and technology being used in the organization. Around 55% of participants believe that the technology that exist in the organization can easily be scaled-out and scalled up without significant interruption on operational IT services. Eventhough 22% of participants disagree on this and the remaining 23% chose to be neutral, it obtained a significant mean value of 3.37.

In general, Information Systems and Technology Maturity in CBE has obtained an aggregated mean value of 3.4 which indicates that majority of the survey participants believe that there is a mature Information systems and infrastructure in the organization except slightly less perception on standardization.

5.1.2 Partners and Supplier Management Practice in CBE Result Analysis

There were two questions in the survey to measure the overall partner and supplier management practice in CBE. The first is a question that checks weather CBE uses quality criteria for partners and subcontractor selection rather than just considering only cost perspectives in outsourcing. And the second question checks whether there exists a close and regular monitoring and performance follow-up activity being carried out to check whether suppliers are performing well and ensure getting the most out of the contracts that the company have with them.

Survey Question			**Response percentage** 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree				
	Mean	**SD**	**1**	**2**	**3**	**4**	**5**
SUP1: We select our partners and subcontractors by quality criteria (rather than pure cost-based decisions)	3.4	1.035	2.6%	18.2%	31.2%	32.5%	15.6%
SUP2: We monitor the performance of our partners and subcontractors very closely and regularly	3.0	1.009	5.2%	22.1%	40.3%	23.4%	9.1%
Valid N (listwise) = 77							

Table 25: Results of Partners and Supplier Management Practice in CBE

48% of participants agree that there is a practice in CBE that uses quality criteria while choosing partners and subcontractors rather than just considering only cost perspectives but 21 % disagree with this and the remaining 31% are neutral to it. The obtained indicater's mean of 3.4 shows that existance of a good practice of using quality perspectives in choosing partners and suppliers.

The response for the other question that focuses on existance of regular monitoring and followup of suppliers and partners is relaively less compared with the quality criteria consideration practice of the company. 32% of participants agree, 27% disagree and remaing 41% are neutral on regular assessment and monitoring of partners and suppliers.

A comulative mean of 3.2 is obtained from the two indicator and this shows that there is relatively good practice in supplier and partner management practice.

5.1.3 Processes Implementation Maturity in CBE Result Analysis

ITSM related Process Implementation Maturity is one of the variables used to measure the ITSM Agility Maturity in CBE. Four Indicators were used to measure the overall process implementation approach. The indicators focused on process definition, simplicity and clearness, proper documentation and reference, regular process reviews are the focus are of the indicators.

For the question that checks whether defined processes are simple, easy to understand and follow question, there responses obtained that reveals that there 40% of the participants Agree but only 13% of the participants disagree and the remaing 47% remain neutral. This is an indication of of the existing processes are defined in in relatively simple and easy to understand manner with a mean value of 3.30.

When it comes to defining all key process and proper awareness creation about the existance of the defined processes to concerned stakeholder is relatively less compared with the response obtained from the first indicator. Only 34% of the participants replied "Agree" and "Strongly Agree" and around 29% of choosed "Disagree" and "Strongly Disagree" and the remaining neutral to confirm the creation and proper communication of all necessary

processes. With a 3.0 mean, this indicator shows that there should be actions required to define all necessary process and properly communicate stakeholders for proper followup. Making the processes simple and easy to understand is one thinkg but creating all the necessary processes and giving awareness to all involved stakeholders is also important for process maturity.

ITSM Processes Flexibility Indicator			**Response percentage** 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree				
	Mean	**SD**	**1**	**2**	**3**	**4**	**5**
PRC1: In our organization, processes are simple and easy to understand and follow	3.30	0.90	3.9%	9.1%	46.8%	31.2%	9.1%
PRC1: All key processes are already defined in our organization and awareness is created to all stakeholders	3.00	0.92	2.6%	26.0%	37.7%	28.6%	5.2%
PRC1: The process definitions are documented properly, with all important aspects like process objective, purpose, scope, process activities, activity definitions/explanation, roles, and Metrics - CSF's/KPI's	3.20	0.86	0.0%	23.4%	41.6%	28.6%	6.5%
PRC1: There is a regular process improvement inputs taken from stakeholders to continually improve the processes	3.00	0.94	3.9%	24.7%	39.0%	27.3%	5.2%
Valid N (listwise) = 77							

Table 26: Processes Implementation Maturity assessment result

The third indicator for process maturity is proper documentation of process definitions including process objective, purpose, scope, activities, activity explanation, roles, and KPI's. From observed results, 35% participant agree and 23% disagree with none strongly disagree. The remaining 42% are neutral. With this result, we can confirm existence of documentation of processes, as the mean value of 3.2 is also an indicator, but it also shows there are remaining further works in process definition and documentation.

Contnual process improvement works is another indicator of process maturity. This quesiton focused to whether there exist a practice of taing inputs from stakeholders to continually improve the processes. The obtained result shows that, around 29% of participants Disagree existance of this practice but relativelya a bit higher participants (32%) aggree to it. The remaining 39% are neutral. As discussed on chapter Five, Continual Improvement is critically

important for maturity of processes and significantly support agility of of IT Service Managmeent practice. The mean value of 3.0 shows that there is relatively much work to be done compared with other indicators similar to Key process definition and awareness creation indicator.

In general, the aggregated mean of all indicators of the process variable is 3.1 and this shows that there exist some level of process implementation maturity but a lot work is still expected to be to improve process definitions and proce continual improvement in order to make the ITSM practice more agile.

5.1.4 Organizational Structure Flexibility in CBE Result Analysis

For measuring Organization Structure flexibility there were four survey question presented. Those questions are good indicators as discussed in the Research Model Development chapter and Model Analysis and Discusions chapter. Below shows the result obtained from the survey.

Organizational Structure Flexibility Indicators			**Response percentage** 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree				
	Mean	**SD**	**1**	**2**	**3**	**4**	**5**
STR1: Our managers can flexibly deploy their resources (material, financial, human, . . .) to make use of opportunities and minimize threats	3.3	0.94	5.2%	11.7%	39.0%	37.7%	6.5%
STR2: We scan and examine our environment systematically to anticipate changes	3.2	0.90	2.6%	18.2%	36.4%	37.7%	5.2%
STR3: We are quick to make appropriate decisions and necessary organizational changes considering all necessary views	3.1	0.82	0.0%	26.0%	40.3%	31.2%	2.6%
STR4: When tasks change, respective managers also replaced with appropriate one	2.7	1.04	13.0%	29.9%	35.1%	19.5%	2.6%

Table 27:Organizational Structure Flexibility assessment result

The first indicater question was focused on how the Managers in IT can flexibly deploy resources with the aim of using opportunities and minimizing possible threats. The collected response reveals that 44% of participants Agree that Managers can flexibly deploy resources and only 17% of the participants Disagree on this and the remaining 39% remained neutral. The

obtained Mean value of 3.3 was the highest among all other indicators within this category and this shows that there exist some level of flexibility in deploying resource.

The second question was focused on the ability to systematically scan and examine the environment to anticipate changes. The obtained responses on this indicator also shows the existance of the practice with the obtained mean value of 3.2. From the total participants, 43 % agreed the presense of the practice whereas the around 21% Disagree and the remaining 36% of participants remaind neutral.

On the question that focused on whether thy are able to make quick and appropriate decissions on changes with an end to end view, 34% agreed and 26% disagreed but there is no participant who strongly disagreed on it and the remaining 40% are in the middle. Hence, with 3.1 mean value the data revealed the existance of thepractice with a need for improvement.

The fourth question was with an observed least result compared with the three other indicators of Organizational Structure flexibility and even all other 31 indicators used in the ITSM Agility Assessment model. where 43% of participants disagree for the question that says “when tasks change respective managers also replaced with appropriate one”. Unlike any other obtained result 13% of participants Strongly Disagree on this. And only 22% of participants believe that when tasks change, respective managers also changed. This indicator was included to chake if the organization is able to replace competitive managers for a unit when the unit’s role changes.

In general, the cumulative mean of all four indicater is 3.1 and this shows that existance of some sort of organizational strucuture flexibility with high level of improvement requirement to improve the overall Organization’s ITSM Agility.

5.1.5 Workforce and Skill in CBE Result Analysis

Workforce and staff skill was another variable measured in CBE as it has contribution to the Agility of ITSM practice. Four indicators were set out to measure workforce and skills and the responses and mean results are shown below.

The result obtained for the first question, which was focused on employee perception towards coninuous improvement, is around 47% and this shows that those participants believe that

employees in IT perform their work with the view of continuous improvement on the services, process and tools they use eventhough 22% of participants diagree to it and the rest 31% remained neutral. With 3.3 mean value the participants believe that employees can act with a view to continuous improvement of the companies products, services, processes, and/or working methods.

Workforce and Skill indicator			**Response percentage** 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree				
	Mean	**SD**	**1**	**2**	**3**	**4**	**5**
SKL1: Our employees can act with a view to continuous improvement of our products, services, processes, and/or working methods	3.3	0.86	1.3%	20.8%	31.2%	44.2%	2.6%
SKL2: Our employees use a broad range of skills and can be applied to other tasks when needed	3.3	1.05	6.5%	11.7%	36.4%	32.5%	13.0%
SKL3: Our employees are ready to learn and are prepared to constantly access, apply, and update knowledge	3.7	0.84	2.6%	3.9%	29.9%	50.6%	13.0%
SKL4: Our employees are self-motivated	3.5	0.82	1.3%	6.5%	41.6%	40.3%	10.4%
Valid N (listwise) = 77							

Table 28: Workforce and Skill assessment result

For the second question “employees can act with a view to continuous improvement of our products, services, processes, and/or working methods”, the btained mean value is similar with the first question but on this part there is a 13% Strong Agreement and around 7% Strong Disagreement. The response obtained for this question shows that employees in CBE have a broad range of Skills, and they do also apply it on the current tasks that they are assigned to with the willing to apply it on other taks when eeded.

Regarding learning and knowledge management practice, the results obtained shows that existance of strong practice with an obtained 3.7 mean value which is the largest mean compared with the rest three indicators used to measure Workforce and Skills variable. A total of around 64% of participants agree that employees in the organization are ready to learn and are prepared to constantly access, apply, and update knowledge. Only around 7% participants Disagree and 30 % remained in the middle.

Regarding Self Motivation, survey participants were asked whether employees are self motivated or not and 51% agree (10.4% Strongly Agree and 40.3% Agree) and only 1% strongly disagree and 6% disagree. The remaining around 42 % of participants are neutra. With the mean value of 3.5 the obtained response shows the existance of Self Motivation within IT unit.

In summary of the responses obtained regarding Workforce and Skills category, an aggregate mean of 3.45 obtained and this big enough to say that the IT Oganization is in good position regarding workforce and skills.

5.1.6 Collaboration and Cooperation in CBE Result Analysis

Collaboration and Cooperation is another pillar considered for assessment in the model. To measure this latent variable, 2 indicater was was used.

Collaboration and Cooperation Indicators			Response percentage 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree				
	Mean	**SD**	**1**	**2**	**3**	**4**	**5**
COL1: We jointly and intensively operate throughout different functions and/or departments for strategic decision making	3.5	0.82	1.3%	10.4%	33.8%	48.1%	6.5%
COL2: We encourage early involvement of several departments and/or functions in new product and/or service development	3.3	0.98	1.3%	19.5%	36.4%	29.9%	13.0%
Valid N (listwise) = 77							

Table 29: Collaboration and Cooperation assessment result

The first question raised for the survey participants was focused on the existence of a practice that help to jointly and intensively operate throughout different sections and deparments. 55% Agree with from the total (around 48% choosing to “Agree” and nearly 7% with “Strongly Agree”) and only aroud 12 % participants to Dissagree (1.3% Strongly Disagree, and 10.4% Disagree) with 44% of the responses being neutral. This indicator obtained a 3.5 mean and this shows that there exist a good cooperation practice in the organizaton.

43% of survey participants Agree, 21% Disagree, and 36 % are neutral in answering the quesition that checks whether they involve different departments as early as possible when planning and introduction of new products and services. With 3.3 mean value, the result shows

that existance of good collaboration and cooperation practice and 13% of participants Strongly Agree to it as well.

The cumulative mean value of the two indicators, 3.4, indicates the existance and a good cooperation and collaboration practice with in IT in CBE.

5.1.7 Stakeholders and Customers Management Practice in CBE Result Analysis

Stakeholders and Customers Management practice, as described in Research Model Development chapter, shows that the organization makes sure that all parties in the service delivery chain can closely collaborate and encourage feedbacks from the customers and stakeholders for successful delivery services and maximum customer/stakeholder satisfaction. To measure this, three indicator questions were included in the survey and the results are shown below.

Indicators for Customer and Stakeholder Management practice			**Response percentage** 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree				
	Mean	**SD**	**1**	**2**	**3**	**4**	**5**
STK1: We align all our activities to Stakeholders/customer requirements and needs	3.4	0.95	2.6%	15.6%	36.4%	35.1%	10.4%
STK2: We closely collaborate with and encourage fast feedback from our customers	3.3	0.92	1.3%	19.5%	40.3%	29.9%	9.1%
STK3: Everything that we do is always mapped with the value for stakeholders	3.4	0.78	0.0%	13.0%	40.3%	41.6%	5.2%
Valid N (listwise) = 77							

Table 30: Stakeholder and Customer Management Practice assessment result

The first question measured the alignment of individual daily activities to the stakeholders and customers (both internal and external) requirements and needs. The result shows that 10% of responses Strongly Agree and 35% Agree, which accumulates to around 45% agreement, and only around 3% Strongly Disagree and 15% just Disagree (18% total disagreement). This result shows that there is a good practice in aligning daily activities to stakeholder requirements with a mean value of 3.4.

The second indicator focused in measuring the collaboration with customer and quick responses to feedbacks provided from customers. In response to this question, 39% agreed that

thy give fast responses for customer feedbacks with close collaboration whereas around 21% disagree to it and the remaining 40% are neutral to it. The 3.3 mean value to this indicator shows there is indeed some sort of collaboration and quick response practice to customer feedbacks.

The third question was focused on linking activities to creating value to stakeholders. 47% responses show that they agree that everything employees do are always mapped with the value for stakeholders and none Strongly Disagree but 13% disagree though. A Mean value of 3.4 shows that existence of a good practice of linking activities with value to stakeholder.

In general, Stakeholder and Customer Management practice has obtained an aggregate mean value of 3.37 and this is an indicator of existence of god practice.

5.1.8 ITSM Agility in CBE Result Analysis

The ultimate this thesis is to assess the organizational practice towards IT Service Management Agility. ITSM Agility, as indicated in all previous chapters, is the result of cumulative effects of all other variables – Information Systems and Technology Maturity, Management of Partners and suppliers, Process Implementation Maturity, Organizational Structure Flexibility, Collaboration and Cooperation, and Stakeholder Management practice. As indicator to this variable, there were six questions were included in the survey. The survey results for this latent variable which assess the Agility of ITSM practice in the organization are shown in the table below.

ITSM Agility Indicators			**Response percentage** 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree				
	Mean	**SD**	**1**	**2**	**3**	**4**	**5**
AGV1: We value more on our stakeholder/customer satisfaction Instead of following strict processes and procedures	3.6	1.04	3.9%	18.2%	40.3%	23.4%	14.3%
AGV2: Instead of spending more time on extensive documentation, we focus on delivering a working IT Services	3.5	0.98	2.6%	13.0%	29.9%	40.3%	14.3%
AGV3: In our organization, we do not do projects at once, rather we work smaller and manageable parts in a timely manner with feedback before, throughout, and after each iteration/phase	2.9	1.14	11.7%	28.6%	27.3%	24.7%	7.8%
AGV4: We immediately react to changes by	3.0	0.98	3.9%	31.2%	35.1%	23.4%	6.5%

quickly updating our processes							
AGV5: We do not start from scratch and build something new without considering what is already available	3.4	1.05	5.2%	14.3%	28.6%	39.0%	13.0%
AGV6: We always think and work holistically considering all aspects - technology, stakeholders, processes, and suppliers	3.3	1.03	6.5%	11.7%	41.6%	28.6%	11.7%
Valid N (listwise) = 77							

Table 31: ITSM Agility Assessment result

The first question asks the survey participants whether they value more on stakeholder and customer satisfaction than just following strict plans, processes, and procedures. 38% of survey participants Agree to this with 23.4% Agree and 14.3% Strongly Agree response. Those with Disagree and Strongly Disagree responses account to 22% of the total whereas 40% responses are Neutral to it. With aggregate mean result of 3.6, this indicator obtained the highest mean compared with all other in indicators selected ITSM Agility.

The second question was intended to test whether quickly releasing a working system way more than extensive documentations for the system. This idea was supported by Agile Manifesto and industry best practices as well. 14.3% of the participants in the survey responded Strongly Agree and 40.3% Agee which accounts a total of around 55% agreement. Although around 16% Disagree and 30% remained neutral, the aggregate mean of 3.5 shows the existence of this practice in the organization.

Project Execution approach is another assessment area used to indicate the ITSM Agility in the organization. The obtained result for this indicator is very low compared with all the other five indicators of this variable. 40% of participants disagreed (around 12% strong disagreement and 28% Disagreement) on the question that says “we do not do projects at once, rather we work smaller and manageable parts in a timely manner with feedback before, throughout, and after each iteration/phase” and those agreed accounts 33% of the total and those remained neutral are 27% of the total. From this we can say that, even though the indicator mean of 2.9 is low compared with other obtained mean, there exist a practice of doing projects iteratively with smaller and manageable parts at a time with regular feedback throughout the project phases.

The fourth question checks whether the organization quickly react to changes by immediately updating the processes which on the other hand this checks agility of processes. 34% responded that the organization do not immediately react to changes by quickly updating their processes whereas 30% believe that the organization quickly make those changes but the remaining 36% are neutral to it. With an obtained mean value 3.0 shows that there exists a practice of quick process updates when changes in the organization happen, but it reveals that a lot of work required to be done.

The obtained result from indicator AGV5 reveals the existence of a practice of reviewing and evaluating available resources within the organization with the aim of considering them while planning a new one. From the best practices, as discussed in Model Development and Literature Review Chapter, organizations should "avoid building something new without considering what is already available". For this question, as shown in the result table above, 52% participants of Agree that they consider what is already in place at the time of planning new ones. Even though around 20% of participants disagree and remaining 28% stay neutral, with a mean value of 3.4 reflects the existence of a practice of considering already available resources before planning new systems in CBE.

A holistic approach is the other question for the participants in order to help answer the agility of ITSM in the organization. As a response for this, 50% of participants of the survey believe that they always work holistically considering all aspects including Technology, Stakeholders, Processes, and Suppliers in mind. However, 18% of the survey participants Disagree and 42% of them remaining neutral.

In summary of responses obtained for ITSM Agility practice in CBE, an observed 3.3 aggregate mean value of all indicators (AGV1, AGV2, AGV3, AGV4, AGV5, and AGV6 with mean value of 3.6, 3.5, 2.9, 3.0, 3.4, and 3.3 respectively) shows that existence of ITSM agility with future improvement requirements.

The Discussion on overall obtained ITSM Agility in CBE considering all dependent and independent latent variable is discussed in the next chapter (Chapter 8)

5.2 Qualitative Data Analysis

Three open ended questions were asked to IT Service Management aware employees working in CBE IT Department. The responses were coded in order to capture and link the responses obtained from the participants to suit to this paper. Details of the responses after coding are shown in Apedix ii and the resulting codes are exported and included in Annex iii as well.

The open ended questions were:

1. How do you describe the overall IT Service Management practice in CBE?
2. Is there any challenge?
3. Any Improvement Suggestions in order to make ITSM agile enough?

The responses were coded into three node groups as shown in Annex iii (Challenges, Current ITSM Practice, and Recommendation) all detailed nodes and sub nodes are attached in annex iii.

In this sectiopn the analysis of all responses is presents in to theree sections. The first section covers the obtained challenges in CBE towards ITSM practice. The second part gives an overview of the ITSM practice from participants perspective. And the third part compiles the improvement feedbacks obtained from participants in this research.

5.2.1 Challenges in CBE while practicing ITSM

This part covers the challenges in CBE towards ITSM practice. Those challenges could be considered to reason out the gaps observed in the assessment survey – quantitatively obtained results.

The coding of responses obtained from the open ended question associated with challenge were end up with 4 main nodes and 11 respective sub nodes. The main nodes include “Collaboration and Cooperation”, “Complexity and resource”, “Organizational”, and “Process and Procedure” related challenges

The diagram below shows the Code node relationships of “Challenge” with its child nodes.

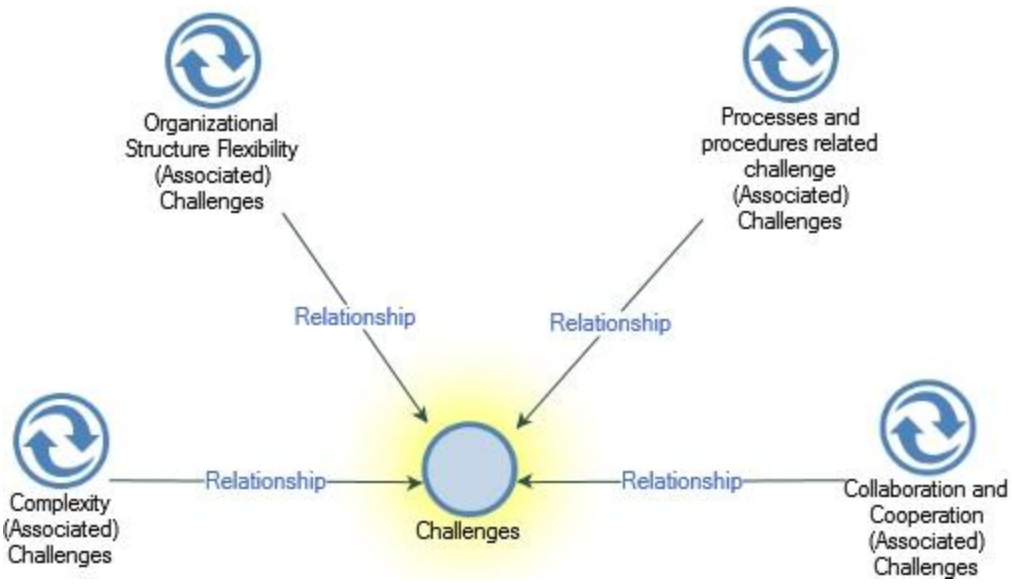

Figure 20: Coded Node Relationship for "Challenge" node

The Collaboration and cooperation related challenges in practicing ITSM in CBE includes Externalization, lack of cooperation and challenges related to timely response and lack of urgency.

The next node contains challenges related to Complexity and Resources. Some respondants beleve that implementation of ITSM practice seems ideal and time taking.

"… CBE took almost more than 3 year for fully implementing ITIL framework"

On the otherhand another respondent said "*In our organization, IT Service Management approach is not well organized …."* This might tell lack of sense of urgency, Leadership gap towards implementation approach. Some seem also confused and frastrated.

"Sometimes it seems ideal. With lot of documentation and confusing words."

This might be because of lack of end to end conceptualization, lack of governance practice, and improper implementation approach being followed while adopting the the choosen ITSM practice (ITIL) as there are other some respondants mentioned including requirment of a consultant.

"IT governance consultant is needed. Single integrated IT governance frameworks and standards are recommended for better ITSM and governance process implementation."

The third part of challenges are grouped as Organizational. Under this, issues related to lack of knowledge transfer, lack of responsibility matrix, unsuitable organization of ITSM approach were included.

There are also process and procedure related issues and challengs. One of the respondant said *"… I hope issues related to some processes and procedures will be undertaken soon to overcome the current challenges..."* and this shows that existence of process and procedure related issues.

Collaboration and cooperation relationships

Challenges related to Collaboration and and relationships are depicted in the diagram below. As, estracted from the obtainded responses, the challenges related to Collaboration and cooperation relationship with Externalization, Timely response, and Lack of Cooperation.

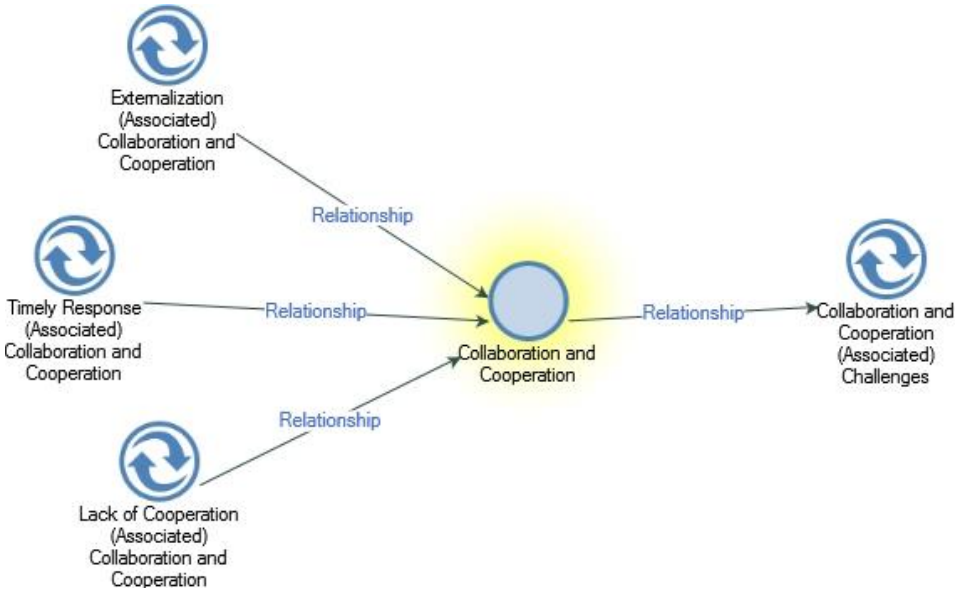

Figure 21:Collaboration and Cooperation Coded Node relationships

Process Implementation Challenge

Some mentioned existance of Process and procedure related challenges. The response tries to mention the existance of this challenge and some also relates it to prioritization of process implementaitons.

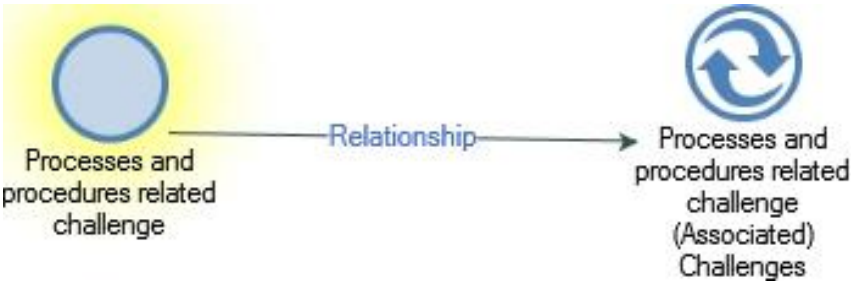

Figure 22: Process and procedure coded node relationship

Organizational Challenges relationships

Organizational Challenges relationships as dipicted in the figure below are Lack of knowledge transfer, Not well organized ITSM implementation approach, Lack or responsibility Matrix, and reactive approach. The figure below dipicts those relationship.

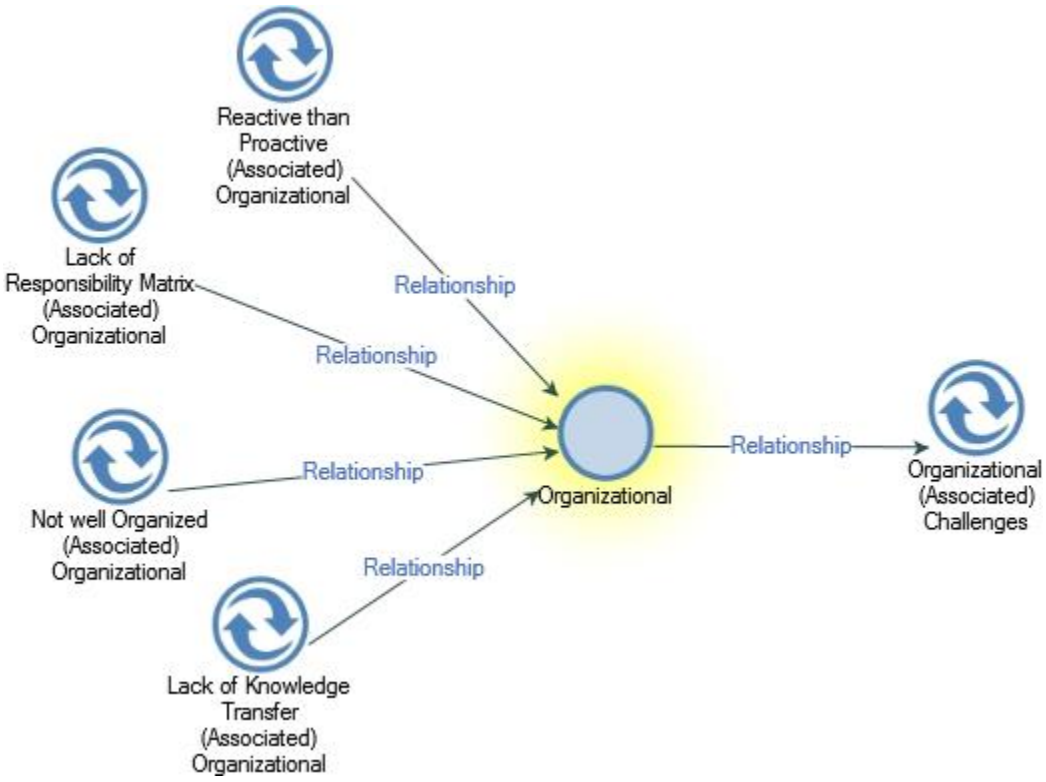

Figure 23: Organizational Challenge Coded Node relationships

5.2.2 Participant Response for Current ITSM Practice

As extracted from the responses obtained from the participant. Majorty mentioned and acknowledges the existnace of IT Service Management Improvement Initiative in CBE with the aim of of improving ITSM practice in the organization. This is a good thing but some others also

mentioned that it is in the early stage and facing difficulties in making it mature enough. **They precisely mentioned that it is not yet mature enough and this fully comply with what is obtained from the quantitative survey result.** Most of them agree that they have a good perception towards adopting ITSM best practice refering ITIL.

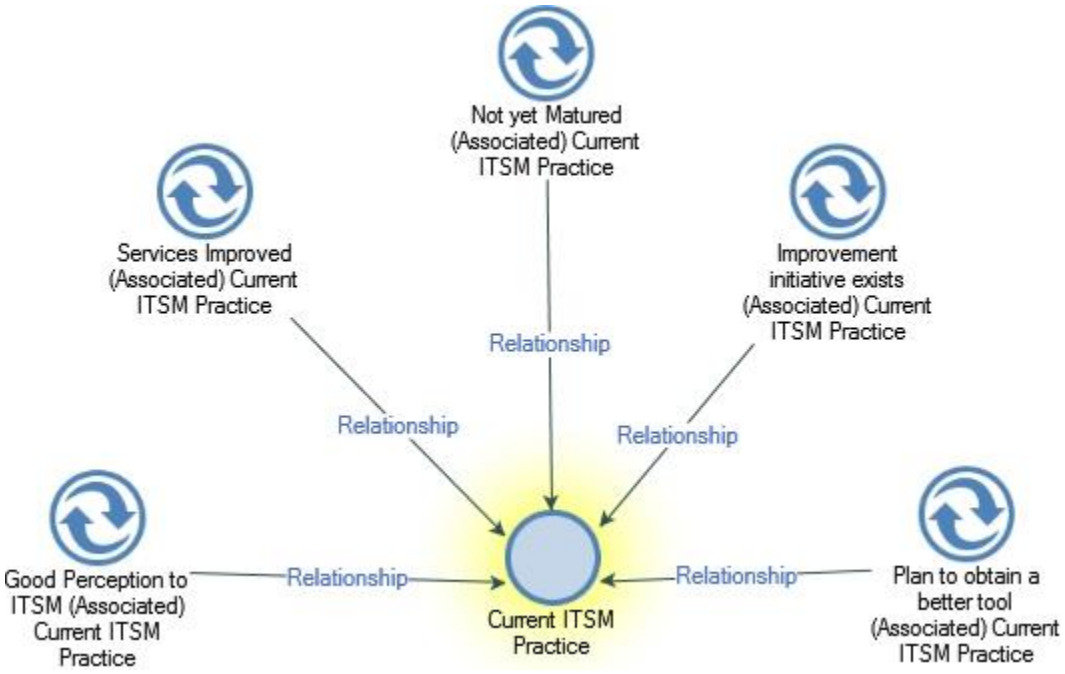

Figure 24: Current ITSM Practice Coded Node relationships

5.2.3 Participant response as Improvement Suggestions

From the comments obtained throught an open ended question, the below 7 Take Aways from the participants can be taken as a next action for CBE to consider.

1. Allow employees to anticipate changes and make quick changes
2. Selectively Implement Processes
3. Experienced staff retention
4. Improvement required in Risk Mnagement
5. Maximize ITSM Practice by using ITSM Tools
6. Training and Knowlesge transfer practice improvement
7. Consultant involvement

5.3 Summary of ITSM Practice Agility in CBE's

The previous sections of this chapter discussed about the analysis of results obtained throught both quantitatve and qualitative data from conducted survey. The overall CBE's ITSM Agility result is summarized in this section.

The cumulative Mean results of each Construct used to determine the ITSM Agility (Information Systems and Technology Maturity, Stakeholder and Supplier Managmeent practice, Collaboration and Cooperation, Workforce and Skills, Organizational Structure Flexibility, Process Implementation Maturity, and Supplier Management practice) were taken as a pillar to build the radar chart as shown in the figure below

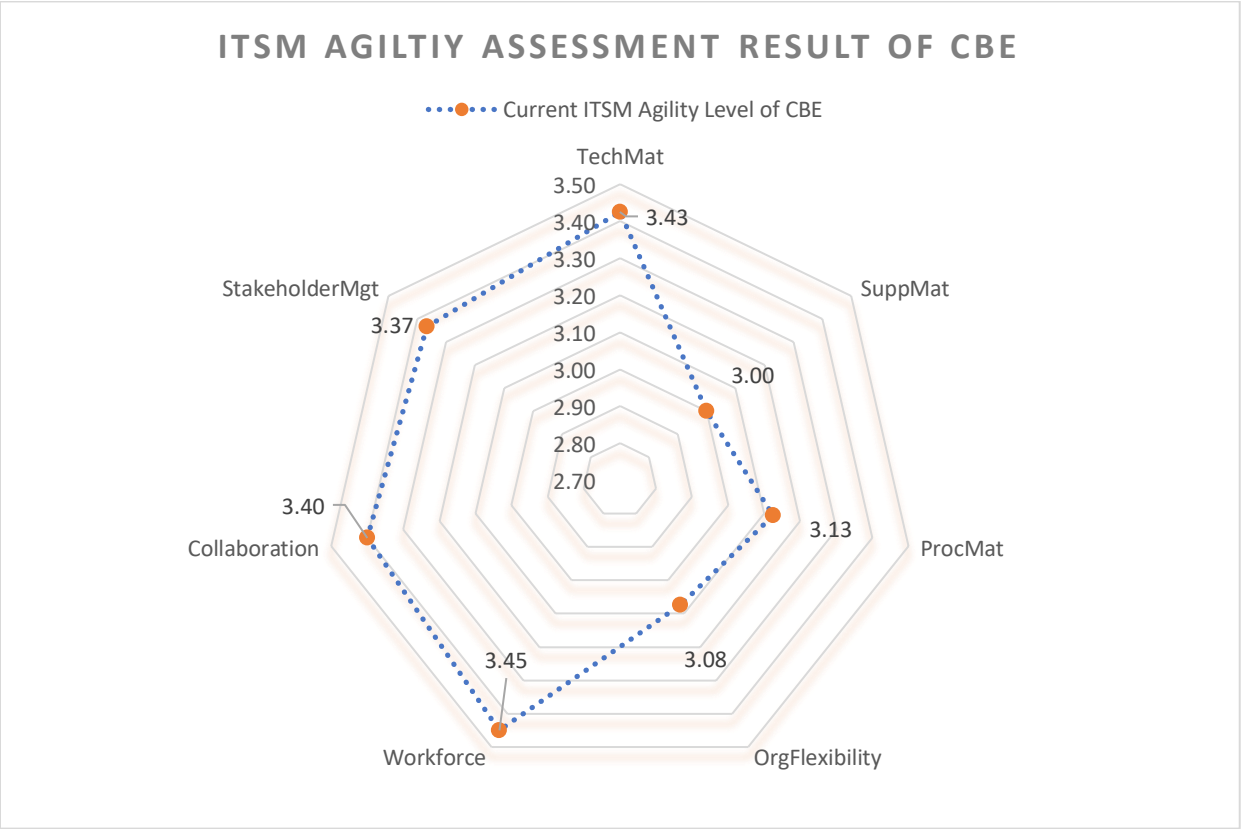

Figure 25: ITSM Agility Assessment Radar Chart

From the values obtained, it is observed that *Workforce and skill, Collaboration and Cooperation, Information Systems and Technology,* have a better maturity, in relative comparison, than *Process Maturity, Organizational Structure Flexibility, and Supplier Management maturity*.

In CBE, *Supplier and Partners Management* practice has the lowest achieved maturity compared with all other variables with 3.0 aggregated mean value of its indicators followed by *Organizational Structure Flexibility* with an aggregate mean of 3.08 and *Process Implementation Maturity* with 3.13 aggregated Mean value. With a bit higher aggregated Mean vlue, 3.37, *Stakeholder and Customer management* practice has better maturity than the above mentioned variables followed by *Collaboration and Cooperation* with 3.4 aggregated Mean

The top two variables with higher aggregated Mean value are *Information Systems and Technology Maturity* with 3.43 aggregated Mean value and *Workforce and Skill* with an aggregated Mean value.

In general, the cumulative Mean of those constructs used to measure the ITSM Agility is 3.26 and with relative similarity cumulative Mean of Indicators of the ITSM Agility construct itself is also 3.28. From this, we can conclude that those constructs used in the ITSM Agility Assessment Model are true determinants of ITSM Agility in the organization.

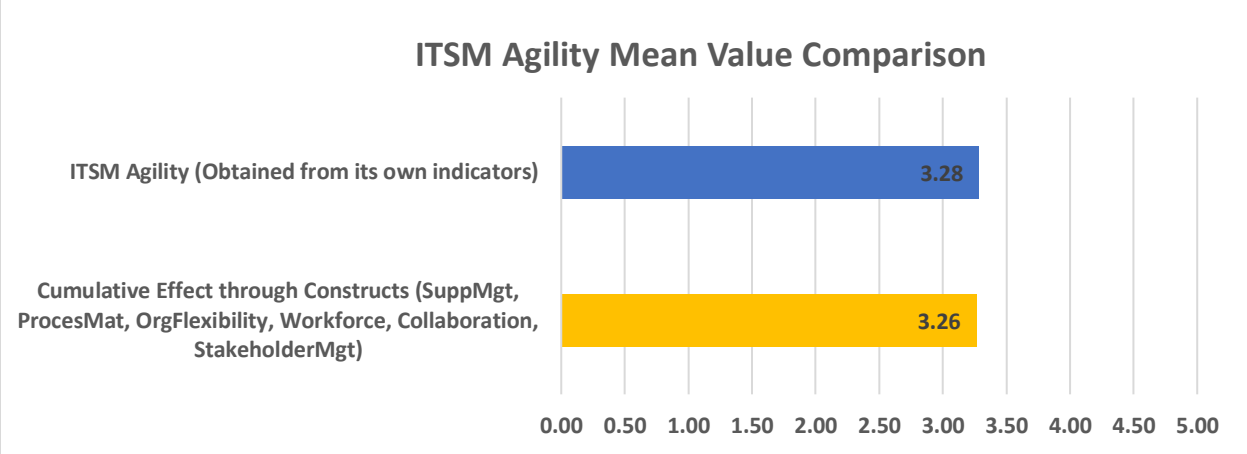

Figure 26: ITSM Agility Mean Value Comparison

With the 3.3 value, we can conclude that the overall ITSM Agility in CBE is at Level 2.

As described in Chapter 5 - Research Model Development, the Agility value that fall within **3 to 3.99** are categorized as Level 2 and this means **The Organization is still in a transition phase towards a complete agile organization** (Wendler, 2014)

In general, the obtained result shows that CBE has established an appropriate technological basis in most parts of the organization and many employees and managers share the idea of

agility and equipped with the necessary skill. Changes in CBE gets handled appropriately and, in many instances, teamwork is promoted and there is also a flexible organizational structure in the IT unit.

6 Conclusion and Recommendation

The conclusion of the whole thesis work which attempted to answer the two research questions – How IT Service Management Agility can be assessed? and What is the current ITSM Agility Level of CBE? are documented in this chapter. Key findings of the research, theoretical and practical implications, recommendations, limitation of the research and future work are included.

6.1 Conclusion

IT Service Management practice in an organization is seen crucially important for efficient and effective delivery IT Services to internal business units and external customers. To bring the efficiency and effectiveness of IT Service, a properly organized ITSM approach is critical, and this could be achieved through a proper adoption of tailored industry best practices like ITIL and COBIT. In this regard, CBE has already gone in an initiative to adopt ITIL processes with the same sole objective of improving its IT Service Delivery. Choosing which processes to adopt and defining the activities, documenting procedures, policies, responsibilities and KPI's as well as communicating and training has already been done for years.

In between, several disruptive technologies and even changes in the practice itself are also happening in the world. Taking those facts in to consideration, CBE needs to understand the importance of its ability to detect and make appropriate changes as quick and flexible as possible. This requires continually assessing IT Service Management agility and knowing the agility level is important for companies to make sure that they can continually improve their service delivery to stay competent and keep providing value to its customers and stakeholders.

With this notion, extensive literature review was conducted to understand and conceptualize Agility from the context of IT Service Management practices. Prior works and literatures on Agility, Organizational Agility, IT Service Management, Agile IT Service Management, Agility Assessment model were reviewed together with widely accepted ITSM industry frameworks and the ISO standard.

After Literature review, a conceptual model was developed that would help to measure the IT Service Management Agility practice of CBE by extracting measurement variables from the

works of Wendler, 2014 - An Organizational Agility Assessment Model, Imache et al, 2012 - An enterprise information system agility assessment model, and ITIL version 4, 2019 from Industry best practices.

The initial ITSM Agility Assessment Model was analyzed using SEM techniques and adjustments were made to make it structurally fit. After making the necessary modification, validity and reliability was checked and the final ITSM Agility Assessment Model for CBE were reported using Structural Equation Modeling Technique. With this attempt, the first research question (RQ1: How ITSM Agility of CBE assessed?) has been successfully answered.

After validating the assessment model and the hypotheses, this research has demonstrated the current agility level of the ITSM practice in CBE with sufficient analysis and explanations. With this, the second research question (RQ2: What is the current ITSM Agility Level of CBE?) has been properly addressed. The obtained result shows the existence of some sort of IT Service Management Agile practice in CBE. The summary of the result is indicated in previous chapter (Chapter Eight).

In general, the goal and objective of this research is properly addressed by developing an IT Service Management Agility assessment model comprising all major aspects suitable for CBE's context. All the variables required for defining ITSM agility with hypotheses were defined. And, using the defined model, IT Service Management agility of Commercial Bank of Ethiopia has been successfully assessed and identified the current level of agile ITSM practice in the company.

6.2 Key Findings of the Study

In general, the obtained result shows that:

- CBE is still in a transition phase towards a complete agile ITSM Practice
- CBE has established an appropriate Information Systems and Technological foundation that support the current and future business demands to keep itself competitive in the market space.
- Much work is required on standardization, interoperability, and elasticity of infrastructures.

- Many employees and managers understand and share the idea of agility and its importance in IT Service management.
- IT Staffs in CBE are equipped with the necessary skills
- There is a change management practice in CBE but requires improvement
- In many instances, there is a teamwork practice in CBE
- In IT Department, there is somehow flexible organizational structure that allows Managers to flexibly deploy resources, but Managers do not seem replaced with appropriate ones when roles of a specific department get changed.

6.3 Theoretical and Practical Implications

Agility in ITSM is a relatively new topic compared with other areas in the IT Service Management domain. There is no other model developed so far for assessing agility of IT Service Management to the best of the researcher's knowledge. Therefore, this research contributes a theoretical foundation on how to assess an IT Service Management Agility practice in an organization.

Practically, CBE can use this model to regularly check its ITSM Agility levels and plan for future improvements to keep aligned with the business and technological changes. By doing so, it can ensure efficient and effective IT Services delivery.

6.4 Recommendations

Through the course of this study, an agility assessment of the ITSM practice were assessed and a useful insight were obtained. As a recommendation to CBE, all ITSM elements considered in this research (Information Systems and Technology Maturity, Stakeholder Management Practice, Process Implementation Maturity, Workforce and Skills, Collaboration and cooperation, Organizational Structure Management Maturity, and Supplier Management practice) should be regularly monitored for insuring a continuous improvement in IT Service Delivery.

- CBE should allow employees to systematically anticipate changes and make appropriate decisions as quick as possible to minimize the counter effect and threats.

- Identification and selective implementation of processes and Maximizing utilization of ITSM tools would help CBE to streamline its ITSM practice and provide common understanding and knowledge to all employee involvement in each process. In return, this also improves capability of measuring the IT Service Delivery practice.
- Even though it is observed that the existence of good maturity of Information systems and Technology, it still requires standardization and improvement the type of infrastructure being used to run the services in the organization to make it as agile as possible.
- Training and Knowledge transfer practice improvement and Experienced staff retention should also be considered as an improvement area.
- Supplier and Partner management practice for IT related works in CBE is way behind compared with other indicators and CBE should consider improvement by practicing supplier engagement through quality criteria and improving regular monitoring practice on the performance of each partners and suppliers to get most as possible.
- The Organizational structure in IT requires improvement to make it flexible as possible to be able to adopt to changes and suit for managers to easily deploy resources. And when the roles of an organizational unit changes, a manager suitable for that position should also be replaced as well.
- Improvement on Collaboration and cooperation should be improved in the organization together with stakeholder management practice improvement.

6.5 Limitations and Future Work

The research was conducted with a limited number of survey participants because of different factors including COVID19. Physical presence and interaction were not easy at the time of the research and this impacted the research to apply strong qualitative sources. Qualitative methods are typically more flexible as they allow greater spontaneity and adaptation of the interaction between the researcher and the study participant (Farr, 2008).

This research can provide a good insight on measuring the IT Service Management Agility as the topic is relatively new in the IT Service Management domain compared with other available researches. Therefore, it can be used as a starting point for other researchers who would like to pursue their research in similar domain.

Recommendations for future researchers:

- Testing whether ITSM agility has significant positive impact on Efficient and Effective IT Service Delivery is an area that future researcher may focus.
- It is recommended if other researchers test the identified model with large survey data within CBE or any other similar companies in the banking sectors.
- Testing Agility level in companies where there is no awareness created about ITSM best practices like ITIL or those with awareness but not yet started implementing those best practices might result with different output and perspectives might also be changed. Checking within that kind of organization might be considered as future research area.
- Testing the ITSM Agility assessment model within other technology intensive sectors like Telecommunications.
- Testing the model with additional and/or different hypotheses.
- Strong qualitative insights from different management and technical professionals through interview could also be another area for future researchers.

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Annex

Annex i. Questionnaire

IT Service Management Agility Assessment

Greetings,

I would like to thank you in advance for your time and genuine response while filling out this questionnaire for my study in an attempt to prepare an ITSM Assessment Model for my thesis work as partial fulfillment of MSc in Information Systems.

It will only take 15 minutes of your estimated time.

Regards,
Fiseha Moges

Section 1: **Information System and Technology Maturity** **This section aims to assess the organization maturity in terms of applications and technology**		
TEC1	Our organization has the right applications and systems to be competitive in the marketplace	Strongly Disagree … Strongly Agree
TEC2	There is an Up-to-Date systems and technology in our organization satisfying our current and future demand	
TEC3	We have well integrated systems supporting different business units in the organization	
TEC4	We have standardized our Information Technology and System throughout the organization	
TEC5	Interoperability is considered while introducing new systems and technologies	
TEC6	Our infrastructure can easily be Expandable (scaled up and scaled out) with minimum effect on the operation	
Section 2: **Partners and suppliers management practice** **This section focuses on partners or supplier engagement with the organization**		
SUP1	We select our partners and subcontractors by quality criteria (rather than pure cost-based decisions)	Strongly Disagree … Strongly Agree
SUP2	We monitor the performance of our partners and subcontractors very closely and regularly	
Section 3: **Processes Implementation Maturity** **This section aims in assessing overall IT process maturity of the organization**		
PRC1	In our organization, processes are simple and easy to understand and follow	Strongly Disagree … Strongly Agree
PRC2	All key processes are already defined in our organization and awareness is created to all stakeholders	
PRC3	The process definitions are documented properly, with all important aspects like process objective, purpose, scope, process activities, activity definitions/explanation, roles, and Metrics - CSF's/KPI's	
PRC4	There is a regular process improvement inputs taken from	

	stakeholders to continually improve the processes	
Section 4: **Organizational Environment Flexibility** **This section focuses on the Organizations**		
STR1	Our managers can flexibly deploy their resources (material, financial, human, . . .) to make use of opportunities and minimize threats	Strongly Disagree … Strongly Agree
STR2	We scan and examine our environment systematically to anticipate changes	
STR3	We are quick to make appropriate decisions and necessary organizational changes considering all necessary views	
STR4	When tasks change, respective managers also replaced with appropriate one	
Section 5: **Workforce and Skills** **This section focuses on the Organizations**		
SKL1	Our employees can act with a view to continuous improvement of our products, services, processes, and/or working methods	Strongly Disagree … Strongly Agree
SKL2	Our employees use a broad range of skills and can be applied to other tasks when needed	
SKL3	Our employees are ready to learn and are prepared to constantly access, apply, and update knowledge	
SKL4	Our employees are self-motivated	
Section 6: **Collaboration and Cooperation**		
COL1	We jointly and intensively operate throughout different functions and/or departments for strategic decision making	Strongly Disagree … Strongly Agree
COL2	We encourage early involvement of several departments and/or functions in new product and/or service development	
Section 7: **Customers and Stakeholder Management**		
STK1	We align all our activities to Stakeholders/customer requirements and needs	Strongly Disagree … Strongly Agree
STK2	We closely collaborate with and encourage fast feedback from our customers	
STK3	Everything that we do is always mapped with the value for stakeholders	
Section 8: **ITSM Agility** **This section aims evaluating the organization's generic ITSM Agility**		
AGV1	We value more on our stakeholder/customer satisfaction Instead of following strict processes and procedures	Strongly Disagree … Strongly Agree
AGV2	Instead of spending more time on extensive documentation, we focus on delivering a working IT Services	
AGV3	In our organization, we do not do projects at once, rather we work smaller and manageable parts in a timely manner with feedback before, throughout, and after each iteration/phase	
AGV4	We immediately react to changes by quickly updating our processes	
AGV5	We do not start from scratch and build something new without considering what is already available	
AGV6	We always think and work holistically considering all aspects - technology, stakeholders, processes, and suppliers	

Annex ii. Coding Export for qualitative analysis of open-ended questions using NVivo

Description: Overall IT Service Management practice in CBE

<Files\\Open-end Question Responses> - § 20 references coded [18.07% Coverage]

Reference 1 - 0.37% Coverage

Response 1:

*"CBE has already started ITIL processes(partially). **Agility is essential** concerning customer satisfaction and balancing their needs with the nature of the banking business. Obviously almost all business operation depends on IT infrastructure. In my opinion, the bank shall not apply all processes of ITIL because of the nature of the business. Risk assessment takes longer time when compared with other serving organizations. With the current situation, there is rapid change in making IT service management advanced."*

Reference 2 - 0.94% Coverage

Response 1:

*"CBE has already started ITIL processes(partially). Agility is essential concerning customer satisfaction and balancing their needs with the nature of the banking business. Obviously almost all business operation depends on IT infrastructure. In my opinion, the bank shall not apply all processes of ITIL because of the nature of the business. Risk assessment takes longer time when compared with other serving organizations. With the current situation, there is **rapid change in making IT service management advanced**."*

Reference 3 - 0.67% Coverage

Response 2:

*"The ITSM approach tends to follow a more reactive than proactive approach to incidents. Even though there was a major progress in the **attempt to have a proper ITSM in place**, using that as a currency to buy into an actual practice was still an uphill climb. But overall, CBE seemed to be in a pole position to make major changes in this department. In addition to this, I believe the main struggle for CBE in improving to a more agile approach is the procedural business processes that tend to mar any new changes to process. I suggest having more flexibility from the business side to 1) give more authority to make changes within the bank 2) Ensure the right support is provided from senior management to the departments to make and implement/enforce these changes"*

Reference 4 - 1.28% Coverage

Response 2:

*"The ITSM approach tends to follow a more reactive than proactive approach to incidents. Even though there was a major progress in the attempt to have a proper ITSM in place, using that as a currency to buy into an actual practice was still an uphill climb. But overall, CBE **seemed to be in a pole position to make major changes in this department**. In addition to this, I believe the main struggle for CBE in improving to a more agile approach is the procedural business processes that tend to mar any new changes to process. I suggest having more flexibility from the business side to 1) give more authority to make changes within the bank 2) Ensure the right support is provided from senior management to the departments to make and implement/enforce these changes"*

Reference 5 - 0.80% Coverage

Response 4:

*"**It is in early stage only conceptually agreed**. It requires management sponsor, commitment*

as it a continuous process …"

Reference 6 - 0.51% Coverage

Response 6:

"Now it is getting improvement and good IT services are being delivered. continuous training should be given to IT staff and experienced IT staff keep should kept."

Reference 7 - 0.64% Coverage

Response 6:

"Now it is getting improvement and good IT services are being delivered. continuous training should be given to IT staff and experienced IT staff keep should kept."

Reference 8 - 2.82% Coverage

Response 8:

"Currently, the bank has adopted ITIL standards to improve the IT Service management, and we are on process to implement all standards to reach the right level of maturity. And hope will continue to be complying ISO standards. The major challenges that the IT service Management is mainly exhibits are Lack of urgency among process to respond timely, lack of established clear responsibility matrix with business team …"

Reference 9 - 1.14% Coverage

Response 9:

"Some ITIL processes are already designed and ITSM tool is bought; but I cannot say the implementation process has met its target. So, CBE is expected to do a lot on the ITSM/ITIL implementation and continual improvement."

Reference 10 - 1.37% Coverage

Response 12:

"The service management in CBE is under progress, and now the bank adopts ITIL. And hope working to fulfill ISO standards. The challenges in SM, process or stakeholder have not yet read each other. We have been working on knowledge transfer to equip all to meet the expected requirements"

Reference 11 - 1.60% Coverage

Response 13:

"In general, now a days in CBE IS sector, all four P's of IT service Management including organizational structure are streamlined by ITIL processes"

Reference 12 - 0.59% Coverage

Response 14:

"Since there is an ongoing reforms i hope issues related to some processes and procedures will be undertaken soon to overcome the current challenges."

Reference 13 - 1.21% Coverage

Response 15:

"All CBE users must be obligated to use ITSM to make IT services good"

Reference 14 - 0.43% Coverage

Response 18:

"There is good initiation, but it needs more focus from the decision making and performers interest."

Reference 15 - 1.45% Coverage

Response 21:

"There is a good start on standardizing our services in all aspects of technologies."

Reference 16 - 0.21% Coverage

Response 22:

"*ITSM is good*"

Reference 17 - 0.53% Coverage

Response 23:

"*I can say there is improvement*"

Reference 18 - 0.32% Coverage

Response 24:

"*Not Matured enough*"

Reference 19 - 0.69% Coverage

Response 26:

"In better way to improve customer needs."

Reference 20 - 0.51% Coverage

Response 27:

"*It is in the beginning stages*"

Annex iii. Code Book Export: Nodes

Name	Description	Files	References
Challenges	**ISM relate Challenges in CBE**	**1**	**14**
Collaboration and Cooperation		1	3
Externalization		1	1
Lack of Cooperation		1	1
Timely Response		1	1
Complexity and Resources		1	5
Confusing Terms		1	1
Forex shortage		1	1
Supplier Dependency		1	1
Time Demanding		1	2
Organizational		1	5
Lack of Knowledge Transfer		1	1
Lack of Responsibility Matrix		1	1
Not well Organized		1	2
Reactive than Proactive		1	1
Processes and procedures related challenge		1	1
Current ITSM Practice	**Overall IT Service Management practice in CBE**	**1**	**20**
Good Perception to ITSM		1	4
Improvement initiative exists		1	12
Not yet Matured		1	2
Plan to obtain a better tool		1	1
Services Improved		1	1
Recommendation	**Improvement Suggestions to make agile the ITSM practice in CBE**	**1**	**16**
Consultant Required		1	1
Freedom to make changes		1	1
Improvement in Risk Assessment		1	1
Maximize ITSM Practice		1	2
Maximum ITSM tool utilization		1	1
Processes Improvement		1	1
Selective in Process Implementation		1	2
Senior Management Support		1	4
Staff Retention		1	1
Training Required		1	2