Enterprise Architecture Driven Design of an Artefact to Support Strategic Information Technology Decision-Making of Small Enterprises in Nigeria and South Africa

By

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Abstract

Information Technology (IT) is inevitably influencing the way enterprises operate, compete, and grow. The contemporary disruption has not excluded small companies. Small enterprises play a significant role in the growth of every economy but are hindered by limited skills, time, and money. The attributes of small enterprises influence the strategic and day-to-day operations. Small enterprise owners are often the managers who make the strategic decisions in order to solve specific problems. The decision style of small enterprise owner-managers limits the leveraging of IT. To ensure the sustainability of small enterprises in a contemporary business ecosystem, it is pertinent to strategise IT investment decisions. Enterprise architecture is a well-known approach to business and IT alignment. This study aims to discover and develop how the complex enterprise architecture principles can strategise the IT decision-making process in small enterprises with limited resources and informal structures. The pragmatic philosophic stance was the premise for understanding the decision challenges and the development of a roadmap to intervene the problems the researcher identified. The Vaishnavi and Kuechler design science research methodology guided this study. The qualitative research approach was employed to collect verbal data with eleven small enterprise owner-managers to understand the processes and the challenges of making IT decision in small enterprises. A thematic analysis of the findings revealed that lack of formalisation, limited information, and lack of IT skill created a critical bottleneck of IT investment decisions in small enterprises. An enterprise architecture-driven framework was developed to overcome the bounded rationality approach to IT choices in small enterprises. The framework holistically assesses organisational business-IT capabilities, constraints, and criteria to guide the decision-maker's choice. The characteristics of small enterprises limit the successful implementation of the enterprise architecture-driven framework as a theoretical guideline for making optimal IT decisions in small enterprises. This study further developed an online IT decision-assistive tool informed by the framework. The instantiation artefact was demonstrated with six small enterprise owners from Nigeria and South Africa. The findings affirmed the prospect, potential, and relevance of an enterprise architecture-driven artefact as a tool to optimise strategic IT decisions in small manufacturing, service, and retail enterprises. The artefact developed in this study provided a practical intervention to the challenges of IT investment decisions in small enterprises.

List of Publications

Publication	Contribution to the Thesis
Alhassan, M. E., & Van Belle, J. P. (2016). Enterprise Architecture Perspective for Strategic IT Decision Making Process of Small Sub-Saharan African Enterprises. In *CENTERIS 2016 - International Conference on Enterprise Information* (pp. 417–424). Porto, Portugal: SciKA.	Chapter 1 (Sections 1.5 & 1.7), Chapter 4 (Section 4.3) and Chapter 6.
Alhassan, M. E., & Van Belle, J. P. (2017a). Typical Information Technology Decision Making Processes of Small Enterprises : Towards a Strategic Approach. In *African Conference on Information Systems and Technology* (pp. 1–9). Cape Town.	Chapter 1 (Section 1.5), Chapter 5 (Section 5.2)
Alhassan, M. E., & Van Belle, J. P. (2017b). Conceptual Enterprise Architecture Driven Framework for Information Technology Decisions in SMEs. In *Proceedings of International Conference on Information Technology*. Singapore: International Conference Proceedings Series, ACM.	Chapter 6 (Sections 6.1 – 6.6)
Alhassan, M. E., & Van Belle, J. P. (Submitted). Understanding Information Technology Decision Making Process of Small Enterprise Owner-Managers: Bounded Rationality Approach. Extended Paper from *African Conference on Information Systems and Technology to be Published in African Journal of Information.*	Chapter 5 (Sections 5.2, 5.3 & 5.4)

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List of Abbreviation

BRCT	Bounded Rational Choice Theory
DMT	Decision-Making Theory
DS	Decision Support
DSR	Design Science Research
DSRPM	Design Science Research Process Model
DSS	Decision Support System
EA	Enterprise Architecture
EADF	Enterprise Architecture-Driven Artefact
IS	Information Systems
IT	information Technology
ITD	Information Technology Decision
MITDA	Manual IT Decision Artefact
OITDAT	Online IT Decision Artefact Tool
RCT	Rational Choice Theory
SAM	Strategic Alignment Model
SB	Small Business
SDM	Strategic Decision Making
SE	Small Enterprise
SITD	Strategic IT Decision
SITDA	Semi-Automated IT Decision Artefact
SME	Small Medium Enterprise

1 Chapter One – Introduction to the Study

1.1 Introduction

This chapter introduces and outlines design science research methodology adopted in this study. This chapter presents a brief overview of the entire study. Sections 1.3, 1.4, and 1.5 discuss the background to this study, the motivation that informed this study, and the aim and objectives of this study. This chapter justifies the relevance of this study as Information Systems research. This chapter also highlights the research methodology adopted and the overall structure of this thesis. This chapter concludes with a summary section that recaps on the content of this chapter.

1.2 Research Overview

This study is a Design Science Research (DSR) that investigates how Small Enterprise (SE) makes Information Technology (IT) decisions and develops artefacts to support IT decision-making processes in Small Enterprises (SEs). Information Technologies are necessary tools for businesses that wish to succeed in a contemporary business environment. SEs can leverage IT to overcome business challenges, improve business operations and performance, and create innovative business opportunities. The key constraints to the success of IT lie in the choice, implementation, and management strategies. This study argues that the success of IT in SEs depends on how thorough the business requirements are analysed before choosing a specific IT. This study upholds that the type and quality of information a decision-maker can acquire determines the decision-maker's IT aspirations and the attainment of the desired goals.

In an attempt to formalise the information SE owner-managers should seek, this study developed a conceptual framework driven by the principles of Enterprise Architecture (EA). The EA provides a holistic perspective of organisation and allows the optimisation and translation of strategies through business and IT. This study acknowledges the complexity of EA which led to the abstraction of the principles instead of the application of the entire EA Framework (EAF). The conceptual framework developed in this study is "Enterprise Architecture-Driven Framework" (EADF). This study adopts a pragmatic philosophic stance which led the researcher to demonstrate the practical application of the EADF in supporting IT decisions. This study demonstrates the workability of the EADF by employing the DSR

methodology to develop an Online IT Decision-Assistive Tool (OITDAT) in three design science iterations. The OITDAT was assessed by SE owner-managers in Nigeria and South Africa. The subsequent sections in this chapter and the following eight chapters describe in detail the activities, the findings, and the outcome of this study.

1.3 Background to the Study

Information Technology is an emerging discipline with a diverse perception and application to the day-to-day activities of people. Information and Communication Technologies (ICT), computers, mobile technologies, and other related technologies are referred to as "Information Technology" in this study. The increasing rate of business performance relative to the cost ratio of IT informs the penetration of IT in SEs (Chuang, Nakatani, & Zhou, 2009). Information Technology has helped to globalise most economies; thus, organisations that seek to be successful need to join the contemporary information world (Ghobakhloo, Sabouri, Hong, & Zulkifli, 2011).

For over three decades, research on the use of IT in SEs has been conducted in the field of Information Systems (Chuang et al., 2009; Frambach, 1993; Snobel, 1981). IT has been arguably perceived as a value driver for businesses, while some regard IT as a complex technology they have to learn to adapt (Alyahya & Suhaimi, 2013). The wide adoption of IT across all facets of large, medium, small, and micro-enterprises poses the challenges of how to successfully invest, manage, align, leverage, and sustain IT. However, IT has made significant improvements in businesses allowing organisations to operate globally, communicate faster, run cost-effective businesses, improve productivity, realise a technology edge over competitors, and reduce the downtime of business operations (Burgess, 2001; Nieto & Fernández, 2005; Ongori, 2009).

Enterprises can achieve viable business growth, join the global market, and improve business performance by effectively aligning business and IT (Van Belle & Giqwa, 2013). Small Enterprises in sub-Saharan Africa lack adequate finance and display insufficient IT skills to support business activities (Duncombe & Molla, 2009). SEs in developing nations contribute to the economic development, employment creation, and poverty reduction despite these challenges (Esselaar, Stork, Ndiwalana, & Deen-Swarray, 2006). Sub-Saharan African SEs can use IT to help overcome some of their challenges. Small Enterprise owner-managers often make IT investment decisions without a thorough need assessment; hence, researchers have

argued for a formalised IT decision process in SEs (Bernaert, Poels, Snoeck, & Backer, 2014; Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012).

The decision-making process is the first stage of IT adoption, and it is a key determinant of the success of any IT investment (Ndiege, Marlien, & Flowerday, 2014). Decisions in SEs have been characterised as being intuitive, relying on insufficient information, influenced by environment, cost-bias, trust, and a reactive approach to short-term issues (Brunetto & Farr-Wharton, 2007; Love & Irani, 2004; Salles, 2006). Formalising an IT investment decision process in SEs could support decision-makers in maximising IT benefits and overcoming business challenges (Ghobakhloo et al., 2012).

It is paramount for decision-makers in SE to utilise their limited resources and develop strategies to maximise their IT investments, especially in developing nations where SEs contribute to the economic development, employment creation, and poverty reduction (Esselaar et al., 2006). Decision-makers in SEs need to make a more holistic assessment of their enterprises in order to overcome the challenges faced when making IT decisions. This study aims to develop artefacts to support the IT decision-making process of SE owner-managers to leverage their IT investment decisions.

1.4 Research Problem and Motivation

Small Enterprises are dynamic businesses operating in vibrant environments with different cultures, values, strategies, skills, limited resources, competitive markets, and management systems (Burgess, 2001). SEs would become more agile, productive, and will be able to compete more effectively nationally and globally when IT investments are strategised. When businesses invest in IT, they want to be sure they have made the right decision that will maximise investment returns and improve business performance (Winborg & Landström, 2001).

The IT decision-making process in SEs has been described as being challenging as a result of insufficient time to analyse alternatives, decision-makers' lack of IT skills, inappropriate information resources, and lack of a formal decision framework (Rantapuska & Ihanainen, 2008). In addition to the decision-making challenges, SEs in the sub-Saharan African economy are faced with the peculiar business challenges of developing nations. Notwithstanding, sub-Saharan African SEs still contribute to job creation, serving as the engine for growth and poverty alleviation, and the breeding ground for entrepreneurship, technical skills, and

innovativeness for private sector development (Apulu & Latham, 2011; Effah & Light, 2009). Formalising strategies for IT investments can help SMEs overcome some business challenges. Strategic Decision-Making (SDM) is a long-term intentional and goal-directed process of SE owners' solely selecting one of the several alternatives, the development and implementation of plans, and allocation or diversion of resources necessary for realising these goals (Iederan, Curayeu, & Vermeulen, 2009; Wang, Walker, & Redmond, 2007). This study refers to IT decisions that have a long-term impact on small businesses as strategic IT. Thus, the definition of strategic IT in this study exclude basic IT investments that have short-term impact on SEs' strategies. IT decision-makers in SEs should thoroughly assess their business needs when investing in IT.

EA is about planning for technology change, and how to achieve and govern strategic business and IT goals (Bailey, 2006; Yoganingrum, Sensuse, & Murni, 2013). EA is an approach for prioritising resources (people, money, and technology) in organisations to achieve a better return on investments (ROI), integrate organisational IT, and improve business performance (Van Belle & Giqwa, 2013). EA in its entirety is assumed to be too complex for SEs to adopt because of the demanding resources required to implement and manage a full-fledged EA. It has been argued that a flexible and simplified approach to EA will offer SEs the potential EA benefits (Bernaert & Poels, 2012; Dehbokry & Chew, 2014; Jacobs & Kotzé, 2011). This study identified the "Keep Control, by means of a Holistic Overview, based on Objective and kept Simple of your Enterprise (CHOOSE model)" (Bernaert & Poels, 2012), the Precise Lightweight Framework for Enterprise Architecture Practice (LEAP) (Clark, Barn, & Oussena, 2011), and the Light Enterprise Architecture Framework (LEAF) (EA Network, 2015), as potential EA approaches for SEs in developed nations.

1.5 Research Aim, Objectives and Questions

This section describes the research aim, the research objectives, and the research questions this study addressed.

1.5.1 Research Aim

The aim of this study is to develop and evaluate an enterprise architecture-driven artefact that will support small enterprise owners in Nigeria and South Africa to make strategic IT decisions.

1.5.2 Research Objectives

The objectives of this research are as follows:

1. To understand the typical IT decision-making process of Nigerian and South African small enterprises.
2. To identify how the principles of enterprise architecture can guide small enterprise owner-managers in making strategic IT decisions.
3. To develop an enterprise architecture-based artefact that will provide small enterprise owner-managers with approach to making strategic IT decisions in small enterprises.
4. To evaluate how the enterprise architecture artefact supports strategic IT decision-making processes in Nigerian and South African small enterprises.

1.5.3 Research Questions

To achieve the objectives of this study, a research question was formulated to guide this study. The primary research question of this study is to investigate how can an enterprise architecture-driven artefact support the strategic IT decision-making process in small enterprises in Nigeria and South Africa? In answering the primary research question, the following sub-questions were addressed in this research:

1. How do small enterprise owners in Nigeria and South Africa make IT decisions?
2. How can enterprise architecture principles inform the development of an enterprise architecture artefact for small enterprises in Nigeria and South Africa?
3. How to develop an enterprise architecture artefact that can support strategic IT decisions of small enterprises in Nigeria and South Africa?
4. How do small enterprise owners in Nigeria and South Africa perceive the enterprise architecture artefact in supporting their strategic IT decisions?

1.6 Research Contextualization in Information Systems (IS)

Information Systems (IS) have gained a widespread acceptance and have maintained a relatively stable identity, demonstrating how IT integrates with organisations, individuals, and markets (Sidorova, Evangelopoulos, Valacich, & Ramakrishnan, 2008). This study seeks to support small enterprises to leverage IT through effective investment decisions. IS has established a new identity and a significant shift from the technocentric focus to balance the

alignment between technology, organisation, management, and social focus (Baskerville & Myers, 2002).

IS scholars are urged to focus on research that produces artefacts (Benbasat & Zmud, 2006). The persistent need for IS research to focus on designing IT artefacts to increase IT's compatibility, relevance, ease of use, and support business initiatives has been established in the past two decades (Sidorova et al., 2008). Benbasat and Zmud (2003) argued that IS research that develops artefacts should not be treated as a black box. Instead, the IS aspect of the phenomena under study should be made evident to demonstrate the unique, innovative, and specific contribution of IS scholarship. The title of this study and the research methodology emphasised artefact development as the research contribution. This study provides a collective understanding of (i) how the IT artefact is conceived, constructed, and implemented, (ii) the usage and the evolvement of the artefacts, and (iii) the influence of the artefact on the strategic IT decision-making process of SE owner-managers (Hevner & Chatterjee, 2010).

The objective of this study is to provide an intervention to managerial challenges towards the Strategic IT Decision-Making (SITDM) process. The artefact produced is assessed based on practical IT investment decisions. The goal is to provide a pragmatic contribution and theorise the approach to formalise SITDM in SEs. The successful completion of this study will demonstrate the potential of IS research serving as an independent discipline that can then serve as a reference to other disciplines (Baskerville & Myers, 2002). In the 80s, IS was an applied discipline that borrowed and learned from theories, exemplars, and methods of relevant disciplines such as computer science, cybernetics, engineering, management science, and behavioural science (Benbasat & Zmud, 2003).

1.7 Design Strategy

The Design Science Research (DSR) methodology was employed to achieve the aim and objectives of this study. This study relied on the Kuechler and Vaishnavi (2004) DSR process model to address the research questions in this study. Figure 1-1 illustrates the activities conducted in each of the design process phases. The literature and empirical research informed the problem awareness. The development of a SITDM framework emerged in the suggestion phase of the design science research process. The framework developed in the suggestion phase was demonstrated by designing and developing three prototype artefacts in three iterations. Prototypes One and Two were evaluated constructively resulting in the

development of the final prototype artefact. The final prototype was evaluated with SE decision-makers.

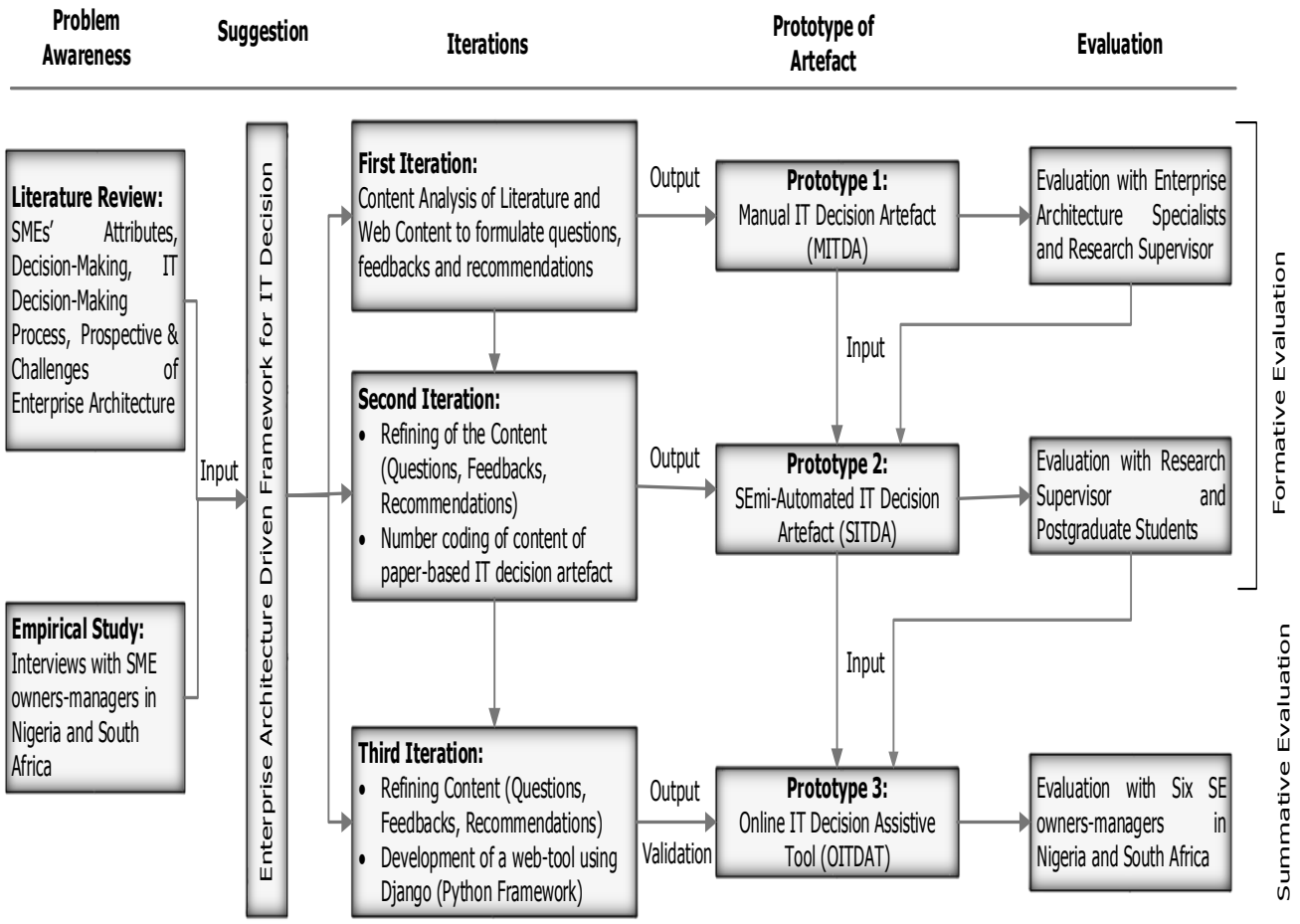

Figure 1-1: Research Design

1.8 Definition of Terms

Table 1-1 highlights the definition of the key terms in this study to contextualise the meaning and clarity.

Concept/Term	Definition	Source
Information Technology	Information Technology (IT) is any tool (hardware or software) that facilitate the identification, collection, processing, presenting, storing, transferring, and distribution of information or any other form of electronically mediated communication.	(Barba-Sánchez, Del Pilar Martínez-Ruiz, & Jiménez-Zarco, 2007).
Strategic IT Decision	The approach SEs owner-managers should/do employ in planning, choosing, developing, and implementing IT alternatives that will influence organisational goals in the long-term. For example, the choice of Customer Relationship Management (CRM) software, online presence strategies, Enterprise Resource Planning (ERP) systems, Internet Connectivity, and so on. This excludes the decision to the type of PC vs laptops, email service to use within an organisation.	(Iederan et al., 2009; Wang et al., 2007).
Small Enterprises	Any manufacturing, service or retail enterprises with less intense information flow that has 50 – 150 employees and is managed by the owner. This study also refers to SME that fit into this category as SE.	(Bureau of Economic Research, 2016; SMEDAN & NBS, 2013)
Enterprise Architecture (EA)	Business plan, operation, and information systems that support business-IT alignment to ensure successful strategy implementation, reduces the risk of change processes, and creates options for actions.	(Wißotzki & Sonnenberger, 2012; Zachman, 2007)

Table 1-1: Definition of Terms

1.9 Structure of this Thesis

This thesis is structured in nine chapters as illustrated in Figure 1-2. The thesis's structure diagram shows how the research objectives are addressed in nine chapters and how the DSR methodology informed the chapter structure. The research objectives of this study led to the choice of the theoretical framework and the research methodology. This study adopted a pragmatic philosophic assumption that suggests that the research problem should drive the research strategy, methodology, and method of enquiry. This study focused on achieving the research objectives which resulted in the structuring of this thesis as follows:

Chapter One provides a general overview and background of this study. This chapter elucidates the underlying motivation for developing an artefact to support strategic IT decisions in SEs. It highlights the aims, objectives, and research questions addressed in this study. The relevance

of this study in Information Systems is elaborated in this chapter. This chapter concludes with the definition of some key concepts as conceived in this study.

Chapter Two discusses the attributes of SEs (also referred to as Small and Medium Enterprise – SME), the role and challenges of Information Technology (IT) in SMEs, and IT Decision Making (ITDM) process in SMEs. Chapter Two also explains the strategic decision-making process in SMEs and the discourse around Enterprise Architecture (EA).

Chapter Three explores the application of a theoretical framework as a guiding lens for this study. Chapter Three presents a background to decision-making theory and the theory of bounded rationality. It discusses the trends of debate and the application of Simon's bounded rationality theory. The chapter demonstrates how the bounded rationality theory informed this study.

Chapter Four justifies the methodology used in this study. This chapter elaborates on the paradigm, design science research approach, and research method employed in this study. The argument for dismissing other strategies are presented in this chapter.

Chapter Five explores the IT decision-making process of Nigerian and South African SE owner-managers. This chapter informs the researcher's understanding of the typical ITDM process of decision-makers in SEs. The results of the interviews conducted in Nigeria and South Africa are presented in Chapter Five. Chapter Five summarises the findings from the empirical studies.

Chapter Six serves as a suggestion chapter informed by the DSR methodology to overcome the challenges identified in Chapter Five. It presents a state-of-the-art Enterprise Architecture-Driven Framework (EADF) for SITDM process. This chapter justifies the need for an EADF, the objectives of the EADF, the process that led to the development of EADF, the definition of the concepts in the EADF, a description of how to use the EADF, conceptual validation of the EADF, and the researcher's reflections about the EADF.

Chapter Seven demonstrates how the EADF guides the development of the instantiation artefacts for SITDM in SEs. Chapter Seven discusses three iteration processes that led to the development of three prototype instantiation-artefacts. This chapter describes the outcome of the formative evaluation that informed the development of the final prototype named Online IT Decision-Assistive Tool (OITDAT).

Chapter Eight validates the relevance of the OITDAT in making optimal strategic IT choices. This chapter discusses how SE decision-makers perceive the value of the OITDAT and the impact of

the artefact on their decision-making process. Chapter Eight concludes the evaluation process of this study as summative evaluation.

The conclusion of this study is discussed in Chapter Nine. This chapter summarises the findings, conclusion drawn based on the findings, and research limitations. Chapter Nine provides a detailed discussion of the practical, theoretical, and methodological contribution to this study. The conclusion chapter provides recommendations for further studies.

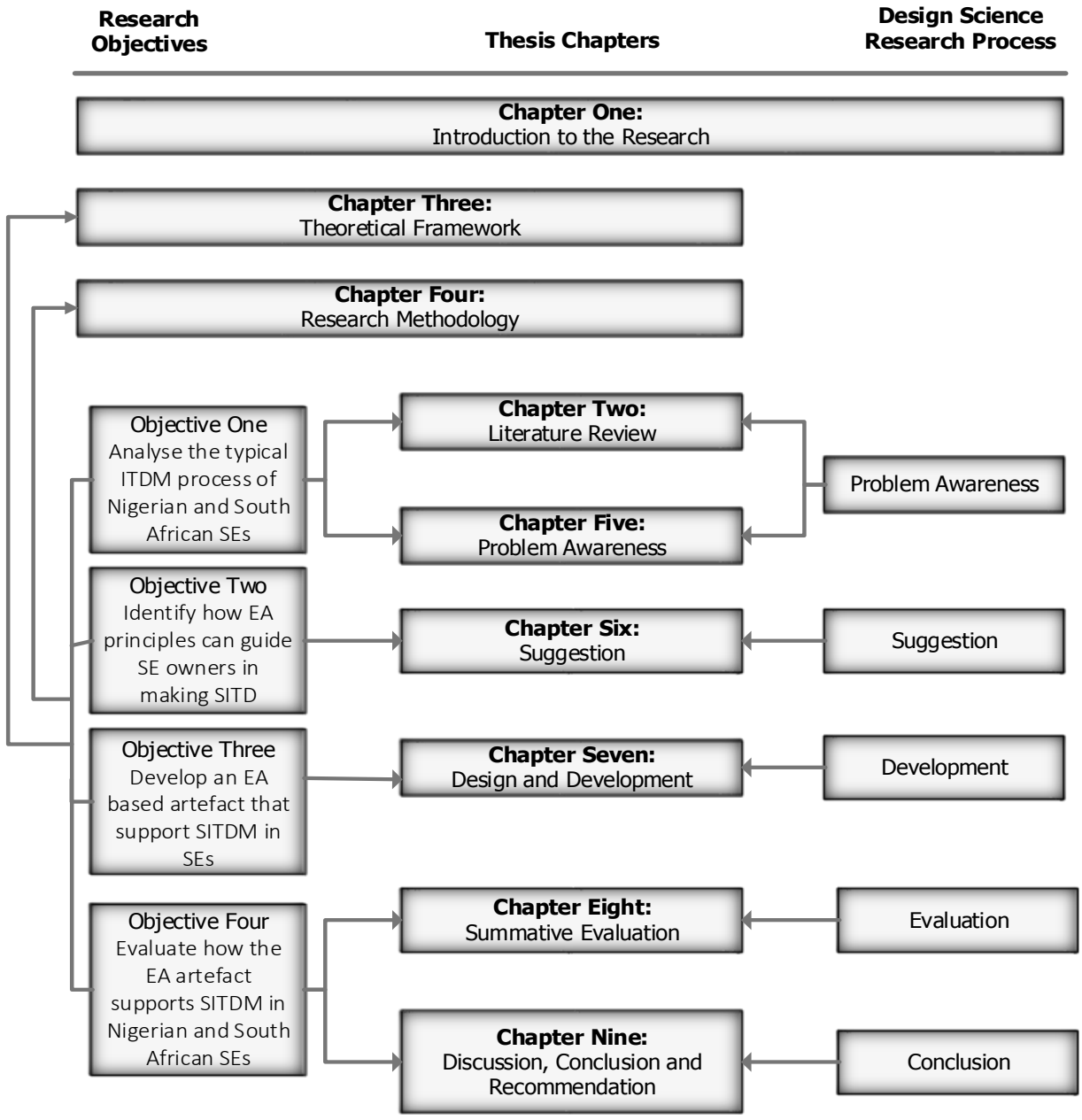

Figure 1-2: Thesis Structure

1.10 Summary

This chapter successfully presents an overview of this study. The underlying issues that motivated the researcher in conducting this research were described in Sections 1.3 and 1.4., followed by an explicit description of the research goals and the objectives that informed this study. This chapter further argued for the relevance of this study to IS research and premised the contribution of this study in the context of IS discipline. The researcher presented and diagrammatically illustrated the structure of this thesis. The next chapter reviews literature as an approach to creating problem awareness towards the ITD and SITDM process in SEs (also referred to as SME).

2 Chapter Two – Literature Review

2.1 Introduction

This chapter presents substantive findings of related scholarly research. The literature reviewed in this study focused on IT in SEs, decision-making process in SEs, enterprise architecture and decision support systems. The purpose of the literature review is to help the researcher understand the body of knowledge, providing a firm foundation to the research topic, and demonstrating the contribution of this study to the field of Information System (Levy & Ellis, 2006). The descriptive approach of conducting the review was employed in achieving the objective of this chapter.

2.2 Small and Medium Enterprise

This section described the concept of Small and Medium Enterprise (SME), the classification of SMEs, and the challenges SMEs face. The review was conducted from a general perspective and further contextualised for the purposes of this research. For clarification, this chapter interchangeably refers to SME and Small Enterprise (SE).

2.2.1 What is SME?

The Small and Medium Enterprise (SME), also referred to as the Small Enterprise (SE) or the Small Business (SB), includes formal and informal firms (Bureau of Economic Research, 2016). SMEs are retail, manufacturing, service, and construction industries playing a significant role in the supply chain of large automobile, mining, defence, and marine industries (Wang et al., 2007). SMEs are mostly family-owned businesses that are often managed with limited resources on a day-to-day basis (Ibielski, 1997). The precise definition of SME varies across different countries and industries (Ritchie & Brindley, 2005). The number of employees and turnover have traditionally been the benchmarks for classifying SMEs.

There is no universal definition of SMEs regarding the number of employees and turnover (Harindranath, Dyerson, & Barnes, 2008). According to the Eurostat, SMEs are privately owned enterprises with fewer than 500 employees (Ghobadian & Gallear, 1997). In Malaysia, SME is a company with an average annual sales turnover of not more than $5.5million and 150 employees (Hashim, 2007). The African Development Bank defines SMEs as companies with less than 50 employees (Esselaar et al., 2006). SMEs in Ghana are firms that employ fewer than

100 people (Effah & Light, 2009). In Egypt and Vietnam, SMEs are firms with between 5 and fewer than 50 employees and between 10 and 300 employees respectively (Dalberg, 2011). Firms with between 10 and fewer than 200 employees and with net assets excluding land and buildings worth between 5 - 500 million Naira are regarded as SMEs in Nigeria (SMEDAN & NBS, 2013). In South Africa, SMEs are enterprises with less than 200 employees with annual turnover less than 64 million rand and capital assets of less than 10 million rand (Bureau of Economic Research, 2016).

The classification of SMEs varies across countries (Dehbokry & Chew, 2014) but the contribution of SMEs to the global economy is irrefutable. For the past 20 years, SMEs account for almost 90 percent of enterprise, 65 percent of employment, and 60 percent of the turnover in the UK and Europe (Ghobadian & Gallear, 1997). In the US, SMEs comprise of 99% of enterprises and 53% of total employment (Dholakia & Kshetri, 2004). SMEs make a significant contribution to national economies (e.g. approximately 30% in Australia and New Zealand, 76% in Luxembourg, 51% in USA and UK, 57% in Japan and Canada) (Wang et al., 2007). In Nigeria, SMEs contribute to 10% of total manufacturing output and almost 70% of industrial employment (Apulu & Latham, 2011).

In general, SMEs account for over half of employment, turnover, and GDP of the economy. The SME sector is recognised for their very important contribution to job creation and GDP of every economy (Ritchie & Brindley, 2005). In the developing economies, SMEs play important economic development roles, reducing poverty, and creating employment (Esselaar et al., 2006). Government and stakeholders recognise the role of SMEs in national development. Hence, governments around the globe have set up national development strategies to increasingly promote and support the growth of SMEs (Wang et al., 2007). Most African countries are rolling out policies such as tax incentives, policy intervention, training, and technical assistance to support SMEs' growth (Esselaar et al., 2006).

The Small and Medium Enterprise Development Agency of Nigeria (SMEDAN) is the governing body for micro, small, and medium enterprises in Nigeria. The Small Enterprise Development Agency (SEDA) is the agency that coordinates and monitors the development of South African small businesses. The importance of SMEs to the Nigerian and South African economies has been well documented (Apulu & Latham, 2011; Bureau of Economic Research, 2016; SMEDAN & NBS, 2013).

2.2.2 Characteristics of SMEs

SMEs are usually considered to be more innovative than large enterprises and contribute to the growth of a nation's economy through different collaborative approaches and by leveraging their resources (Dehbokry & Chew, 2014). Ibielski (1997) states that business success in SMEs is determined by the level of business flexibility and the informal operations or relationships that often satisfy customer demands in comparison to the large enterprises. Despite SMEs' limited resources they have managed to make innovative contributions, occupy a niche market, and have taken business risks that large organisations cannot economically afford to consider (Wang et al., 2007). SMEs can take higher risks because they are more flexible and struggle with less bureaucracy than large organisations (Yusof & Aspinwall, 2000). Also, many SMEs explore risky business ventures because of their strong entrepreneurial spirit and quick decision-making process (Hung, Chang, Lin, & Hsiao, 2014). However, SMEs need to be more frugal and creative in managing their resources because they have fewer resources to draw from when compared to large organisations (Bidan, Rowe, & Truex, 2012). According to Ibielski (1997), SMEs are:

> *"mighty minnows, reflecting the competitive spirit that a market economy needs for efficiency; they provide an outlet for entrepreneurial talents, a wider range of consumer goods and services, a check to monopoly inefficiency, a source of innovation, and a seedbed for new industries; they allow an economy to be more adaptable to structural change through continuous initiatives embodying new technologies, skills, processes, or products." Ibielski (1997, p.1)*

SMEs and large organisations are not just different due to the number of employees and amount of capital, but the organisational structure, management style, decision-making process, policy-making procedure, resource utilisation, knowledge and technology capabilities distinguish SMEs from large enterprises (Dehbokry & Chew, 2014; Ghobadian & Gallear, 1997). Ghobadian & Gallear (1997) succinctly distinguish between SMEs and large organisations as shown in Table 2-1.

The characteristics described in Table 2-1 informs the tenet and the context of this study. However, certain factors such as limited customer base and limited external contact of SMEs highlighted in Ghobadian & Gallear (1997) and Levy et al. (2002) may not apply to SMEs in a contemporary and globalised economy. With the advent of IT and e-commerce, SMEs can

access a wide range of customers. Conclusively, SMEs can be as profitable and productive as large counterpart enterprises (Ibielski, 1997).

	SMEs	Large Enterprises
Structure	Flat structure with very few layers of management	Hierarchical with different level of management
	Specialisation is low and division of activities is unclear and limited	High degree of specialisation with defined division of activities
	Flexible information flows	Rigid information flows
	Top management is closely engaged in the day-to-day activities	Top management is often separated from daily activities
	Top management is highly visible	Top management's visibility is limited
	Existence of very few interest groups	Interest groups are many
	Response to environmental changes is normally rapid	Response to environmental changes is often slow
	Innovation is highly prevalent	Innovation is not very prevalent
Procedures	Low degree of formalisation and standardisation	High level of formalisation and standardisation
	Procedures do not govern activities and operations	Formal rules and procedures govern most activities and operations
	Processes are flexible	Processes are very rigid and unadaptable
	Decision-making is mostly based on intuition and "gut feeling"	Decision-making is prevalently fact-based
	Few decision-makers	Decision-makers are fragmented and influenced by different stakeholders and groups
Behaviour	Simple and less bureaucratic	Mostly bureaucratic
	The business owner/manager often influences the behaviour of the employee	Corporate culture subjugates behaviour of the employee and operations
Processes	Short decision-making chain	Extended decision-making chain
	Simplified and informal process of planning, evaluation, reporting and control	Complex and formalised process of planning, evaluation, reporting and control
	Heuristic and incremental strategic process	Formal and deliberate strategic process
People	High personal authority	Relatively low personal authority
	Pioneers and entrepreneurs dominate business	Professionals and technocrats dominate the organisation
	Individual creativity is often encouraged	Individual creativity is often not a priority
	Staff development and training is more likely on a small scale or ad-hoc	Staff development and training are often planned
	There is no specific budget for training	Staff development is always budgeted
	Negligible resistance to change	High degree of resistant to change
	Human capital, know-how and financial resources are often limited	Sufficient human capital, know-how and financial resources

Table 2-1: Comparison of SMEs and large enterprises (adapted from Ghobadian & Gallear, 1997)

2.2.3 The challenges of SMEs in Nigeria and South Africa

To gain a better understanding of the context of this study, the researcher provided a detailed description of the challenges faced by SMEs in Nigeria and South Africa.

i. Access to finance and credit

In Nigeria and South Africa, SMEs find it difficult to access credit from banks and other financial lending or empowerment institutions (Bureau of Economic Research, 2016; SMEDAN & NBS, 2013). This challenge is very peculiar to start-ups because well-established SMEs are likely to have access to credit facilities. In South Africa, the inclination depends on locations. For example, SMEs in Gauteng and North West Province tend to have greater access to credit facilities compared to other South African SMEs (Bureau of Economic Research, 2016). Nigerian banks do not consider SMEs as attractive ventures for loan facilities because of the risk profile and inadequate collateral (Apulu & Latham, 2011). The challenge of inadequate finance often results in SMEs failure in South Africa and Nigeria.

ii. Poor infrastructure

The way SMEs conduct business in Nigeria and South Africa is impeded significantly due to the lack of physical infrastructures like communication, transport, utilities, and electricity (Bureau of Economic Research, 2016; SMEDAN & NBS, 2013). Inefficient and inadequate infrastructural facilities, like water supply and electricity, tend to increase the cost of running small businesses in Nigeria (Akpan-Obong, 2007; Apulu & Latham, 2011). Small businesses lost almost 24% of their output to erratic power supply and statistics have shown that only 40% of the Nigerian population has access to electricity (Ngwu Onugu, 2005), which is a major setback for business investment in Nigeria. Also, access to land for conducting business has been confirmed to be a hindering factor to the growth of businesses in Gauteng, South Africa (Bureau of Economic Research, 2016) and the same can be argued about establishing a business in Lagos, Nigeria.

iii. Inefficient government bureaucracy

According to the SEDA report 2016, the delay in the time to obtain a business permit and licences posed a challenge to South African SMEs (Bureau of Economic Research, 2016). SMEs consider the duplication of government policies and regulations as a constraint for SMEs. In Nigeria, inconsistent government policy, stringent strategies to enforce legislations, development of policies that favoured large and foreign companies, corruption and high

bureaucratic costs create uncertainty for SMEs, which often affects the activities and growth of small businesses (Apulu & Latham, 2011; SMEDAN & NBS, 2013).

iv. Lack of access to market

SMEs in Nigeria and South Africa are faced with the challenge of timely delivery of their products to market, especially small businesses in rural areas (Bureau of Economic Research, 2016). SMEs identified access to the market as a threatening factor to their longevity (SMEDAN & NBS, 2013). SMEs in Nigeria compete with large organisations, the challenge of customers' preference of imported products to locally manufactured goods, and a decline in customers' purchasing power, reduces SBs bargaining power in Nigeria (Ngwu Onugu, 2005). SMEs often compete in an unfavourable market.

v. Inadequate educate workforce

The shortage of skills and limited entrepreneurship capacity in small businesses hinders the growth of SMEs (Bureau of Economic Research, 2016). The educational factor is arguably because, in Nigeria, 51% of SMEs' employees possess an equivalent of a first degree and about 90% of SMEs' employees do have formal education (SMEDAN & NBS, 2013).

vi. Low level of research and development

SMEs in South Africa perceived research and development (R&D) to be important in determining the feasibility of transforming ideas into actual business and investment opportunities. South African SMEs are less innovative compared to SMEs in developed countries because small businesses do not have strong linkages with large organisations, hindering technology diffusion (Bureau of Economic Research, 2016). Lack of research and innovation are other factors affecting the growth of small businesses in Nigeria (Ngwu Onugu, 2005).

vii. High levels of crime

The formal and informal micro and SMEs are affected by the pervasive high level of crime in South Africa (Bureau of Economic Research, 2016). Hence, SMEs are obligated to increase their spending on security, which often has a ripple effect on the overall cost of running SBs and creates setback of investor confidence in South Africa.

viii. Obsolete technology

SMEs in Nigeria considered the unavailability of contemporary technologies that drive innovation and global competition as a challenge (SMEDAN & NBS, 2013). The technologies currently available for small business are often imported. The technology dependency of SMEs

on foreign companies results in Nigerian inability to achieve a technology-driven business environment (Akpan-Obong, 2007).

This study assumed that appropriate use of IT could help small business owners overcome some of these business challenges in order to attain better business management and growth (Afolayan, 2014; Nieto & Fernández, 2005). The next section expands on the significant role of IT in SMEs.

2.3 Information Technology in SMEs

The significance of Information Technology in day-to-day running, management, and growth of SMEs is important and well discussed in the literature. The following subsection highlights the value-adding role of IT to small businesses in developing countries to overcome some of the challenges. The challenges hindering the successful implementation of IT in SMEs has also been described in this section.

2.3.1 The role of Information Technology in SMEs

IT serves as an informative orientation tool employed by organisations to provide and distribute business, commercial, and corporate information to stakeholders (Huizingh, 2000). IT offers small businesses a means of communication, information sharing, and the automation of internal process within organisations (Lopez-Nicolas & Soto-Acosta, 2010). The use of email is a popular means of communication and document sharing among businesses. IT provides the information channel for managing large volume business transactional records, immediate transmission of information, and creates platforms for communication without physical movement. Access to large volumes of information and improving innovation capacity through information channels have been considered revolutionary (Wolf, 2001).

The recent IT advancement has eased the way information and knowledge are conceived, conveyed, assessed, and used (Barba-Sánchez et al., 2007). Small businesses are able to compete with large organisations through new business opportunities and possibilities. ICT has diffused and disrupted the established conventional economies, thereby creating new possibilities (Wolf, 2001). This has led to the creation of new jobs, elimination of redundant jobs, new skills requirement, creation of new markets, the establishment of new alliances and value networks, changes in business operations, and service delivery (Peterson, Anderson, Culler, & Roscoe, 2003).

The advent of the internet has transformed the way SBs operate and conduct trade. The application of IT and internet offers SMEs an effective way of reaching out to consumers, suppliers, and producers which helps to improve business performance (Wolf, 2001). Developing SMEs can effectively use IT to integrate and coordinate their business processes to make more informed business decisions that improve business performance (Barba-Sánchez et al., 2007). For instance, the automation of business processes supports the vertical and horizontal integration of activities, which allows an enterprise-wide view of an organisation, improved process management, and supports the quick and informed decision-making process.

SMEs have been urged to adopt IT to remain competitive despite the dynamics of globalisation and liberalisation of both domestic and international markets (Ongori, 2009). Telephone, mobile phones, fax, and computer applications have been identified as significant contributors to SMEs' competitiveness in Kenya, Tanzania, and South Africa (Wolf, 2001). Businesses can lower their cost of coordination, have access to more markets within a shorter time across different boundaries, and create global linkages (Barba-Sánchez et al., 2007). These factors help SBs to improve their productivity and competitiveness.

SMEs can now reach out to a wide audience of customers or target groups with personalised product advertisements. IT provides the marketer with a renewed capability of precise product branding, mass-customization, and one-on-one marketing strategies (Barba-Sánchez et al., 2007). The customer relationship management (CRM) system is an example of an IT-driven tool that supports the management of customers and the analysis of customers' interactions with the goal of improving the relationship with customers. In research conducted in 14 African countries, 76% of over 3500 SMEs sampled use mobile phones to maintain customer relationships (Esselaar et al., 2006)

Information Technology has become a powerful tool that allows SBs to take part in local and international markets by promoting, improving service delivery, and developing business opportunities. SMEs can become more innovative, gain stability in international markets, reduce the cost of reaching out to market, facilitate market research, network, and achieve business growth using IT (Apulu & Latham, 2011; Love & Irani, 2004; Mary & Ofafa, 2013). Therefore, SMEs can overcome market access constraints, lack of knowledge to explore niche markets, limited resources to promote products, and the inability to access the global market (Mary & Ofafa, 2013). The World Wide Web (www) allows businesses to reach out to the global

market at any time, operate in a borderless market, and enable 24 hours of trading. In Kenya, SMEs have increased their market access through the use of mobile phones and m-banking platforms like M-Pesa and Safaricom (Mary & Ofafa, 2013).

The emergence of the internet has led to the exploitation of new business opportunities, the creation of e-commerce businesses, elimination of entry difficulties to market, and improved internalisation of SMEs (Drew, 2003; Nieto & Fernández, 2005). Due to the recent IT advancements, small businesses can improve the way they conduct transactions, reduce transaction costs, initiate a faster and more reliable way of transacting, eliminate market boundaries, and achieve a wider reach to customers (Barba-Sánchez et al., 2007). E-commerce is becoming a mainstream part of business planning and is transforming business activities in SMEs. The evolution of ICT has changed how businesses operate and compete which has compelled SMEs to adopt these technological changes to cope with the changing environment (Ongori, 2009).

However, the rapid evolution of IT has posed a challenge to large and small enterprises as they struggle to catch up with the changes and the complexities of IT. The SEs are more prone to the challenges of leveraging IT because of their peculiar characteristics as discussed in Section 2.2. The subsequent sub-section describes the factors that hinder IT usage in some SMEs despite the promising benefits.

2.3.2 Challenges Hindering the Leverage of Information Technology in SEs

It is evident that IT is changing the way business is conducted in sub-Saharan African SMEs. However, studies have shown that the use of ICT in developing countries is relatively low due to some hindrances resulting in SMEs not been able to fully derive the value of IT. Table 2-2 highlights several factors affecting the success of IT in small business. The factors have been categorised as internal and external factors (Ghobakhloo et al., 2012). The internal factors are challenges within the control of the organisation, and the external factors are environmentally driven.

The SE owner-managers are often responsible for all the decision-making processes in their organisation (Nguyen, 2009), although managers do not necessarily have specialised knowledge on every problem. SE owners are *'generalists'* in their decision approach because of the varying nature and scope of decisions they make on a daily basis (Carson & Gilmore, 2000). The managers who make all operational and strategic decisions are responsible for IT

decisions, despite often not possessing IT knowledge. Carson & Gilmore (2000) suggest that SE managers' decisions are based on personal judgement, existing experience, and trusted information. In a study that investigated how SE owners acquire knowledge for IT investment decision, it was revealed that SE owner-managers use tacit knowledge which implies that rationality may have been over-emphasised in other IT decision-making models (Rantapuska & Ihanainen, 2008).

	Challenging Factors	Sources
Internal	Sole Decision-Making Process	(Nguyen, 2009)
	Perceived Relevance	(Fink, 1998; Mole, Ghobadian, O'Regan, & Liu, 2004; Premkumar & Roberts, 1999)
	Lack of Top Management Support	(Nguyen, 2009; Premkumar & Roberts, 1999; Thong, Yap, & Raman, 1993)
	Cost (Limited Access to Capital)	(Drew, 2003; Premkumar & Roberts, 1999; Yap, Thong, & Raman, 1994)
	Organisational Culture	(Nguyen, 2009)
	Resistance to Change	(Drew, 2003)
	Limited IT skills	(Drew, 2003; Premkumar & Roberts, 1999; Thong et al., 1993)
	Technology Push	(Nguyen, 2009)
	Inadequate Supporting Infrastructures	(Apulu & Latham, 2011; Drew, 2003; Premkumar & Roberts, 1999)
External	Poor Electricity Supply	(Apulu & Latham, 2011)
	Compatibility of IT	(Mole et al., 2004; Premkumar & Roberts, 1999)
	Competitive Pressure	(Drew, 2003; Mole et al., 2004; Nguyen, 2009; Premkumar & Roberts, 1999)
	Poor IT Support from Vendors	(Nguyen, 2009; Thong et al., 1993)
	Unfavourable Government Policies	(Drew, 2003; Yap et al., 1994)
	IT Complexity	(Mole et al., 2004; Premkumar & Roberts, 1999)
	External Pressure (from partners & stakeholders)	(Premkumar & Roberts, 1999)

Table 2-2: Factors hindering the success of IT in SEs as found in literature

Small enterprise owners should have a clear definition of purpose when they invest in IT because of the significance of IT to business operations (Nguyen, 2009). The decision-makers' understanding of the business and IT knowledge determine how they perceive the usefulness of IT to their business (Premkumar & Roberts, 1999). It is important to consider the role of decision-makers in SEs to achieve successful IT implementation in SEs. The role of top management support in successful IT implementation has been acknowledged (Nguyen, 2009). The SE struggles to access resources like skills and finance. Ghobakhloo et al. (2012) suggest that SEs' restricted access to financial resources, technical skills, internal and external

expertise, and IT knowledge hinders the adoption of IT. However, IT expenses have been contended as a constraint because the costs of software and hardware have drastically reduced in recent times (Dibrell, Davis, & Craig, 2008). In addition to the cost of purchasing computers and software, other expenditures like the cost of training, software application development, implementation, and support are the expenditures that SEs struggle to cope with (Nguyen, 2009). Access to internal IS expertise is also a significant factor inhibiting SEs' leveraging IT benefits (Ghobakhloo et al., 2012). Small South African enterprises lack sufficient access to internal IT expertise and also consider IT to be expensive, with the investment cost being more than the value derived from the IT (Ismail, Jeffery, & Van Belle, 2011).

Ghobakhloo et al. (2012) state that external consultants and vendors provide the major external support for IS implementation in SEs. Therefore, SEs tend to rely on external consultants and vendors when they implement IT (Bayrak, 2013). The professional ability of the vendors and consultants determine the success of IT in SEs because the decision-makers lack internal IT expertise to guide their investment (Morgan, Colebourne, & Thomas, 2006; Nguyen, 2009). The lack of internal support has been described as one of the major factors hindering the success, evolution, and sophistication of IT within SEs (Drew, 2003; Ismail et al., 2011). Therefore, SE owner-managers should develop strategies to develop their internal end-user IT skills or seek external support to overcome the challenge (Ghobakhloo et al., 2012). Businesses that have achieved better IS effectiveness and user satisfaction have employed a higher level of external IS consultants (Morgan et al., 2006; Thong, 2001). Ghobakhloo et al. (2012) suggest that SEs could fill the knowledge gap by engaging and seeking the assistance of external experts and vendors. However, this recommendation is not viable for most SEs because of their financial constraints and the cost of hiring external experts to assess their IT criteria (Apulu & Latham, 2011; Ghobakhloo et al., 2012). A more pragmatic intervention for SEs is to consider the adoption of open-source applications to cut down the cost for implementing IT (Antlova, 2013; Constantinos, 2013; Macredie & Mijinyawa, 2011).

Small enterprises are often vulnerable to pressure from their customers, suppliers, and vendors (Dholakia & Kshetri, 2004). As a result, SEs succumb to stakeholders' IT demands to sustain their inter-relationships (Ghobakhloo et al., 2012), The external pressure has forced some SEs to quickly adopt certain IT as a response to environmental pressure to stay competitive and gain advantages (Drew, 2003; Nguyen, 2009). As a result, SE owner-managers do not thoroughly think through the IT investment process (James & Van Belle, 2013).

There are other factors such as government support, as well as a lack of adequate supporting infrastructures like electricity, internet access, and so on, which pose challenges to SEs (Effah & Light, 2009). In Nigeria, IT usage is hindered due to the lack of supporting infrastructure and unstable power supply. Hence, SEs are unable to keep up with the globalised economy (Apulu & Latham, 2011). Premkumar & Roberts (1999) had long argued that SEs in less vibrant economies are alienated from technological infrastructures because market forces often drive government developmental plans. The SEs in rural areas are more prone to the challenges of infrastructural development.

For SEs to overcome these challenges, owner-managers need to formalise their IS to attain the intended benefits of IT investment and overcome the challenges of IT in SEs (Duncombe & Molla, 2009). A study that investigated IT adoption strategies in Kenyan SMEs identified decision-making, implementation, and evaluation as three stages of successful IT adoption strategies (Ndiege et al., 2014). The decision-making stage is the first phase of successful IT adoption and the decision-maker needs to be well informed to achieve the desired benefits of IT (Sharma & Bhagwat, 2006). Failure to implement strategies for IT investments in SEs can cause a significant financial setback and economic failure in SEs (Ghobakhloo et al., 2012). Literature has suggested SE owner-managers need to make more informed and holistic IT decisions to leverage the potential benefits of IT (Hang & Wang, 2012; James & Van Belle, 2013; Rantapuska & Ihanainen, 2008).

2.4 IT Investment Decision Making Process in Small Enterprises

2.4.1 Concept of Decision-Making

The process of choosing between two or more alternatives to accomplish a set goal is regarded as the decision-making process (Negulescu, 2014). Decision-making is also perceived as an act of choosing the best option from a set of alternatives by thoroughly assessing possible alternatives and decision constraints to inform the decision-maker's action (Ogarcă, 2010). One of the crucial drivers of organisational performance is an effective decision (O'Regan, Sims, & Ghobadian, 2005). Figure 2-1 illustrates the decision-making process. Decision-making is the act of acquiring, processing, synthesising, and analysing information to make a rational choice after filtering (internal and external) factors that affect a given problem/situation (Öksüzoğlu-

Güven, 2014). The success, opportunity, and risk an organisation faces are as a result of decision-makers making or not making a decision (Ogarcă, 2010).

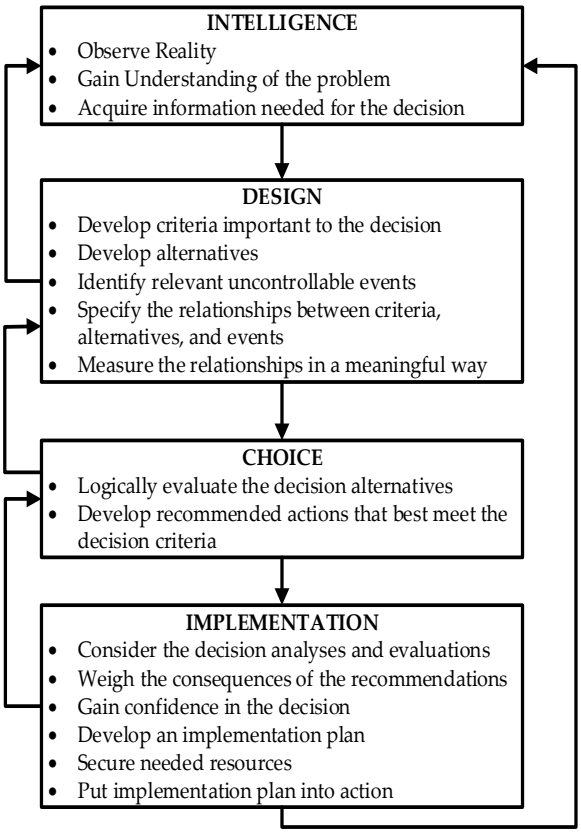

Figure 2-1: Decision Making Model (Source: Phillips-Wren, 2013)

The process of making a decision is one of the most important and complex activities of the SE owner-manager (Lunenburg, 2011; Negulescu, 2014). Most management decisions are made under constantly changing external and internal environmental constraints (Negulescu, 2014). The process of making an organisational decision is complex when compared with individual daily life decisions (Lunenburg, 2011). The decision-maker keeps wondering about possible options, constraints, the consequences of each alternative, the desirable choice, and cognitive considerations (Connolly & Zeelenberg, 2002).

It is paramount that the decision-maker in SEs understand the problem and define potential opportunities to solve the problem (Negulescu, 2014). The sustainability and competitiveness of SEs greatly depends on the appropriateness and quality of the decisions (Dimants, 2012). SEs that seek to achieve better performance and ultimately competitive advantage cannot afford to make decisions that pose an inherent risk or are based on trial and error (O'Regan et al., 2005). Öksüzoğlu-Güven (2014) argued that it is unrealistic to expect a fully informed

(rational) decision on every problem in SEs because human factor limits the cognition of SB owner-managers.

The SEs are often owned by the owner-manager or a small number of individuals who make final decisions in the organisation (O'Regan et al., 2005). The individuality of the business owner highly influences both operational and strategic decisions made in SEs (Öksüzoğlu-Güven, 2014). Decision styles are characterised by the company type and size, the type of decision, management style, the business environment, and business uncertainty (Atik, 2012). The task of making a decision can be an individual or group activity (Lunenburg, 2011). The individual decision involves one person (sole) deciding, while a group decision requires two or more persons to decide on preferred alternatives through consensus or democratic choice. In small enterprises, the individualistic decision is prominent. The participatory group decision provides a greater forum for examining alternatives, more expertise and knowledge to resolve a problem, greater acceptance of the chosen alternative, and commitment by stakeholders to the final decision (Herrera-Viedma, Chiclana, Herrera, & Alonso, 2007; Lunenburg, 2011).

2.4.2 Characteristics of Decision-Making Style in Small Enterprises

The term "style" represents an idiosyncratic behaviour and method of acting (Ogarca, 2015). Style determines the distinctiveness of something and defines certain principles, norms, or guidelines. In the context of this study, decision-making style refers to the approach of consciously selecting, making a preference based on intuition, deliberation, or choice evaluation (Raffaldi, Iannello, Vittani, & Antonietti, 2012).

Yousef (1998) argued that organisational factors (age, ownership, size, and activities), decision-maker's demography (age, education, job level), organisational culture, organisational technology, and the decision-maker's cultural background, all influence small enterprises' decision-making style in non-Western countries. Ogarcă (2010) affirms that organisational factors, environmental factors, and specific decisional factors (such as decision-makers' parameters, time, complexity, consensus, and risk) influence decision style in SEs.

Decision style is a cognitive process that synthesises the decision-maker's insight, perception, information, knowledge, experience, personality, leadership style, rationing, and problem solving (Ogarca, 2015; Ülgen, Sağlam, & Tuğsal, 2016). The approach to decision-making varies in SEs, depending on how the problem is perceived, the available information, the decision maker's experience, and interaction with the employee (Ogarca, 2015; Raffaldi et al., 2012).

On the contrary, the individual ethical values of SE owner-managers often correlate with their decision-making process (Öksüzoğlu-Güven, 2014). That is, decision-makers' moral, social construct, and experience influences their decision style.

SE owner-managers are often autonomous thinkers who take independent action when making decisions (Öksüzoğlu-Güven, 2014). The decision-maker in SEs neglects procedures when making decisions and acts inspirationally to respond to the changing environmental uncertainty and volatility. SE owner-managers make decisions as the situation arises in a reactive approach (Dimants, 2012). The decision style in SEs is non-routine and inclined toward heuristic solutions. Decision problems in SEs vary and often do not recur nor warrant the development of routine procedures (Grieco, 2007).

The reasoning process of small enterprise owner-managers when making decisions depend on the decision problem and the decision-maker's experience. The reasoning process of small enterprise owners is categorised as 'causal' and 'effectual' (Sarasvathy, 2001). A particular effect initiates the *Causal reasoning process* and focus is on selecting alternatives to achieve the effect; and the *effectuation reasoning process* starts with a set of given alternatives and focuses on choosing between possible effects that can be created with the given alternatives (Sarasvathy, 2001). That is, causal cognitive process pre-establishes a goal and looks for optimal alternatives to fulfil the goals; while effectuation is a reasoning process of sustenance, preserving, hanging on, and striving until the final goal is achieved. Ogarca (2010) argued that effective small business owners prefer the effectual reasoning to casual cognition because it is more creative, spontaneous, urges imaginations, and initiates innovative risks.

Furthermore, the knowledge and capabilities of decision-makers are not homogenous and vary amongst novice and habitual (serial or portfolio) entrepreneur (Ucbasaran, Alsos, Westhead, & Wright, 2007). The experiences of business owners differ according to the number of businesses they own or have previously owned. Orgarca (2010) citing (Ucbasaran et al., 2007) argued that novice SE owners are more meticulous and analytical in deciding, while the habitual business owners are experiential. The systematic and analytic approach could lead to businesses losing opportunities considering the dynamic environment in which the SMEs operate, although habitual business owners are susceptible to making risky decisions.

In summary, decision-making in an SE is subject to the range of factors discussed above. The decision process in SEs can be categorised as formal, informal, or a combination (both formal and informal) process (Dimants, 2012). Decision-makers adopt a method that suits their

enterprise profile, decision problem, available information, and decision's goal. As earlier discussed, the demographic factors, training, experience, and psychological differences between the business owners were affirmed to have significant influence when small enterprise owner-managers invest in IT (Barba-Sánchez et al., 2007). The attributes of a business owner determine his/her tendency towards risk, need for achievement, and preference for innovation, often leading business owners to look for IT intervention. The subsequent sections discuss the IT decision-making process in small enterprises.

2.4.3 IT Decision-Making in Small Enterprises

IT decision-making processes are complex activities that often have strategic implications for businesses. This study assumes a close comparison between IT and financial investments because of the crucial influence of IT on business growth and the need to maximise investments. SEs are constantly looking for ways to limit their IT budget, curtail their dependencies on high cost IT infrastructure, and overcome limited resources through IT investments (Bayrak, 2013). Nevertheless, IT is a tool that offers SEs informational, spatial, temporal, and transactional benefits (Mwangi & Brown, 2015). This explains why most studies focus on the transactional and operational role of IT in SMEs rather than the strategic role (Alyahya & Suhaimi, 2013).

SEs are yet to achieve the level of benefits IT offers large organisations even though managers of SEs do occasionally align their IT strategy to strategic context (Levy, Powell, & Yetton, 2002). A mere investment in state-of-the-art IT cannot lead to the realisation of promising benefits of IT in small businesses. The lack of strategy of small businesses toward IT investments and misconceived benefits of IT affect the investment decision process (Nguyen, 2009). The lack of strategy alludes to the unplanned and fragmented use of IT in SEs (Alyahya & Suhaimi, 2013; Levy et al., 2002). SEs are yet to leverage their IT resources to support customers and services, link their supply chain, and achieve certain strategic benefits (Kyobe, 2004). IT investment decisions in SEs are often made based on short-term, informal, and ad-hoc practices (Rantapuska & Ihanainen, 2008).

SEs make routine IT investment decisions without proficient IT skills. Therefore, decision-makers rely on several (internal and external) information sources to make IT decisions due to the lack of IT skills and provision of formal knowledge to guide owner-managers' choice process (Chiware & Dick, 2008). Studies conducted in SEs in Botswana, Kenya, Nigeria, South Africa,

Uganda, and Tanzania suggest that decision-makers rely strongly on informal information sources when making IT decisions (Chiware & Dick, 2008; Kyobe, 2004; Moyi, 2003; Oyelaran-Oyeyinka & Lal, 2006; Wolf, 2001). Formal information is any form of information that is in a recordable or readable format and is available as manual, report, gazette, online or database; while informal information is un-recorded and unstructured subjective-conversational information or internalised knowledge/experience that is acquired from a network of personal contacts, friends, and family members (Duncombe & Molla, 2009; Rantapuska & Ihanainen, 2008).

IT decisions made based on insufficient knowledge are likely to have a less rational influence on the organisation (James & Van Belle, 2013). Small business owner-managers make IT decisions out of enthusiasm as opposed to a thoughtful business strategy (Alyahya & Suhaimi, 2013). There is no formal guided strategy that SEs owners employ in their IT decision process. SE owner-managers bootstrap to find their solutions to the daily organisational problems and ignore a routine-procedural (textbook, manual, documentation, etc.) approach (Ekanem & Smallbone, 2007). Bootstrapping refers to a learning behaviour that involves "patching things, trial and error, or making do" based on informal experience or information gathered through social interaction with business networks, peers, customers, and associates (Ekanem, 2005).

Rantapuska & Ihanainen (2008) investigated the knowledge used and IT decision style of SE owner-managers and categorised IT decision-making styles as problem, product, and provider oriented. Table 2-3 illustrates the characteristics of the different orientation styles of the IT decision-making process in small businesses.

IT decisions in SE is a sole function of the entrepreneur, influenced by inevitable human factors (Rantapuska & Ihanainen, 2008). The decision-maker often resorts to the use of tacit knowledge and cognition when making IT decisions (Ekanem, 2005; Rantapuska & Ihanainen, 2008). Nevertheless, the decision-makers' ability to learn from decision mistakes, experience, and benefits enhance the decision-makers' style in subsequent decisions (Ekanem & Smallbone, 2007). The learning process and strategies are often not formalised, which results in the decision-makers' reliance on 'gut-feeling' and external sources in subsequent information. Small enterprise owner-managers build trust and personal relationships with suppliers and providers in their attempt to reduce risk and uncertainty when they make unfamiliar decisions (Ekanem & Smallbone, 2007). Irrespective of the ownership of a small business, stakeholders' influence exists and often plays a significant role in the activities and

decision-making process (Ekanem & Smallbone, 2007). In SEs, the customers, suppliers, consultants, vendors, business partners, and government play significant roles in the IT decision-making process.

Orientation Style	*Description*	*Approach*	*Knowledge Used*
Problem	IT investment decision is perceived as central to the business problem. The decision-maker emphasises the need for acquisition, explains his/her requirements to the provider, and the need for investment is thoroughly stressed to the provider.	Business need informs IT	Externalisation (tacit to explicit)
Product	The requirements, features and specifications of a product are the central focus. Decision-maker cautiously evaluates alternatives and is conversant with their existing IT systems.	IT alternatives to fit business need	Combination (explicit to explicit) and Externalisation
Provider	Decisions are made based on existing customer/provider relationship with consideration of providers' reputation, size and background. The investment process starts by selecting a provider, and the decision-maker relies on the provider's experience. The business owner decides based on instinct, intuition, and guts.	Reliance on consultant and vendor	Socialisation (tacit to tacit)

Table 2-3: IT Decision-Making Drive of SMEs (adapted from Rantapuska & Ihanainen, 2008)

The IT choice process of SE owner-managers cannot be referred to as explicitly rational because their actions are based on learning process and experiences acquired through interaction (Ekanem, 2005). The decision-makers are often limited to the information available to them when making IT choices. The IT decision-making process of small enterprise owner-managers is considered as a bounded rational choice (James & Van Belle, 2013; Pomerol & Adam, 2006). Better quality information will lead to a more informed IT decision (Duncombe & Molla, 2009). The need to provide SEs with information resources to guide the decision process has been iterated in the literature (Fodor, 2011; Salles, 2006). The provision of educational programs has been suggested to enable Kenyan SE owners to make informed IT decisions (Mwangi & Brown, 2015). The findings of James & Van-Belle (2013) suggest a clearly perceived usefulness of information resources to generate a rigorous IT investment decision process in SEs.

The SE owners need to perceive IT investments as a planned and formalised process (Apulu & Latham, 2011). Failure to implement formalised strategies will continuously lead to a misfit

and underutilisation of IT resources in SBs. An investigation of IS formalisation in Botswanan SEs revealed the unmet demand and satisfaction of Information Systems (Duncombe & Molla, 2009). A similar study in South Africa indicates that SEs are inhibited with the utilisation of their enormous IT resources due to poor planning and limited IT vision of the business leadership (Kyobe, 2004). The definition of a formalised IS process, and the factors that determine a formalised IS, remains a puzzle that needs to be addressed (Duncombe & Molla, 2009). Formalised IS will involve the small business owners to (i) have a well-defined IT strategy, (ii) rely on formal information, (iii) ensure a holistic integration of IT to business activities, (iv) create policies and principles based on business goals/vision, and (v) implement a strategy to assess IT investments.

Small enterprise owner-managers should ensure that the benefits of their IT investment outweigh the risks and maintenance cost (Barba-Sánchez et al., 2007). A thorough analysis of the decision-makers' strategic motivation and evaluation of criteria should guide IT decision-making process in SEs (Ekanem & Smallbone, 2007). Also, IT investment decisions should be exploited with consideration to the organisation's available resources to achieve competitive advantage (Barba-Sánchez et al., 2007). Furthermore, Barba-Sánchez et al. (2007), suggested three steps to guide IT investment decision process in SBs: (i) IT solutions should be introduced gradually to mitigate the risk of failure, (ii) users of new systems should be trained and offered adequate support to overcome the lack of IT skills in small enterprises, and (iii) organisational culture and managers' orientation needs should be accounted for to ensure the success of the new IT systems.

The need for a more formalised IS planning is not a peculiar challenge to SE owner-managers but CIO of large organisations are also faced with the challenges of strategic planning of IS (Bai & Lee, 2003). There are existing studies that have attempted to develop strategies to guide SEs' IT decision processes (Alyahya & Suhaimi, 2013; Bayrak, 2013; Riemenschneider, Harrison, & Mykytyn, 2003; Salles, 2006). Despite the numerous attempts towards strategic IT decision-making processes, this study is yet to identify the model/framework that focuses on small businesses in developing nations. The SMEs' environment, organisational culture, information systems specificity, psycho-sociological, and decisional factors warrant the need for a specific strategy for IT investment decisions (Alyahya & Suhaimi, 2013).

2.4.4 Strategic Decision Making in Small Enterprises

Strategic decision-making is a combination of a coherent and convergent approach of instituting a procedure/system through a holistic, intuitive, and creative-thinking process to unravel a strategic business problem. Strategic decision-making is a long-term, intentional, and goal-directed process of selecting one of the several alternatives, the development and implementation of plans, and the allocation or diversion of resources necessary for realising business goals (Iederan et al., 2009; Wang et al., 2007). The strategic decision process is a novel way of thinking to overcome business concerns in order to compete in an equivocal and ever-changing competitive environment (Steptoe-Warren, Howat, & Hume, 2011). Strategic decision-making is the act of creating a survival perspective plan for the business, based on organisational past and present attributes. The strategic decision is based on a structured process that involves a thorough assessment of circumstances, criteria, alternatives, and consequences (Citroen, 2011).

Contemporarily, strategic planning is not just making a long-term plan and having a one-size-fits-all business strategy. Eisenhardt & Brown (1998) have long emphasised that the traditional strategic approach of choosing from the attractive market, creation of strategies on core competencies, and picking unique strategies, cannot be upheld in the present globalised economy which is highly volatile, disruptive, and fiercely competitive. SEs operate in a dynamic business environment with unstable internal and external influences. Hence, this study stalwartly suggests that strategic decision-making is attainable in SEs (Ibrahim, Dumas, & Mcguire, 2001) and focuses on how small enterprises can attain a formalised IT decision-making process.

Strategic investment decisions are choices that often have a substantial effect on an organisation's operational performance, financial status, and competitive advantage (Atik, 2012). Hence, organisations should evaluate strategic outcomes and potential risks of their decisions when making investments. Organisations need to position their IT investments as strategic assets to derive the intended benefit of IT and to achieve a sustainable competitive advantage (Oh, Loong-Tatt Ng, & Teo, 2007). Hence, this study perceives strategic IT decisions as a process of making a rational choice based on relatively comprehensive information, a thorough analysis of different alternatives, assessing possible consequences of actions, evaluation of internal and external environmental factors (Oh et al., 2007), and developing

strategies to mitigate potential outcomes. Strategic IT Decisions (SITD) are significant but infrequent decisions that can influence organisational productivity, improve the efficiency and long-term competitiveness of enterprises, potentially lead to a costly and complex organisational change, reduce costs, and overcome the challenges towards the realisation of IT benefits in organisations (Tamm & Parkes, 2014).

The responsibility of making strategic IT choices lies with the top management personnel (strategic thinkers and decision-makers) who are exclusively responsible for making decisions on organisational management and the creation of strategic direction for an organisation (Steptoe-Warren et al., 2011). Business owner-managers make strategic decisions in SEs and are responsible for making choices that have the potential of impacting enterprise survival. The act of making strategic decisions is challenging because of the huge uncertainties involved in the process (Tamm & Parkes, 2014).

In small firms, the dynamic external environmental factors, firms' resources, firms' capabilities, and business owners' values and consideration, often affect the Strategic Decision Making (SDM) process (Ibrahim et al., 2001). Other factors such as skills, competencies, competitors, market conditions, finance and customer demand determine SEs' Strategic IT Decision Making (SITDM) process (Mador, 2000; O'Regan et al., 2005). The decision-makers' cognitive divergence does have a significant influence on a strategic decision in organisations (Olson, Parayitam, & Bao, 2007). There is an assumption that the decision-maker developed competency over time which influences his/her divergence. Also, the characteristics of a firm's owner and trust also have a substantial influence on the rationality of a decision-maker (Talaulicar, Grundei, & Werder, 2005). There is a need for SEs to adopt SITDM to overcome the hindering factors that lead to bounded decisions (Mador, 2000) due to insufficient information. There is a limit to the amount of information that can be collected which implies that a rational decision does not mean that every bit of information about a problem will have to be analysed before making a choice (Citroen, 2011). Decision-makers rely on information about competitors, market and, above all, information about the internal and external environment (Citroen, 2011). Studies revealed that executives that make rational decisions collect ample amount of information to reduce the uncertainty in their decision process (Citroen, 2011). The quality of information is paramount to overcome information overload. The more information a decision-maker has, the more time required to analyse the information which will delay the decision process (especially in time-bounded decision problems). Decision-makers rely and

trust internal information sources more than information that emerges from external sources like vendors, suppliers, and so on (Citroen, 2011).

The act of making a strategic choice is geared towards the achievement of a rational decision (Citroen, 2011). In recent times, organisations such as micro, small, medium, and large-sized companies are faced with the intricate business opportunity, the need to join the global market, overcoming the unpredictable-vibrant external environment factors, managing internal factors that are changing organisational culture, sustaining competitive advantage, and coping with dynamic pressure. Business owners need to develop strategies to overcome some of the business challenges and opportunities they habitually encounter (Steptoe-Warren et al., 2011).

There have been significant theoretical and empirical studies that have investigated strategic decisions from both psychological and managerial perspectives (Steptoe-Warren et al., 2011). Studies are yet to develop models that incorporate peculiar influencing factors to strategic decisions for small businesses (Ibrahim et al., 2001). Tamm & Parkes (2014) presented a holistic SITDM model that described the relationship between decision context (external environment and organisational characteristics), top management team (team-level and decision-maker characteristics), decision-specific characteristics (decision-matter and informational factors) and nature of the decision-making process (analytical, intuitive and political), all influencing the outcome of a strategic IT decision in the organisation. The strategic IT decision model provided a generic model of strategic IT decisions. This study conducted a systematic review of the literature to demonstrate the gap in literature towards a strategic and formalised IT decision-making process in SMEs. Articles were reviewed and analysed based on the Tamm & Parkes (2014) model for SITDM. The analysis presented in Table 2-4 shows the research methodology adopted in a study, the theoretical grounding, model development, the factors and nature of SITDM (Tamm & Parkes, 2014), and the case study.

References	Country	Method	Theory	Model Dev.	Factors Affecting SITDM			Nature of SITDM Process			Case Study	
					Context	TMT	DS	AY	IV	PO	SMEs	LEs
Karsak& O'zugul (2009)	Turkey	Quantitative		Y			Y	Y				Y
Bai & Lee (2003)	Taiwan	Quantitative	IS Strategic Planning		Y	Y		Y				Y
Frisk, Lindgren, & Mathiassen (2014)	Sweden	Design Approach	Rationality & Bounded	Y		Y		Y	Y	Y		Y
Córdoba (2009)	Colombia	System Thinking	Rationality + PP	Y		Y	Y	Y				Y
Ranganathan & Sethi (2002)	Random	Qualitative		Y	Y	Y		Y		Y	Y	Y
Grover, Teng, & Fiedler (1980)	US	Quantitative		Y	Y		Y	Y				Y
Pugliese & Wenstøp (2007)	Norway	Qualitative	Cognitive & Agency	Y			Y		Y	Y	Y	
Rantapuska & Ihanainen (2008)	Finland	Qualitative	Cognitive		Y		Y	Y	Y		Y	
Shepherd & Rudd (2014)	Review	Qualitative	Upper Echelon	Y	Y	Y	Y	Y				Y
Elbanna & Child (2007)	Egypt	Mixed Method	SDM Rationality	Y	Y			Y				Y
Preston, Chen, & Leidner (2008)	US	Quantitative	Managerial Discretion + PP	Y	Y				Y	Y		Y
Count				9	7	5	6	9	4	4	3	9

SMEs – Small and Medium Enterprises, LEs – Large Enterprises, Y – Presence of Attribute, DS – Decision Specific, AY-Analytical, IV – Intuitive, PO – Political, PP – Power and Politics

Table 2-4: Review of Articles on strategic IT decision making in organisations

The articles reviewed were retrieved from the Google Scholar search engine. Terms like "strategic IT", "formalised IT", and "planned IT" were used to retrieve different articles. The researcher focused on authors that were relevant based on the query terms. Table 2-4 revealed that there is an evident dearth of studies that attempt to formalise the IT decision-making process. The analysis of the articles revealed the gap in studies relating to strategic decisions in SEs, and less focus is in the development of model for strategic decisions in SEs. Table 2-4 presents small sample of studies but it can be deduced that there is a gap based on the articles reviewed. The existing generic strategic IT alignment models are resource-consuming for SEs to adopt (Alyahya & Suhaimi, 2013).

2.5 Enterprise Architecture Principles for IT Decision-Making Process

2.5.1 What is Enterprise Architecture

Enterprise Architecture (EA) is a formal expression of an enterprise's business plan, business operation, and information systems to support business-IT alignment, support strategy implementation, reduce the risk of change processes, and create options for actions (Wißotzki & Sonnenberger, 2012). EA provides a holistic view of an enterprise, allows the optimisation of an enterprise, the translation of enterprise strategy, and simplifies the control of complexity through business and IT (Devos, Van Landeghem & Deschoolmeester, 2013). EA is a prominent and growing approach that large organisations are adopting to guide their business and IT alignment (Zachman, 2007). Managing EA is a complex process that even large organisations are still dealing with but the concept has been widely accepted as an approach to leverage IT investments (Bernaert et al., 2014; Van Belle & Giqwa, 2013).

TOGAF provides the most comprehensive process of guiding decision-making processes and guidance of IT resources (Urbaczewski & Mrdalj, 2006). The focus of this study is to employ the principles of enterprise architecture to guide the IT decision-making process of SE owner-managers (Bernaert & Poels, 2012; Dehbokry & Chew, 2014; Van Belle & Giqwa, 2013).

2.5.2 Enterprise Architecture in Small Enterprises

Small enterprises can embrace the use of enterprise architecture if the EA frameworks and models are generic to SMEs, easy to use, affordable, support quick strategic IT decision processes, and explicitly define road maps (Van Belle & Giqwa, 2013). EA can provide SEs with business agility, strategic planning, continuous IT alignment, unified and integrated data and business-IT processes, minimised management complexity, and return on investments (Van Zijl & Van Belle, 2014; Wißotzki & Sonnenberger, 2012).

The Open Group Architecture Framework (TOGAF) has also identified the need for an EA for SEs but is yet to announce any success in developing an EA for SEs (TOGAF, 2015). This study identified three known EA approaches for SEs. The CHOOSE is an EA approach that focuses on modelling EA for SEs and can be adapted to the characteristics and needs of SEs, but the techniques focus on architectural modelling which will be complex and challenging for SEs (Ingelbeen, Bernaert, & Poels, 2013). Meanwhile, the LEAP is a simple framework for EA that allows all aspects of the architecture to be precisely defined using standard modelling

notations. The LEAP views an enterprise as an entity with hierarchically decomposed communicating components (Clark et al., 2011). LEAP suggests how EA can be made practical and describes EA in three-tiers of Alignment Architecture (Vertical), Agility Architecture (Horizontal), and Adaptive Architecture (Circular) (EA Network, 2015). LEAF has continuously published the development of LEAF since 2004.

It is evident that SE owner-managers are responsible for setting and changing employees' roles, responsibilities, business processes, and IT infrastructures (Mador, 2000; Pugliese & Wenstøp, 2007). The management of small businesses need to define business and IT vision explicitly using relevant tools to achieve the needed goal (Rantapuska & Ihanainen, 2008). There is a need for SE owner-managers to consider the adoption of EA to guide decision-makers in the planning, alignment, investment, and implementation of IT (Dehbokry & Chew, 2014; Yoganingrum et al., 2013). The proposition for EA in SEs is based on dynamic internal and external environmental challenges, lack of functional strategic IT framework, and holistic assessment of business structures of SEs (Bernaert & Poels, 2012; Dehbokry & Chew, 2014). Furthermore, SEs need EA to support IT decisions for strategic advantages and to maximise return on investment of IT through better alignment decisions (Van Zijl & Van Belle, 2014).

The adoption of enterprise architecture even in large organisations still poses some challenges such as lack of top management commitment and strategic vision, inadequate reserve finance and human resources, political factors, organisational culture, and project management issues (Van Belle & Giqwa, 2013). There has been a debate on the possibility of EA to holistically fit into the context of SMEs because of the complexity of EA principles, framework, and guidelines (Bernaert & Poels, 2012; Yoganingrum et al., 2013). SEs are resisting the adoption of EA due to its unclear benefit, complexity, cost, skills requirement, and time of implementation (Bidan et al., 2012; Dehbokry & Chew, 2014; Wilton, 2008). Despite the foreseen challenges, there is optimism on the possibility of EA providing the IT benefits in SEs (Bernaert, Poels, Snoeck, & De Backer, 2014; Hämäläinen & Liimatainen, 2008; Jacobs & Kotzé, 2011; Sonnenberger & Wißotzki, 2014; Van Belle & Giqwa, 2013; Wißotzki & Sonnenberger, 2012; Yoganingrum et al., 2013).

2.6 Decision Support System

Decision Support System (DSS) is perceived as interactive computer-based systems that uses knowledge and theory from various disciplines such as database research, decision theory, artificial intelligence, cognitive science, mathematical modelling and management science to support decision making activities (Kou, Shi, & Wang, 2011). DSS assist decision-makers in making a choice, rendering a judgement, or drawing a conclusion. The decision-makers organisational operations are subordinated to the human user, who remains central to and in control of the decision-making process (Forgionne, Kohli, & Jennings, 2002). In other words, DSS is a process by which people, procedures, methods, equipment, and tools are integrated to produce a desired result (Gachet & Haettenschwiler, 2006). The user interface (or user), the model and the database (knowledge base) are three major components of DSS (Power, 2002). This study describes decision support system as information system based system that supports enterprise or business's decision-making process. DSS is as a tool that support SE owner-managers to decide on structured and unstructured problems that influence business operations and organisational processes (Richard, 2009).

The research in the field of decision support system has grown given the complexities and uncertainties of decisions that managers struggle to overcome (Power & Sharda, 2007). Decision support systems are extensively adopted and in use in many large organisations (Çagˇdaç Arslan, Çatay, & Budak, 2004). Therefore, there is tendency to apply experience and techniques gained from large organisations directly to small businesses, without taking into cognisance the peculiarity and the different decision support needs of the small enterprises. The setback with DSS in SEs is perception of small businesses as miniature versions of large businesses ignoring that problems differ, and even similar problems require different solutions. SEs have higher failure risks and commonly do not have access adequate and timely information can pose further challenges to small organisations (Duan & Xu, 2009).

Duan and Xu (2015) further states that the problems inherent in providing support for small business management are commonly studied from a social or economic viewpoint. Only very few studies indeed have addressed decision support needs in the context of SEs (Delisle & St-Pierre, 2004). There are more than thirty different approaches to the design and construction of decision support methods that have been developed over the last two decades (Gachet & Haettenschwiler, 2006). The methodologies for achieving successful DSS design in SEs should

accommodate human reasoning from strategic to lowest levels of granularity of action decided by SE owner-managers. Human reasoning have not been applied in the practice of DSS development and focus has been on high-level decision making (Pomerol & Adam, 2006). This study proposed an artefact that holistically evaluate small enterprises from highest to lowest level of granularity using the principle of enterprise architecture to guide structured and unstructured IT problems in SEs.

Phillips- Wren (2013) categorised problems that requires to be decided on as structured, semi –structured and unstructured. The structured decisions have known optimal solutions, while the unstructured decisions have no agreed-upon criteria or solution and decision-makers rely on the personal preferences. In between the structured and unstructured decision-problems, there is a range of semi-structured problems that have some agreed-upon parameters and yet require human preferences for a decision within a specific set of criteria (Phillips-Wren, 2013). DSS is a broad range of interactive computer system that support decision maker to utilise data, model and knowledge to solve semi-structured, ill-structured or unstructured problems (Richard, 2009). Gachet & Haettenschwiler (2006) states that: *"There will always be a tension – ideally a creative one – in the DSS field between Decision and Systems but the link between the two is - Support. The quality of the support we can provide managers depends on our understanding of both decision-making and system building".*

Knowing the objectives of the decision-makers allow the evaluation of decision. Thus, it is important to know the utility of decision-maker and understands the expected outcome of the decision-maker regarding probabilities of future events (Pomerol & Adam, 2006). It is paramount to characterise the decision-makers' problem before one can begin to understand how to support or assist the decision-makers. Phillips- Wren (2013) argued that semi-structured decision problems are amenable to decision support through interaction with decision makers and developing alternatives based on criteria and optimal solutions. DSS are designed to support different decisions, e.g. single, multiple or decisions that that ranges from managerial to creative problem solving.

This study acknowledges the debate on the categorisation of DSS discussed in (Alter, 1980; Kuljis & Paul, 2001; Power & Sharda, 2007). However, the Power & Sharda (2007) presents an expanded categorisation of DSS into five types of DSS.

i. Communications-Driven DSS get functionalities that support the shared decision-making from information technology and communications.
ii. Large structured database drives Data-Driven DSS. For example, Executive Information Systems and Business Intelligent Systems.
iii. Document-Driven DSS supports decision making process by integrating different storage and processing technologies to provide enhanced document retrieval and analysis.
iv. Knowledge-Driven DSS preserve knowledge that recommend actions based on artificial intelligence, case-based reasoning and Bayesian networks.
v. Model-Driven DSS allows the user to manipulate the parameters of a given model to evaluate the output of a decision problem.

The advantage of a model driven DSS is the accessibility of the DSS to non-technical specialist like manager through user friendly interface. The decision maker provides data and parameters for analysing a problem situation. The model-driven DSS is often built based on decision analysis, mathematic programming and simulation techniques (Power & Sharda, 2007). Several model-driven DSS applications such financial and accounting systems have been developed for managers to support their decision making process using spreadsheet and web-based (Kuljis & Paul, 2001; Power & Sharda, 2007). The spreadsheet-based and web-based DSS has become the most common techniques of modelling DSS applications (Ragsdale, 2000). In any case, DSS should be driven by exigencies encountered in the real-world problems, and not a means to overcome some conception of a theoretical model (Delisle & St-Pierre, 2004).

2.7 Summary

This chapter is part of the problem awareness phase of the DSR methodology. This chapter enlightened the researcher on the challenges faced by SE decision-makers, the peculiar characteristics of SME, the trend and gap of research in IT decisions, and the concepts of enterprise architecture in SEs. The researcher emphasised the attributes and the challenges of SEs to elucidate the significance of the problems surrounding the phenomenon in this study. The researcher's pragmatic philosophic assumption influences the adoption of a problem-centric approach to conducting the literature review. The gap in the adoption of EA as IT decision-making strategies in SEs is also identified a finding of the literature review.

3 Chapter Three – Theoretical Framework

3.1 Introduction

This chapter presents the theoretical framework that guides this study. The literature discussed in this chapter extends to the early emergence of decision-making theory in the mid-1950s. This chapter is structured into seven major sections. Section 3.2 provides background understanding about decision-making theories. Section 3.3 describes assumptions, concepts, and constructs of Bounded Rationality Theory (BRT). In Section 3.4, the researcher discusses the argument in favour, as well as the criticism of, BRT based on the discourse in literature. This chapter highlights the application of BRT in related disciplines in Section 3.5. Section 3.6 presents the contextualisation of BRT in this study. The chapter concludes with a summary section that provides an overview of the content of the chapter.

3.2 Background to Decision-Making Theoretical Framework

The approach to research often influences the choice of a theoretical framework as a guiding lens (Mackenzie & Knipe, 2006). The choice of the theoretical framework allows the researcher to establish a relationship between local context and the phenomenon of investigation and attempts to relate it to similar events. This research makes a prescriptive contribution on how an EA artefact can support Strategic IT Decisions (SITD) in small enterprises (Gregor, 2015). Design Science Research (DSR) has been suggested to complement both behavioural and design research (Hevner, March, Park, & Ram, 2004). The behavioural science involves the development and justification of theories. The focus of this study is to improve IT decisions in SEs by supporting the SE owner-managers' decision-making process. To achieve the aim of this study, the researcher explored the decision-making style that best described the SEs owners' decision-making process and what informs their choices.

This study acknowledges the existence of several Decision-Making Theories (DMT). The normative DMT prescribes how the decision-maker (individual or organisations) should behave under certain conditions to attain certain goals, while the descriptive DMT describes how decision-makers behave in achieving a goal (Simon, 1972). Probability theory, game theory, rational expectation, and experimental economics are intellectual contributions that changed the discourse of theories of decision-making uncertainty (Baron, 2008; Pomerol & Adam, 2006; Simon, 2000). Rational Choice Theory (RCT) assumes that an individual has preferences among

the available choice alternatives that allows them to state which option they prefer and focuses on the determinants of those individual choices (Bicchieri, 2003; Grüne-Yanoff, 2012). Jonathan (1991) described the assumptions of RCT as: humans are purposive and goal-oriented; humans have sets of hierarchically ordered preferences or utilities; in choosing lines of behaviour, humans make rational calculations; emergent social phenomena are ultimately the result of rational choices made by utility-maximizing individuals; and emergent social phenomena that arise from rational choices which constitute a set of parameters for subsequent rational choices of the individual (Jonathan, 1991). Vroom (2003) states that quality decision and support/commitment are what makes an effective decision. Furthermore, quality decisions refers to the analytical aspect of decisions where the action chosen is consistent with an organisational goal and potential availability of information about the choice (Vroom, 2000). Savage Expected Utility Model or Subjective Expected Utility Model assumes that: if a decision-maker starts with a set of states, a set of outcomes, and a preference order of function from states to outcomes satisfying certain presumptions such as transitivity, then the decision-maker has a probability on states and utility function for outcomes such that he/she is maximizing the expected utility for the said probabilities (Phillips-Wren, 2013).

Literature revealed that the theory of bounded rationality informs SEs' decision-making process, cognitive theory, and real life choice (Fodor, 2011; Iederan et al., 2009). The Bounded Rationality Theory (BRT) serves as a theoretical guiding framework for this study. The BRT is employed to ascertain the optimality of the IT choice of decision-makers based on how decision-makers process the information available to them and to ascertain the role of information in assessing alternatives, evaluating future consequences, and selecting the most preferred alternative preference. Information processing in this study refers to (i) strategy for information seeking, (ii) assessment of information, (iii) analysis of information, (iv) deduction and learning from the available information, and (v) the influence of the information on decision outcomes. This study referenced literature dating back to the 1950s to establish the background of bounded rationality theory because the Simon's BRT has been honoured by wide assumptions, expansion, transformation, and distortion (March, 1978).

3.3 Bounded Rationality Decision Theory

3.3.1 Background to Bounded Rationality Theory

The human bounded rationality theory has been a discourse since classical times (Simon, 2000). There have been several narratives on the emergence of Bounded Rationality Choice Theory (BRCT). The experimental studies in the 60s and 70s contributed to the understanding of bounded rational decision-making (Reinhard, 1990). Ellison (2006) argued that the distinct emergence of bounded rationality began in the late 70s and early 80s, which marked the revolution in game theory in organisations. Simon's Bounded Rationality Theory (BRT) which focused on the process of information gathering, human's limits of rationality, decision under uncertainty, and the consequences of payoff functions, forms the basis for BRT (March, 1978). Simon's BRT recognised the limitations of Savage's theory and propounded BRT as a decision scenario where decision-makers have limited information to guide their choice process and are constrained by their *cognitive abilities* (Phillips-Wren, 2013). However, Simon (2000) acknowledged the introduction of the term 'utility', introduced by Mill in 1848, and argued for the inapplicability of the mathematical conceptualisation of utility theory that dominated the economic rationality discipline in the mid-20th century. To retain the precise meaning of what bounded rationality is, this study presents Simon's conceptualisation of BRT.

> *"Bounded rationality is simply the idea that the choices people make are determined not only by some consistent overall goal and the properties of the external world, but also by knowledge that decision-makers do and don't have of the world, their ability or inability to evoke that knowledge when it is relevant, to work out the consequences of their actions, to conjure up possible courses of action, to cope with uncertainty and to adjudicate among their many competing wants. Rationality is bounded because these abilities are severely limited"* (Simon, 2000).

Simon (2000) contended that optimality is attainable through procedural rationality. That is, the process that leads to choices with an emphasis on the phenomenon associated with a limit on rationality. It is arguable that the rationality of decision procedures of humans is subject to the given constraints (March, 1978). From a psychological perspective, rationality is the behavioural style of a decision-maker that is appropriate to the attainment of a given goal in spite of limitations and constraints (Koumakhov, 2009; Simon, 1972). As the BRT evolves, rationality is determined by the decision-maker's inner environment, memory content and their process, and the outer environment in which they act, and vice versa (Simon, 2000).

A succinct summary of Simon's definition of BRT was presented in Dequech (2001), where he argued that Simon's BRT focused strictly on the individual with little consideration to the interactions of a social context and the participation of an institution. Dequech (2001) concluded that BRT has limited applicability in a situation of uncertainty and neglected the innovativeness and creativity of an individual or organisation.

This study focuses on the 'search' and 'satisficing' as the key concepts of BRT. 'Search' is the extensive pursuit of information in a given time frame. Satisficing is attained when a decision-maker achieves satisfactory alternatives which likely might be influenced by the adjustment of the aspiration level (goal) because of the known information about the environment (Tiwana, Wang, Keil & Ahluwalia, 2007). For example, an IT project manager conducts an extensive search of information (about the cost of the project, perceived organisation benefits, business and technical requirements) to guide her decision-making process. In the later stage, she terminates the information searching process to choose without further considerations. The search and satisficing process makes the decision-maker vulnerable to cognitive biases. Satisficing and optimising exist in situations where the complexity of the decision problem and uncertainty makes full rationality impossible. Hence, decision-makers settle for "satisfactory" rather than "best approximate option" (Koumakhov, 2009; Simon, 1972).

In light of the 40 years' discourse on the clarity of bounded rationality theory, Simon (2000) states that the BRT focuses on procedural rationality – i.e. the quality of the decision process, and substantive rationality – i.e. the quality of the outcome. He emphasised that to understand the procedural rationality one needs to have a theory of psychology of the decision-maker and the theory of goal and external environment to understand the latter.

Reinhard (1990) elucidates on the three-level theory of decision-making and identified the routine level, the level of imagination, and the level of reasoning as three mental stages of decision-making. Firstly, the routine level is a situation of making a quick decision with little or no thought process because the decision-maker is time bounded with little or no time for conscious deliberations. Secondly, the decision-maker attempts to picture the actions and consequences of his/her choice on an imagination level. The third level involves the analysis of a decision problem scenario before deciding. To better understand the argument posed by Reinhard (1990), the researcher relates the three level theory with the BRT propositions in (Dequech, 2001):

i. The decision-maker often pursues multiple objectives which may be conflicting.

ii. The alternatives from which to choose to pursue these objectives are not previously given to the decision-maker, who then needs to adopt a process for generating alternatives.

iii. The limits of the decision-maker's mental capacity compared to the complexity of the decision environment are already present at this early stage and usually prevent him/her from considering all the alternatives.

iv. Those limits are also present when the decision-maker has to consider the consequences of the alternatives so that the decision-maker employs some heuristic procedure for that purpose.

v. The decision-maker adopts a "satisficing" rather than an optimising strategy, searching for solutions that are "good enough" or satisfactory, given some aspiration levels.

Theories that incorporate the limits of information processing capacity of the decision-maker are theories of bounded rationality (Ellison, 2006; Foss, 2003). Rationality is bounded when: (i) risk and uncertainty are introduced in the decision problem, (ii) the decision-maker has incomplete information about alternatives, and (iii) the existence of environmental constraints makes the computation of the best course of action difficult (Dequech, 2001; Simon, 1972; Tiwana et al., 2007). Simon (1955) disagrees that there is no empirical evidence that computation can be or is performed in any complex human choice situation and puts forward an “approximate” rationality that can be employed by the decision-maker who is processing limited information with limited computation capacity. Koumakhov (2009) appraised Simon’s conventionalism view that, in understanding the problem of coordination, one must take into account individual cognition limits and social representations of reality. Conventionally, the author implies, how common cognition of reality, roles, and group identity operates within a firm, and how these elements interact to inform the decision-maker’s learning process. The assumptions of BRT explicitly depict the decision-making process in SEs when owner-managers make IT investment decisions because decision-makers lack sufficient IT skills, cognitive abilities, and information to decide.

3.3.2 Simon’s Bounded Rationality Theory

Simon discarded the assumption postulated in traditional economic theory that assumes that a decision-maker has absolute knowledge of the environment, has a well organised and stable preference, possesses sufficient computation skills to determine the best alternative action,

and can attain the highest aspirational level (Simon, 1955). People often weigh their current costs and benefits against future ones when making choices. Hence, gratification is delayed when the gratifying object is not visible or imaginable by the decision-maker (Camerer, 1998). Ellison (2006) suggests that Simon's BRT proposed a global replacement for rationality choice and stressed two significant advantages of bounded rationality choice: a more realistic approach and extensibility of the features of the BRT. In addition, Reinhard (1990) also conceived Simon's bounded rationality as a more realistic view of dealing with decision processes and believed that choice optimisation of decision-makers exceeds human cognitive abilities. Foss (2003) acknowledged the significant contribution of Herbert Simon towards BRT but argued that the BRT only serves a rhetorical function with less significant impact on utilitarian purpose. It is difficult to describe empirical predictions of bounded rationality theory explicitly.

It has been argued that bounded rationality establishes the knowledge of decision process which helps in predicting the outcome of decision (Simon, 2000). Simon's BRT focuses too much on satisficing – a choice process where a decision-maker continuously searches for actions until they achieve a payoff that offers at least a minimal aspiration (Ellison, 2006). Thus, the thought of BRT as cognitive-driven theory is dubitable because human capabilities of computation and cogitation are factors that impose limits on rationality (Reinhard, 1990). There is no explicit guide about bounded rationality but, with certainty, bounded rationality is not like any other theory of utility maximisation. It is time to focus on the emprical application of BRT and spend less time debating on the relevance and incompleteness of BRT (Camerer, 1998; Reinhard, 1990).

3.4 Application of Bounded Rationality Theory in Related Studies

Bounded rationality is used widely by various economic disciplines (Ellison, 2006). BRT has been used in social science fields like anthropology, sociology, and political science (Simon, 2000). Ellison (2006) presents a general review of bounded rationality in industrial organisations. Tiwana et al. (2007) describe how IT managers demonstrate bounded rationality bias by associating real options with perceived values of a project, establishing the search and satisficing phases of bounded rationality.

Dating back to the 70s through to the 90s, Camerer (1998) elucidates on several studies of bounded rationality in individual decision-making and strongly emphasised the need to further

explore the promising direction of procedural (or bounded) rationality of an individuals' choice. The need for experimental/empirical study to fill the knowledge gap was emphasised as a pragmatic way to understand bounded rationality (Reinhard, 1990). March (1978) and Reinhard (1990) suggest that there is no generally accepted behavioural theory of choice, but empirical studies over the past twenty years have established a better understanding of the bounded rational decision processes. The issue of clarity of BRT has long been a topic of discourse in the fields of economics and psychology. Foss (2003) emphasises the lack of clarity to operationalise BRT and offers a vague agreement on the nature of BR, the strategy to model BR, and the implication for the firm's behaviour and organisation.

Simon (2000) proposes four ways of systematising theory of bounded rationality as follows: (i) tool for finding empirical phenomena, (ii) tool for building theories, (iii) tool for testing theories, and (iv) dealing with uncertainty. In this study, bounded rationality is perceived as a theory for understanding the SITDM process and to overcome uncertainties of strategic IT investment decisions in SEs. Simon (2000) suggests that the researcher must be able to develop analytical skills for non-numerical data and methods to observe, interview, and analyse verbal think-aloud protocols to collate information about the decision process to understand phenomenon with bounded rationality theory. Simon (2000) further emphasises employing bounded rationality as a tool for generating alternatives for the decision-maker.

3.5 Bounded Rationality as a Theoretical Framework for this Study

The aim of this study is to identify how the quality and the amount of information SE owner-manager can access influences their IT choice. Also, to determine how the introduction of a formalised information as an artefact can improve the level of cognition of the SE owner-manager when he/she makes IT decisions. The following theoretical assumptions were proposed based on the BRT to achieve the objectives of this study:

1. The SE owner-managers search and satisfice based on their experience when they make IT decisions.
2. The IT aspirations of the SE owner-managers would change when they have access to more structured information.
3. There is an existence of relationship between the complexity of IT decisions and the time the decision-maker spends in searching for information that guides their choices.

4. Providing an IT artefact as an information source to support strategic IT decision-making can influence the choices of the SE owner-managers.
5. Decision mistakes and complexities can be averted with an artefact that supports the decision-making process of SE owner-managers.

3.6 Summary

This chapter highlighted some decision-making theories and narrowed the choice of a decision-making theory for this study to Simon's Bounded Rationality Decision-making Theory. This chapter presented some discourse around bounded rationality theory and concluded with the particularisation of Simon's BRT to this study. The next chapter describes the methodology adopted to achieve the aim and objectives of this study.

4 Chapter Four – Research Methodology

4.1 Introduction

This chapter describes the research approach and techniques adopted in this study. The chapter starts with an explanation of the research paradigm employed in this study. The researcher demonstrates the use of pragmatism as the paradigm to achieve the aims and objectives of this study. The research paradigm influences the choice of a qualitative research methodology and design science research as strategies to investigate the IT decision-making process of SEs owner-managers and the development of an artefact that supports the IT Strategic Decision-Making (SITDM) process. This chapter elaborates on the Design Science Research (DSR) process that led to the development and evaluation of an Enterprise Architecture-driven Artefact (EADF) for SITDM process in SEs. This chapter also explains in detail the sampling techniques, how the researcher collected data, and the analysis process. Section 4.2 describes the research paradigm, and Section 4.3 discusses the design science methodology in the context of this study. Section 4.3 provides a detailed description of the research methodology and the application of the Vijay Vaishnavi and Bill Kuechler's DSR Process Model is described in Section 4.5. Section 4.6 is the chapter summary.

4.2 Research Paradigm

A paradigm is a collection of plausibly related concepts, assumptions, and propositions that orient the philosophy underpinning a research (Mackenzie & Knipe, 2006). A paradigm consists of elements that inform how and why the researcher views truth, seeks and perceives knowledge. The choice of a paradigm is a combination of elements of ontology and epistemology which informs the choice of methodology and axiology (Klakegg, 2016; Scotland, 2012). Thus, research approach and strategies are strongly influenced by the choice of paradigm. Scotland (2012) argued that the choice of paradigm inherently influences truth and knowledge. There are several paradigms and the choice of a paradigm is dependent on the researcher's views and beliefs. However, the isolation of the researcher from the research is almost impossible because the assumptions and beliefs of the researcher about the world reflect the activities and findings of the research (Klakegg, 2016). Hence, the research paradigm influences the way knowledge is studied and interpreted and sets out the intent,

motivation and expectation of research (Creswell, 2003). The positivist, post-positivism, interpretivist, realism, and pragmatism are examples of paradigms.

4.2.1 Ontology

Ontology is the study of being (Klakegg, 2016) that is concerned with what constitutes reality (Scotland, 2012). The ontological assumption is the explanation of the law of nature (how things exist) and reality (how things work). The two prominent ontologies are realism and anti-realism. The contrast is the claim to whether the world exists apart from our understanding of it (post-positivism) or a constructivist belief that the world is a creation of our conception of it (Morgan, 2014). The question could be asked whether small enterprise as a social entity should be considered as an objective entity or as a socially constructed entity that is built based on the perception of the people (Klakegg, 2016). The ontological assumption of a researcher influences the formulation of research questions, research strategy, and the utilisation of research methods. Sometimes, qualitative research assumed the constructivism while the positivist and post-positivism adopts quantitative research methods. This study assumed that the concept of reality is not a constant phenomenon but a reflection of actions and beliefs of people (Parvaiz, Mufti & Wahab, 2016). The realism and relativism ontological stance will confine the critical perspective of this study. These assumptions and beliefs positioned the researcher as a pragmatic philosopher (Bacon, 2012).

4.2.2 Epistemology

The term epistemology is known as the theory of knowledge which refers to what is true and what is not true (Klakegg, 2016). In essence, epistemology is concerned with how we know reality – that is, the process of learning. Epistemology is concerned with the nature and forms of knowledge, and how knowledge can be acquired and communicated to social entities (Cohen, Manion, & Morrison, 2007 p7.). In other words, epistemology seeks to understand what it means to know reality. Epistemology examines the nature of the association between the knower and the known (Scotland, 2012).

The epistemological stance influences the choice of a paradigm. Positivism is a phenomenalism that believes truth is measurable and can be represented in data (Cohen et al., 2007). Realism assumes that the phenomenon under study is dependent on certain elements (Klakegg, 2016). Interpretivism suggests that a phenomenon is not absolute because people can break free of

a pre-defined label (Mackenzie & Knipe, 2006), and pragmatism assumes a factual approach to solving problems (Bacon, 2012). This study adopted the pragmatic belief of knowledge creation, acquisition, and communication. Table 4-1 compared four (4) paradigms with corresponding beliefs about reality.

	Fundamental Beliefs			
Research Paradigms	Ontology: what is truth or reality	Epistemology: the view on what constitutes acceptable knowledge	Axiology: the role of values in research and the researcher's stance	Research Methodology
Positivism (Naïve realism)	There is a single reality or truth	Reality is measurable hence only observable phenomena can provide reliable facts	Value-free & etic Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Quantitative
Post positivism/ Critical Realism	Reality is socially constructed entity that is under constant internal influence	The power play within a social entity influences truth and reality, hence, only observable phenomena can provide reliable facts	Value-laden & etic Research is value laden; the researcher is biased by the world views, cultural experiences, and upbringing	Quantitative or qualitative
Interpretivism/ Constructivism	There is no single reality or truth. Instead, it is a creation of individuals in groups	Reality has a subjective meaning that needs to interpret to understand the meaning of activities with emphasis on detail	Value-bond & emic Research is value bond, the researcher is part of what is being researched, cannot be separated and so will be subjective	Qualitative
Pragmatism	Reality is constantly changing based on actions, i.e. renegotiated, interpreted based on its usefulness in an unpredictable situation	Dynamism in reality as a result of our changing actions, i.e. the best method is the one that solves the problem. Research question is centric with focus on incorporating different perspectives to help interpret the data	Value-bond & emic Research is value bond, the researcher is part of what is being researched, cannot be separated and so will be subjective	Quantitative and qualitative (mixed or multimethod design)

Table 4-1: Comparison of Research Paradigms based on Wahyuni (2012)

4.2.3 Pragmatism as Ontology and Epistemology in this Study

This study assumed the pragmatic paradigm (Bacon, 2012; Biesta & Burbules, 2003; Morgan, 2014; Olsson, 2006; Pansiri, 2005; Parvaiz et al., 2016). Pragmatism is a philosophy with a real world practice orientation to research and rejects the distinction between anti-realism and realism (Mackenzie & Knipe, 2006). Truth is constructed in pragmatic paradigm but not in an arbitrary way because the truth is rooted in practice and experience. The prediction of the outcome of an action is fallible and probabilistic based on previous experience because of the changing nature in which we find ourselves (Morgan, 2014). Most SEs operate in rapidly changing environments and are required to make an optimal choice with limited experience of prior action.

The pragmatic paradigm suggests that research problem(s) should be the main focus of action and not the method of conducting research (Pansiri, 2005). Pragmatism allowed the researcher to place the research question centrally, to apply different approaches to understand what and how the research problem needed to be addressed (Creswell, 2003). Pragmatism focuses on what works as truth in research as opposed to other paradigms and advocates the use of mixed methods in investigating a phenomenon (Tashakkori & Teddlie, 2003). This researcher adopted qualitative research and DSR methodology to develop an EADF and evaluate the relevance of the artefact to the SITDM process in SEs (Parvaiz et al., 2016). A pragmatic research involves a prolonged engagement to capture diverse opinions in addition to pursuing the research concerned so as to accommodate multiple stances and values (Onwuegbuzie & Leech, 2005).

To better understand the researcher's argument for pragmatism as a paradigm, it is important to highlight Dewey's theory of enquiry that is the centrepiece of pragmatism (Kaufmann, 1959). Reflecting on Dewey's approach to enquiry (which his philosophy of knowledge relies on) suggests that the origin of our beliefs emanate from our previous actions and the outcome of previous actions are rooted in our beliefs (Kaufmann, 1959). Morgan (2014) described Dewey's approach to an enquiry as a careful and self-conscious inquest without a boundary between daily life and research. Contextualising Dewey's systematic approach to enquiry further emphasised the adoption of pragmatic paradigm in this study (Biesta & Burbules, 2003; Kaufmann, 1959; Morgan, 2014; Olsson, 2006). Figure 4-1 illustrates Dewey's model of enquiry.

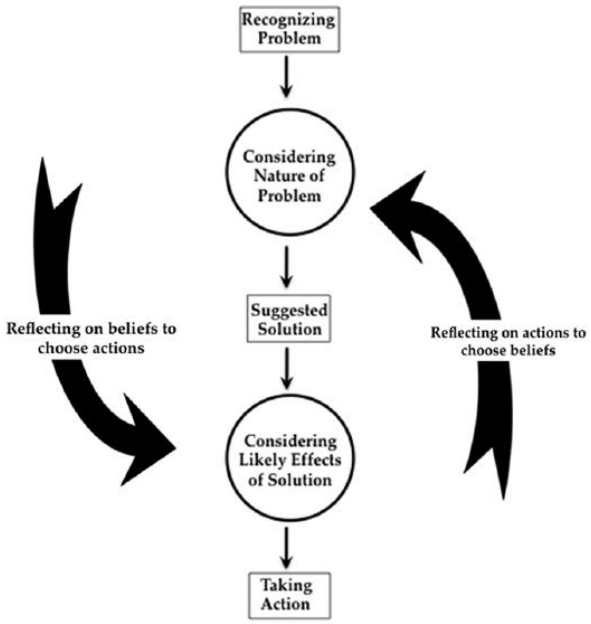

Figure 4-1: Dewey's Model of Enquiry (Source: Morgan, 2014)

This study contextualised Dewey's systematic approach (illustrated in Figure 4-1) as follows:

i. Recognition of problematic situation – these are the challenges hindering the achievement of optimal IT decisions in SEs.
ii. Considering the nature of the problem - the limited IT skills of SE decision-makers affects the quality of information they are able to access and assess in order to guide their IT investment decisions.
iii. Suggested solution - providing SE decision-makers with more structured and precise information that can guide their decisions to achieve a strategic IT investment choice.
iv. Considering likely effect of the solution - improve SE decision-makers' aspirational level when making IT choices which will lead to a more optimal IT choice.
v. Taking action - design and development of an intervention (artefact) to help overcome the problem situation identified in i-iv.

This study suggests the need to improve SE decision-makers' ability to strategies their IT decision-making process. Findings from literature led to the adoption of a qualitative methodology and the adoption of DSR as a strategy for developing a supportive artefact for SE owner-managers. Reflections on prior actions and experiences often shape and inform the researchers' beliefs (Biesta & Burbules, 2003). It is arguable that we are constrained relatively by our experiences of the world and the interpretations of our experience are limited by our understanding of the world (Lohse, 2016).

Pragmatism has replaced the native knowledge of philosophy as a combination of ontology, epistemology, and methodology because pragmatism is not just concerned with problem-solving but also serves as a doctrine (Parvaiz et al., 2016). The pragmatism stance in absolute terms rejects the debate between realism and anti-realism because reality keeps changing based on our actions (Wahyuni, 2012). Pragmatism has been considered recently as an ontology and paradigm for research (Haack, 1997; Lohse, 2016; Morgan, 2014; Parvaiz et al., 2016). This call is by no means a denial of existing approaches to ontologies and epistemologies but suggests the mutual existence of the assertions of realism and anti-realism (Bacon, 2012; Morgan, 2014; Wahyuni, 2012). The pragmatic paradigm focuses on the characteristics of the approach to enquiry rather than assigning an ontological and epistemological stance as demonstrated in the subsequent chapters (Morgan, 2014).

4.2.4 Research Method

This section describes the research methodology as an approach to conducting a pragmatic and design science research. This section describes how the qualitative research methodology was used to conduct the problem awareness and the evaluation phases of a design science methodology, the sampling strategy, data collection process, and the analysis of data in this study.

4.2.4.1 What is Qualitative Research

The qualitative research requires the researcher to immerse in the life of the people under study (Bengtsson, 2016; Blaikie, 2010). The process involves the researcher's deep engagement with the research problem by uncovering the thoughts and opinions of the people or the actors of the social world. The qualitative research method has manifested in Information Systems since the 1970s (Lee & Liebenau, 1997). Lee & Liebenau (1997) argued that qualitative research in information systems is challenging because of the changes information systems pose to traditional research approaches and the emerging diversity. However, the information systems tools cannot make a difference to how research is conducted (Silverman, 1998) without the researcher's contribution (Bengtsson, 2016). Also, IS researchers have been challenged to take up trending emerging issues with practical intervention as demonstrated in this study (Agarwal & Lucas Jr., 2005; Benbasat & Zmud, 2003).

This study acknowledges the long debate between qualitative and quantitative research methodology. The superiority of methodology has long been under discussion. The research objectives and the phenomenon under study should inform the choice of research methodology. The qualitative data does not differ significantly from the quantitative data (Blaikie, 2010). The quantitative data is a product of coding – that is, information that is stripped and later manipulated to draw a contextual meaning in the social world. Appendix A8 summarises the motivations and justifications for adopting a qualitative research as opposed to a quantitative research method to answer the research question of how an EA driven artefact can support IT decisions in SEs.

Silverman (1998) perceived qualitative research as an approach that focuses on practice "*in situ"* – and emphasised the need to explore how people operate in organisations as opposed to focusing on using qualitative research to analyse how people perceive things. One of the objectives of this study (objective number one) is to understand how SE owner-managers make IT decisions in their organisations. Studies have argued that a mere use of the quantitative method in social studies might ignore cultural and social variables (Blaikie, 2010; Silverman, 1998). The peculiarity of organisational culture in SEs and the mechanisms that determine IT choices are variables the researcher intends to explore for developing an artefact for intervention. The bounded rationality is the theoretical guiding lens that informed this study. However, qualitative researchers have been cautioned not to allow the theoretical baggage from the lending discipline diminish the information systems importance and discipline (Lee & Liebenau, 1997). The researcher overcomes this possible challenge by adopting a pragmatic paradigm that is problem-centric and by making adequate plans to stay on track of the set goals of the research.

Planning for any research is significant. The available time, financial resources, and researcher's ability and knowledge are important considerations when planning qualitative research (Bengtsson, 2016). To effectively plan this study, a proposal presentation was presented six (6) months into the doctorate program. The researcher presented a feasibility plan on how to proceed with the proposed research, and the faculty and the University approved the proposal. The approval of the research was followed by an ethics clearance application for data collection purpose. Appendix A2 is the ethics approval for this study. The next section describes the data collection process in this study.

4.2.4.2 Data Collection and Analysis

The data collection process in this study was conducted twelve months after the commencement of the PhD program (after a careful plan and piloting the research instrument). The data collection process began with the identification of the population for study, then sampling the participants and administering the research instrument.

a. Population: SEs in Nigeria and South Africa:

The research population is the aggregate of all cases that conformed to the researcher's predefined set of criteria (Blaikie, 2010). Research population could be a citizen of a country, first-year students, people of a given demography, trending issues in newspapers, or any predefined element in the context of a given study. In this study, the research population is Nigerian and South African small enterprises.

This study focused on non-IT SEs with fairly stable IT infrastructures, with employees between 50 -150, and where IT plays a supporting role to businesses. The scope of this research was limited to small enterprises in Nigeria and South Africa. Nigeria and South Africa are the largest and most developed economies in Africa with a mixed economy, emerging market, highest gross domestic product, and the existence of dual economic systems where development, technology, and demand patterns are separated in two sectors within the same country. The distinctive factors in South Africa and Nigeria provided the preferred case for evaluating the research artefact.

b. Sampling of Participants:

The sampling process is the choice of the participants that will participate in the data collection process (Blaikie, 2010; Fox & Bayat, 2007). The two known sampling techniques are probability and non-probability sampling techniques. The probability sample technique is used when the population has a known chance of being included in a sample, while the non-probability sampling is used when the unit of analysis has no equal chance of being included in the samples. The probability is a valid technique for estimation of the population sample. Random (simple and stratified), systemic, and cluster are three major types of probability sampling techniques. However, the nature of this study does not provide a large sample of the population that requires estimation and probabilistic sampling (Fox & Bayat, 2007). The study narrowed the sampling technique choice to the non-probability sampling techniques. Table 4-4 describes the different types of non-probability sampling.

Types of Non-Probability Sampling Techniques	Description	Usage/Implication
Accidental sampling	It is the most convenient approach to sampling.	The accidental sampling should be used as last resort of data collection. The inductive conclusion from accidental sampling might not represent typical scenario and cannot be generalised.
Convenience Sampling	The convenience sampling allows easy access to the available population.	It can be a bias representation of a unit of analysis.
Judgement Sampling (sometimes referred to as purposive sampling)	The selection of population is based on the researcher's knowledge of the population.	The judgement sampling techniques can be biased.
Snowball Sampling	The sample population can easily grow in size because sampling strategy is based on recommendations of previous population.	The tendency of bias because the selection is subject to the previous participant who is likely recommending based on circles.
Self-Selection sampling	There is a willingness amongst the participants because their participation is at their discretion.	The sample population might be participating because of certain incentives. The researcher may end up with a population that is not contributive engaging in the research.
Quota sampling	The researcher is conversant with the population sample.	The researcher needs to be conscious that his/her prior information about the population has not changed to avoid sample error.
Purposive sampling (sometimes referred to as judgmental sampling)	The reliance on previous experience and previous research experience is imminent. This makes the purposive sampling the most important non-probability sampling. Sample selection is often a good representation of the relevant unit of analysis.	It is difficult to ascertain the relevancy of a selected sample because researchers may have different ways of purposive sampling.

Table 4-4: Description of Non-Probability Sampling Techniques

The sampling of participants was conducted in the problem awareness, suggestion, development, and evaluation phases (described in section 4.4).

c. Conducting Interview with SE owners-managers:

For the researcher to connect and interact successfully with the participants, it was recommended that the researcher be subjective in the collection of the data (Blaikie, 2010). The interview is the most dominating method of data collection in qualitative research (Lee & Liebenau, 1997; Silverman, 1998). The interview allows the researcher to fully engage and to

be immersed in the study (Blaikie, 2010). However, this can occasionally lead to emotional involvement on the part of the researcher. The researcher stuck to the interview questions to avoid distractions. Two different sets of interviews were conducted in this study. The first set of interviews developed awareness of the problem of strategic IT decision in SEs. The second interview was designed to conduct a summative evaluation of the artefacts produced in this study.

d. Data Analysis Techniques

The qualitative data analysis technique is an evolving technique (Blaikie, 2010). The qualitative data analysis has been used widely in other disciplines such as nursing, psychology, and so on (Burnard, 1991). The analysis techniques lack generic strategies (Braun & Clarke, 2006). It will be difficult to argue for a unified method of qualitative data analysis because the type of interview conducted determines the best-suited analysis method (Burnard, 1991). Other qualitative data analysis methods were identified and assessed for fitness with the objectives of this study. The thematic data analysis, thematic decomposition (Braun & Clarke, 2006), narrative analysis, grounded theory analysis (Charmaz & Belgrave, 2012), document analysis (Bowen, 2009), and thematic content analysis (Burnard, 1991; Clarke & Braun, 2013).

The data collected in this study were analysed using thematic analysis method (Braun & Clarke, 2006; Clarke & Braun, 2013, 2014). Thematic analysis is a widely used data analysis technique that provides a detailed description of data by identifying, analysing, and reporting themes (or trends) of qualitative data (Braun & Clarke, 2006). Thematic analysis dwells less on technological and theoretical knowledge in comparison to other qualitative analytic methods (Braun & Clarke, 2006). Table 4-5 illustrates the benefits that informed the adoption of thematic analysis and the anticipated challenges the researcher was cautious of when employing thematic analysis (Braun & Clarke, 2006; Clarke & Braun, 2013, 2014).

Advantages	It's a comparatively easy and quick method to comprehend and use.	The analysis of the data conducted in problem awareness phase was done without any software (Braun & Clarke, 2006; Weitzman, 2000).
	Produce result that is easily accessible to the public as demonstrated in step six.	The nature of the result produced is easily understood by public audience in comparison to result of quantitative analysis.
	Flexibility.	As a pragmatic researcher, it allows the centralisation of the research problem and not restricting the researcher to a pre-defined constructs/concepts.

	It allows easy identification of trends, patterns and similarities in the data.	The researcher was able to easily understand the IT decision-making process in SMEs, their challenges and area of interventions.
	It supports the generation of unanticipated insights.	Leading to development of a framework.
Disadvantage	High phase analysis is very difficult.	The empirical study conducted in the problem awareness phase is intended to understand the typical IT choice process, not to develop any high-level analysis. The analysis conducted in the evaluation is to provide insight to the contribution of the IT decision artefact.
	It has limited interpretive power.	The data collection in this study is geared towards a descriptive and exploratory investigation

Table 4-5: The merits and demerits of thematic analysis technique

In the quantitative method, codes are generated and imposed by the researcher while in qualitative research, and themes are allowed to emanate from data which makes the qualitative method a preferred technique in this study (Blaikie, 2010). The researcher familiarised himself with the different analysis techniques before the commencement of data collection. The thematic analysis suggests the definition and setting of criteria for what a theme would be in the context of a study as the first important step of conducting a thematic analysis (Clarke & Braun, 2014). The application of thematic analysis techniques to analyse the data collected in the problem awareness and evaluation phases is discussed in section 4.4.

4.2.5 Research Strategy

This research adopted abductive and deductive inferences as shown in Figure 4-3. The abductive approach allowed the identification of possible explanations for observations which guided this research in making suggestions on how small enterprise owner-managers make IT decisions (Vaishnavi & Kuechler, 2004). This research abducted and conceptualised from enterprise architecture principles and IT decision-making models of large enterprises. Then, this study developed a simple and flexible enterprise architecture-driven IT decision-making artefact for small enterprises for an optimal IT decision-making process. The artefact was deductively demonstrated and evaluated with six (6) selected small enterprises in South Africa and Nigeria. This research is a prescriptive study that provided an artefact that supports how small enterprise owner-managers make strategic IT decisions using the design science research method (Gregor, 2015).

4.3 Design Science Research

Design Science Research (DSR) is a methodology used in IS research that involves the design of innovative artefacts and the evaluation of the performance of the artefact towards solving intended problems (Kuechler & Vaishnavi, 2008). Design Science (DS) represents a design knowledge that is analytical, formalise-able, empirical, and a teachable doctrine (Gregor & Jones, 2007). In other words, DS is a body of knowledge that deals with the design of human-made objects and phenomenon designed to achieve some set goals (Vaishnavi & Kuechler, 2012).

DSR is aimed at understanding and improving human performance (Van Aken, 2005) by creating an innovative artefact that extends the boundaries of existing human knowledge and organisational capabilities to solve a known organisation problem. Making optimal and efficient IT decisions is a persistent organisational bottleneck in SEs. Hevner et al. (2004) described the characteristics of problems that warrant the use of DSR:

i. Problems that are unstable with ill-defined requirements and constraints due to environmental context. In this study, the criteria and constraints for making IT decisions in SEs vary by enterprise type, category, and location.
ii. Problems with complex interactions between the subcomponents of an organisational problem and known-solutions. For every IT choice, SE owner-managers are concerned by one or more consequence of action, making IT choice a complex process (especially in the context of this study where SEs do not have any internal IT skills).
iii. Organisational problems that depend on human cognitive abilities to make optimal choices. SE owner-managers are cognitive and autonomous thinkers that make all organisation decisions based on their intuition (Dimants, 2012; Gibcus & Van Hoesel, 2004).

It is important to clarify that design, design science, and design science research are three distinct but related concepts. In literal terms, design means to bring into existence a product. Vaishnavi & Kuechler (2012) distinguished between design science and DSR. The former is the knowledge of creating constructs, techniques, methods, and models that satisfy predefined functional requirements and the latter is a research process that creates the former through design, analysis, reflection, and abstraction. It is also worth noting the distinction between routine design and design science research. The routine design is the creation of an artefact

based on existing knowledge (Vaishnavi & Kuechler, 2012) through the application of pre-existing models to develop software for a firm. The major difference between routine design and DSR depends on the nature of the problems and solutions.

DSR innovatively addresses a unique and unsolved problem or applies effectiveness and efficiency in solving an existing problem (Hevner et al., 2004). However, the application of existing knowledge to figure out the knowledge gap in a new area of design can also be referred to as a DSR (Vaishnavi & Kuechler, 2012). Design science research process involves some level of intellectual risk and uncertainties at the proposed design stage. The aim of this study and the time horizon inform the choice of DSR as a research method (Hevner & Chatterjee, 2010). The DSR involves a rigorous research method in the creation of new knowledge. The knowledge produced must relate to the pre-existing knowledge for justification purposes, and the result must be communicated to the community (Johannesson & Perjons, 2014). However, a notable fundamental similarity between the design, DS, and DSR is the production of an artefact as an output.

4.3.1 Information Technology (IT) Artefacts

An artefact is a human creation (object) that emanates as a result of scientific investigation or experimentation to address a specific problem. People in practice react to practical problems by producing an artefact that will help them overcome their obstacle (Johannesson & Perjons, 2014).

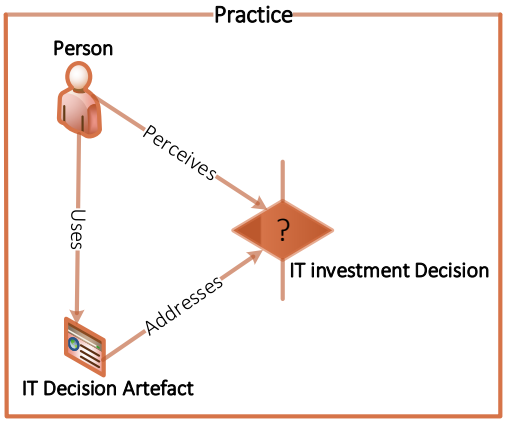

Figure 4-2: IT artefact in practice (adapted from Johannesson & Perjons, 20114)

Figure 4-2 illustrates the relationship between practice, people, problem, and artefact as illustrated in (Johannesson & Perjons, 2014). SE owner-managers in practice face business problems which they attempt to overcome with IT. The process of making IT tends to be

challenging to decision-makers because they lack sufficient IT skills to make the optimal choices to fulfil their aspirations. The nature of the artefact produced in this study intends to solve organisational problems to extend the intellectual and computational ability of decision-makers (Hevner et al., 2004).

IT artefacts can be categorised as material and abstract artefacts. The classification of an IT artefact depends on the type of knowledge contribution and the functional impact of the artefact (Johannesson & Perjons, 2014). IT artefacts are broadly classified as constructs, models, methods, and instantiation (Hevner et al., 2004; Johannesson & Perjons, 2014; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007).

General Classification - output	Description	Knowledge Contribution
Model	This study presented a conceptual IT decision-making framework to guide IT investments in SEs. The framework is namely: Enterprise Architecture-driven Framework (EADF). The EADF is an innovative framework that is abstracted from existing frameworks of business – IT alignment.	Prescriptive
Methods	The application of the EADF in three (3) iterations and the presentation of algorithms to design a decision assisted tool for IT decision-making using the EADF as illustrated in Chapter Seven (7) offered a methodological contribution.	Descriptive
Instantiation	Instantiation is a working system. This study produced an online decision-assistive tool for SEs' owner-managers. The online assistive decision tool helped in solving practical problems. The documentation and evaluation of the artefact has been detailed in Chapter Seven (7) and Eight (8)	Prescriptive

Table 4-2: IT Artefact Output

Vaishnavi & Kuechler (2012) presented a broader classification of IT artefacts to include constructs, models, methods, instantiation, frameworks, architectures, design principles, and design theories. However, they presented a very abstract description of the additional classification (Vaishnavi & Kuechler, 2004). Table 4-2 highlights the IT artefacts output in this study.

4.3.2 Design Science Research Methodologies

Design science research has become a widely accepted methodology in Information Systems disciplines (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007; Vaishnavi & Kuechler, 2012) with a recent increase in DS research in IS publications (McKay & Marshall, 2005). However, there is still lack of consensus on the methodology, epistemology, and ontology of DSR (Fischer & Gregor, 2011; Gregor, 2015; Kuechler & Vaishnavi, 2008). Design science methodologies lack

a comprehensive and detailed clarity (Alturki, Gable, & Bandara, 2011; McKay & Marshall, 2005). The publication of (Baskerville, 2008) dismisses different assumptions about design science. However, there is unanimity on the demonstration of design innovativeness, rigour, and problem centric-ness of DSR practice. Table 4-3 summarises some DSR methodologies as presented in (Alturki et al., 2011). This study adopted the Vaishnavi & Kuechler (2012) Design Science Research Process Model.

Author/Year	#	Design Science Methodologies (Steps/Activities/Tasks)											
(Nunamaker, Chen, & Purdin, 1990)	5	Construct a conceptual framework	Develop a system architecture	Analyse and design the system	Build the (prototype) system	Observe and evaluate the system							
(Walls, Widmeyer, & El Sawy, 1992)		Design Product						Design Science					
	7	Meta-requirements	Meta-design	Kernel theories	Testable design product hypotheses			Design method	Kernel theories	Testable design process hypotheses			
(S. T. March & Smith, 1995)	2	Build					Evaluate						
(Rossi & Sein, 2003)	5	Identify a need	Build	Evaluate	Learn	Theorise							
(Hevner et al., 2004)	7	Design as an Artefact	Problem Relevance	Design Evaluation	Research Contributions	Research Rigour	Design as a Search Process	Communication of Research					
(Vaishnavi & Kuechler, 2012)	5	Awareness of a problem	Suggestion	Development	Evaluation	Conclusion							
(Van Aken, 2004)	4	Choosing a case	Planning and implementing interventions	Reflecting on the results	Developing design knowledge to be tested and refined in subsequent cases								
(Cole, Purao, Rossi, & Sein, 2005)	4	Problem Definition	Intervention	Evaluation	Reflection and Learning								
(Venable, 2006)	4	Solution technology invention	Theory building	Artificial evaluation	Naturalistic evaluation								
(Peffers et al., 2007)	6	Problem identification and motivation	Define the objectives for a solution	Design and development	Demonstration	Evaluation	Communication						
(Gregor & Jones, 2007)		Compulsory								Optional			
	8	The purpose and scope	Constructs	Principles of form and function	Artefact mutability	Testable propositions	Justificatory knowledge	Principles of implementation	Expository instantiation				
(S. March & Storey, 2008)	6	Identification and clear description of a relevant organisational IT problem	Demonstration that no adequate solutions exist in the extant knowledge-base	Development and presentation of a novel IT an artefact that addresses the problem	Rigorous evaluation of the IT artefact enabling the assessment of its utility	Articulation of the value added to the knowledge-base and to practice	Explanation of the implications for IT management and practice						
(Pries-Heje, Baskerville, & Venable, 2008a)	4	Risk identification	Risk analysing	Risk treatment	Risk monitoring								
(Pries-Heje, Baskerville, & Venable, 2008b)		Ex Ante Evaluation Activity						Ex Post Evaluation Activity					
	8	Naturalistic Design process	Naturalistic Design product	Artificial Design process	Artificial Design product	Naturalistic Design process	Naturalistic Design product	Artificial Design process	Artificial Design product				
(R. Baskerville, Pries-Heje, & Venable, 2009)	7	A specific problem is identified and delineated	Problem must then be expressed as a a specific set of requirements	The specific problems are systemically abstracted and translated into a general problem	General solution design (a class of solutions) for the general problem	General design requirements are compared with the specific problem	A declarative search is made for the specific components that will provide a workable instance of a solution to the general requirements.	An instance of the specific solution is constructed and deployed into the social system					

Table 4-3: Comparison of DSR Methodologies (Source: Alturki et al., 2011)

4.4 Application of Vaishnavi and Kuechler's DSR Process Model (DSRPM)

The design science research is acknowledged to have originated and broadened from engineering and architecture (McKay & Marshall, 2005). The Vaishnavi & Kuechler's DSR methodology was adapted from "*design cycle model*" presented in (Takeda, Veerkamp, Tomiyama, & Yoshikawa, 1990) and presented as a DSRPM in (Vaishnavi & Kuechler, 2004). The distinction of the DSR process model illustrated in Figure 4-3 from other DSR methodologies is the emphasis of the model on the contribution of new (and true) knowledge – as the fundamental focus of DSR (Vaishnavi & Kuechler, 2012). The Vaishnavi & Kuechler DSRPM is widely used in conducting DSR. At the time of this study, the Vaishnavi & Kuechler DSRPM (Design Research in Information Systems) has been cited by over 700 articles as indicated in Google Scholar. As illustrated in Figure 4-2, this study adopted the Vaishnavi & Kuechler (2012) DSRPM as a methodology given its popularity and acceptance level.

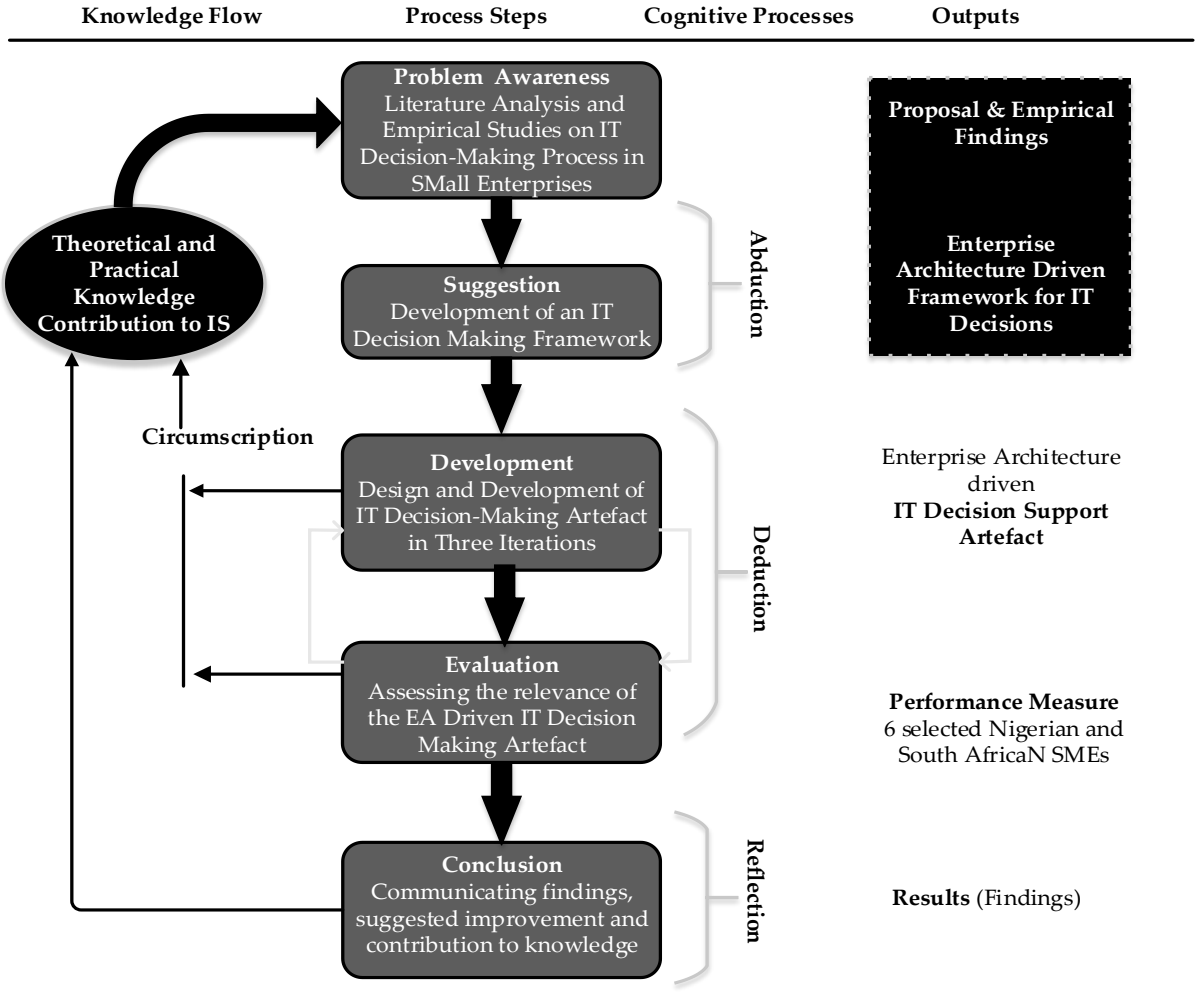

Figure 4-3: Design Science Model for this research (Source: Vaishnavi & Kuechler, 2012)

4.4.1 Problem Awareness

The awareness of research problems can emanate from multiple sources such as new industry development, discourse in allied fields, and literature (Vaishnavi & Kuechler, 2012). Problem awareness allows the practical justification and relevance of a DSR. The literature discourse and empirical investigation led to the establishment of a sound problem awareness in this study.

4.4.1.1 Problem awareness from literature

The researcher conducted a systematic search of academic discourse on the issues of IT decision-making and strategic decisions in SEs as demonstrated in Chapter Two. The objectives achieved by conducting a literature review as a problem awareness strategy in this study include (Fox & Bayat, 2007; Hevner et al., 2004; Vaishnavi & Kuechler, 2004):

i. The researcher was able to clarify the issues SEs' owner-managers struggle with when making IT decisions, the characteristic of SEs, and how an artefact can help decision-makers to overcome IT decision challenges.
ii. The literature review conducted allowed the researcher to justify the relevance of this study in the context of other IS research.
iii. Provided insight into related studies on SEs and IT decisions, which helped the researcher in understanding the previous related work and future research direction for IT investment decisions in SEs.
iv. The literature review assisted in interpreting the linkage between the academic discourse and practical situation.

The researcher adopted a descriptive style of a literature review to appraise sources like books, journal articles, and conference proceedings. The documents reviewed were mostly primary source documents. The researcher selectively searched for relevant literature. The literature searched and reviewed were mostly from 2000 - 2017 to demonstrate the persistence of the need for intervention to support IT decisions in SEs.

4.4.1.2 Problem Awareness from Empirical Investigation

Eleven semi-structured interviews were conducted with SE owner-managers. The first phase of the interviews was with eight SE owner-managers in Nigeria and the second set of the interviews was with three SE owner-managers in South Africa. The empirical investigation

provided a practical awareness to the problem of IT decision-making in SEs. This study adopted a pragmatic philosophic assumption, arguing that an artefact must provide a solution to a practical problem. The findings from literature provided a general perspective to the problems of IT decision-making and the empirical study offered a contextualised description of the issues of IT investment decisions in SEs. The empirical investigation corroborated the findings from the literature.

The researcher sought to scope the focus of this research and to ensure that the artefact developed is relevant to the SE owner-managers who struggle with IT decisions. Thus, this study limited the case study selection to non-IT SEs in South Africa and Nigeria with between 50 – 150 employees. This study also focused on firms where IT plays a supporting role with moderate information intensity within the organisation. This study refers to information intensity as the amount of value chain information generated within a firm. For example, microfinance banks, insurance company, and media were considered as highly information intense in the context of this study. SEs that completely lack any form of formal record or documentations of organisational information flow were considered low-information intense and were thereby excluded in this study even if the firm had the pre-defined employee size. The scope of the research participants limits the number of samples available for this study. This study is a DSR with pragmatism philosophic stance, so the focus of the researcher was problem-centric and to ensure that the workability of the artefact within a given context.

This study adopted purposive sampling techniques to select the participants that informed the researcher's awareness of the typical IT decision-making process in SEs (Fox & Bayat, 2007; Johannesson & Perjons, 2014). A database of non-IT enterprises with less than 150 employees was compiled and, at the time of collecting data for this study, 187 and 362 SEs were identified from Nigeria and South Africa respectively. The Nigerian Bureau of Statistics (NBS) provided a list of SMEs from Nigeria, and the Small Enterprise Development Agency (SEDA) provided a list of South African SEs. The list was further scrutinised to eliminate firms with less intense and highly intense information flow, and firms with a formal IT support department, which reduced the list of SEs to 102. The researcher sent out emails and text messages to the SEs to participate in this study but only 23 SEs responded. Sixteen of the twenty-three respondents accepted to participate in this study. The researcher sampled (16) of the SEs based on industry type, that is, manufacturing servicing and retail industry. The SE owner-managers were further contacted via email and phone calls to schedule appointments. The researcher was able to make eleven

successful appointments for interviews with eight participants from Nigeria and three participants from South Africa.

The interview instrument used in the problem awareness phase is shown in Appendix A3. The interview questions were based on the Phillips-Wren 2013 Decision Making Model (DMM) illustrated in Figure 2-1. The questions were phrased to address the intelligence, design, choice and implementation phases of the Phillips-Wren 2013 DMM. The interview with participants lasted between 60 – 120 minutes. Before the commencement of the interview, the participants were presented with a letter describing the aims and objectives of this study. The participants were presented with a consent form which they signed before the commencement of the interview process. The copy of the consent form is attached in Appendix A1.

Prior to the thirteen interviews, a pilot interview was conducted with two postgraduate students to evaluate the feasibility, relevance, and validation of the research instrument. The interviews from Nigeria formed the first phase of data analysis which comprises of eight SE owner-managers. The researcher identified saturation after the seventh interview conducted in Nigeria, as themes begin to re-emerge but the researcher completed the scheduled interviews. The second phase comprised of interviews with three participants in South Africa. The findings from the interviews from Nigeria and South Africa were combined and summarised in Chapter Five.

There are several technologies available to ease the data management and analysis of qualitative data, but onus lies with the researcher to systematically draw meaning from the data (Weitzman, 2000). The data analysis in this phase was conducted without the application of any analytical software. The description of data analysis described in this section applies to the two different sets of interviews conducted in Nigeria and South Africa because the same technique was adopted. Where applicable, the researcher will distinguish between the processes. However, it is important to note that the analysis of the data collected from Nigeria was conducted before the analysis of the data collected in South Africa. The participants in South Africa took a longer time to respond to interview schedules. The following thematic data analysis technique was adopted:

a. Data familiarisation: The researcher conducted the data collection in Nigeria and South Africa, hence the familiarisation to the data commenced during the data collection stage. The researcher was able to note some important thoughts, such as SE owner-

managers' limited IT skills, decision-making complexities, reliance on vendors, and business-IT alignment challenges in the first set (Nigerian data collection) of interviews (Burnard, 1991). The researcher became immersed in the interview data during the repetitive listening. With the Nigerian interviews, the researcher listened to the recorded interviews (eight interview recordings) one to two times to find answers to some of the interesting concerns/patterns that were noted during the interviews. During the back and forth listening, three themes emerged. The three prevalent themes were business-IT goals in SEs, SE owner-managers' information sources, and preference strategies.

b. Data familiarisation with the three sets of interviews in South Africa also involved a back-and-forth listening of the interview recordings. The research had some pre-defined themes from the Nigerian interviews but did not pre-empt the data. There were no additional emerging themes because the same instrument was used for Nigerian and South African interviews. The researcher transcribed all eleven recorded interviews by typesetting using Microsoft Word. The transcriptions were word – for-word based on the recordings. The minimum time spent on the transcription of the interviews was four hours at a stretch, and the longest transcription took six hours. The researcher proceeded to the next phase of data analysis.
c. Generating initial codes: This is the second stage of the data analysis process for the eleven (11) interviews. The code generation process was done manually (Braun & Clarke, 2006). The transcripts were printed and the researcher read through the transcripts. The codes were highlighted in different colours as the researcher read through the transcripts. After reading through each of the transcripts twice, the codes were exhausted.
d. Searching for themes: The inductive approach of the problem awareness phase in this study allowed the emergence of five themes, with the aim to answer the research question of how SE owner-managers make IT decisions. The theory underlying the creation of the themes was based on the typical decision-making model. The decision model suggests the identification of the need for a decision, searching for information, making preference, and deciding (Pomerol & Adam, 2006). The codes that emerged from the second step of the analysis were listed. The codes were then grouped based on earlier identified themes. In the first set of data analysis (data from Nigeria), the

researcher identified seven sets of candidate themes as: strategic IT decisions, decision requirements, consideration for choosing IT, preference for choosing IT, preference for information sources, decision-making process, and miscellaneous. The theme "miscellaneous" is a collection of codes that did not fit into the six main themes. The themes from the first set of analysis were used in the analysis of interviews from South Africa. The researcher was hoping that new themes will emerge, but new themes were not identified.

e. Reviewing themes: The first stage of the review involved the merging of related themes. The researcher merged the "consideration for IT theme" into "decision requirements theme", and the "decision-making process theme" was merged with the "miscellaneous theme". After merging the themes, five themes were retained. The researcher proceeded to the next stage of theme reviewing by reading through the codes and the transcripts in search of new possible themes and codes. The researcher could not identify any new code or possible themes. Hence, the theme reviewing process was terminated, and the next stage of analysis was initiated.
f. Defining and naming themes: The five themes from the fourth step of the analysis were defined and named as: description of participants, business goals that inform IT decisions, criteria for making IT decisions, IT decision-making preferences, and information source for making IT decisions. The researcher defined each theme and proceeded to present the analysis based on the themes.
g. Producing the report: The overall objective of collecting and analysing data in this stage of DSR is to create a better understanding of the typical IT decision-making process in SEs. The findings of the data analysis are presented in Chapter Five. Also, the analysis of the data collected from Nigeria was published in a conference proceeding. The first and second set of data analysis has also been submitted for a journal publication. Above all, the report produced from the analysis led to the suggestion phase of DSR in this study.

The problem awareness phase justified the research problem and demonstrated the need for an artefact that will solve the identified problems (Hevner & Chatterjee, 2010). Most SEs in South Africa and Nigeria are yet to leverage their businesses with IT opportunities in spite of the promising advantages of IT as demonstrated in the literature review and empirical study. This study argued for the adoption of EA principles to support small enterprise owners to make

IT decisions as opposed to the typical decision-making process (Ndiege et al., 2014; Rantapuska & Ihanainen, 2008).

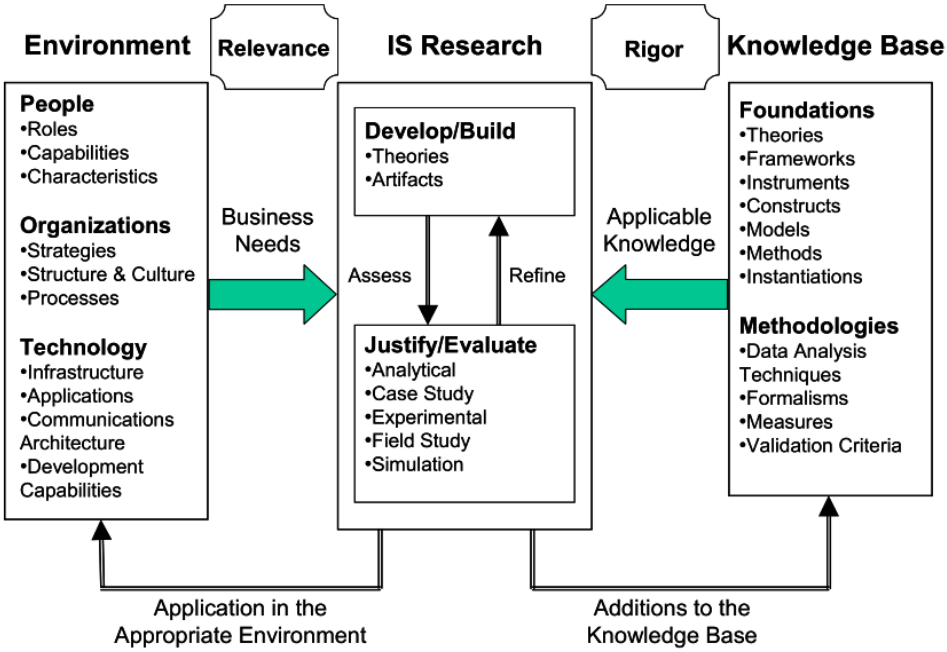

Figure 4-4: Information Systems Research Framework (Hevner et al., 2004)

In the IS research framework illustrated in Figure 4-4, the left-facing arrow to the bottom depicts the research contribution in this study as "business need". Chapter Two and Chapter Five described the awareness of the problems of IT decision-making in SEs. The need to overcome the problems of IT decisions in SE led the researcher to suggest a framework for making SITD in SEs based on the findings of the literature and empirical investigation.

4.4.2 Suggestion

The suggestion phase is the creation of an innovative and functional approach that is envisioned to overcome the identified problem (Vaishnavi & Kuechler, 2012). The suggestion phase has also been described as a build phase (Rossi & Sein, 2003), problem relevance phase (Hevner et al., 2004), planning and intervention phase (Van Aken, 2004), and as a demonstration of lack of adequate solution phase (March & Storey, 2008). The problem awareness phase indicated the lack of holistic assessment of different business and IT considerations when SEs invest in IT.

This study suggested a conceptual framework that guides the SITDM process. The framework suggested in this study has been named "Enterprise Architecture-driven Framework - EADF" for strategic IT decisions. The EADF is a conception from the themes that emerged in the

problem awareness phase (interviews), decision-making models, and enterprise architecture principles. Grounded theory approach is an alternative methodology for developing a conceptual framework but was not used in this study because the data collected was to understand IT decision-making process and challenges in order to improve the investment decisions and not to create a new theory (Blaikie, 2010). This study followed "*six steps of developing a conceptual framework*" based on recommended guidelines in (Corvellec, 2013; Jabareen, 2009). The following steps describe the procedures that led to the development of the EADF:

i. Justification for a conceptual framework (CF): The challenges decision-makers face when making IT decisions and lack of frameworks to overcome the entire IT decision-making obstacles identified were sufficient justification for a new framework. This study identified several challenges that affect the IT decisions of SE owner-managers and strongly argued that the existing decision models and frameworks lack details and contextualisation to help decision-makers in making optimal choices.

ii. Defining the objectives of the CF: The EADF aimed at providing decision-makers with an overview of the information that they can seek to guide their choice, and the criteria to attain optimal aspiration for IT investments in SEs.

iii. Concept and variable searching and listing: This stage involves the searching and listing of concepts and variables (themes) from literature, interviews, documents, or any data source. Further identification of concepts and variables emerged from the interview data as illustrated in the data analysis section in Chapter Six. In conclusion, the problem awareness phase of this study generated the concepts and variables in the EADF.

iv. Development of code book: This stage is the process of searching for patterns and interlinks of concepts and variables (dependent and independent variables). The pattern searching is an iterative process of refining the EADF based on existing decisions and EA frameworks. The researcher linked the concepts and identified the dependent and independent variables based on Simon's decision-making model and TOGAF (enterprise architecture framework). The third cycle of the framework development was presented at a conference for feedback and evaluation.

v. Framework description: The description stage provided meaningful and explicit interlinks and relationships between the concepts and variables in the framework. Chapter Five (5) provides a detailed description of the EADF.

vi. Framework validation: For the generalisation purpose, the EADF was validated with the two most common and complex IT decisions identified in the interviews. The decisions are: how to use IT to manage customers' relationship and maintaining online presence.

The judgmental sampling technique was employed in this phase through conference participation. The conceptual framework was presented at a conference and feedbacks from the participants were documented and implemented, resulting in the final version of the EADF presented in Chapter Six.

4.4.3 Development

The development phase is the proof of concept phase of DSR, and it involves the development and implementation of a tentative artefact. The Vaishnavi & Kuechler (2012) DSR methodology is not very explicit in the description of the activities in the development phase. The researcher adopted other corresponding DSR methodologies to understand the requirements of the development phase. Peffers et al. (2007) suggest that the DS researcher is expected to determine the desired functionality and architecture of an artefact in the development phase. The DSR methodologies emphasised the demonstration of design novelty in the development phase (Hevner et al., 2004; Johannesson & Perjons, 2014; Peffers et al., 2007; Vaishnavi & Kuechler, 2012). The design novelty demonstrated in this study is the application of the EADF in the development of an assistive tool to overcome unsolved IT decision problems in SEs (Hevner et al., 2004). The detailed description of the development phase is illustrated in Chapter Seven.

Most of the DSR methodologies emphasised design rigour in the development phase. The primary aim of demonstrating rigour is to determine the workability of an artefact (Hevner et al., 2004). This study conducted three iterations in the development phase as discussed in Chapter Seven. The first iteration was the development of a "Manual IT Decision Artefact (MITDA)", the second iteration was the development of a "Semi-Automated IT Decision Artefact (SITDA)", and the final prototype development was the "Online IT Decision-Assistive Tool (OITDAT)". The formative evaluation was carried out on the artefact developed in the first and second iterations. The formative evaluation focused on the content, usability and the design perspective of the artefact.

i. First iteration – Manual IT Decision Artefact (MITDA): To demonstrate the EADF as a framework for strategic IT decisions in SEs, the researcher formulated questions based

on the concepts of the EADF to guide in making certain IT decisions. The researcher's experience, literature, and online resources informed the formulation of the questions and responses. Responses to questions were categorised based on the formulated maturity levels of a firm. Word Processing software was used to generate tables to represent all the questions, responses, and feedbacks as illustrated in Appendix A5.

ii. Second Iteration - Semi-Automated IT Decision Artefact (SITDA): The first iteration phase revealed some limitations of using the MITDA as detailed in Chapter Seven. To overcome the challenges, the researcher converted the MITDA into a spreadsheet and number coded the questions, feedbacks, and recommendations using Microsoft Excel software. The Microsoft Excel software saves computation time, improves the accuracy of text-string manipulation, and supports instant updating and referencing of cells (Winston, 2011). The description of how the researcher developed the SITDA and the algorithm – table structure, flow chart, and use-case diagram - has been documented in Chapter Seven. Appendix A6 shows some content of the SITDA.

iii. Third Iteration - Online IT Decision-Assistive Tool (OITDAT): The need for the third iteration was imminent after assessing the challenges the researcher faced in ascertaining the workability of the SITDA. The setbacks from the second iteration led to the full automation of the SITDA into a fully automated decision-assistive tool. The researcher developed an algorithm to support the development of the IT decision-assistive artefact as illustrated in Chapter Seven. The reasons for a OITDAT are:

a) SEs struggle with limited resources (such as IT skills, infrastructure, and time) to implement a complex tool (e.g. a standalone desktop tool).
b) To offer an IT decision-assistive tool that is accessible to a wider audience and SE owner-managers.
c) To attain easy interoperability with existing devices and applications used by SEs.
d) To implement an artefact that is easy to install, update, and maintain.
e) To deploy a cost effective artefact.

There are numerous tools for designing and developing a web-based application. This study identified over 100 tools built on popular technologies like Ajax, ASP.NET, CSS, HTML, Action Scripts, PHP, Python, and Ruby. The researcher chose Django, a Python framework based on convenience and the researcher's experience of using Python. The Python programming language is an open source, general high-level programming language released in 1991. The

Python language allows the expression of concepts in fewer lines of codes when compared to other languages like C, C++, and Java (Maruch & Maruch, 2006). Python is occasionally considered to be weak in mobile computing, slow processing of query, and has restricted database access. This study used a Python technology because it supports multiple platforms, offers forum support, availability of extensive libraries, and less development time (Maruch & Maruch, 2006; Oliphant, 2007). The Django framework is an easy and scalable web application development framework that is very fast for web development, with extensive re-useable handles and functions.

The first and second iterations of the development were considered as a formative evaluation process. The researcher invited some postgraduate students and Enterprise Architects he met during EA training (and forums) to participate in the formative evaluation of the artefact. Then a follow-up meeting (artefact assessment) was arranged with participants that were willing to partake in the study. Chapter Seven describes in detail the process of sampling for the three iterations respectively.

4.4.4 Evaluation

The technique to evaluate and analyse the findings of the two final artefacts produced in this study was based on the DSR methodologies. Vaishnavi & Kuechler (2012) presented an abstract and theoretical description of the evaluation process in DSR. The evaluation process is described as an analytic phase that hypothesises about the behaviour of the artefact with evaluation criteria that are implicit and which are often made explicit in the problem awareness phase (Vaishnavi & Kuechler, 2012). Hevner et al. (2004) provide a more detailed description of design evaluation as a critical component of the research process that demonstrates utility, quality, and efficacy of the design artefact. Cole, Purao, Rossi, & Sein (2005) also perceived evaluation as described in Hevner et al. (2004). Peffers et al. (2007) described evaluation as the observation and measurement of how well the developed artefact supports a solution to a business problem.

Artefact can be evaluated in terms of usability, functionality, consistency, completeness, accuracy, fitness with the organisation, performance, reliability, and other relevant quality attributes (Hevner et al., 2004). The overall objective of evaluation in this study is to ascertain how the EADF and the OITDAT support SITDM process and to validate the theoretical assumptions discussed in Chapter Three. The EADF is considered as a model-type of artefact

and the OITDAT is an instantiation artefact. Venable et al. (2012) described the evaluation of two types of artefacts, that is, the product artefact (tools, diagrams, and software) and process artefact (methods and procedures). This study adopted the evaluation guidelines discussed in (Gill & Hevner, 2011; Venable, Pries-Heje, & Baskerville, 2012).

The evaluation process in this study successfully achieved the following: (i) demonstrated the utility and efficacy of the designed artefacts, (ii) confirmed the design theory that informs the design of the OITDAT, (iii) evaluated the over-edge of the newly designed artefacts over the conventional SITDM process in SME, (iv) identified the undesirable consequences or side-effects of the EADF and the OITDAT, (v) identified areas of improvement of the artefacts designed in this study, and (vi) validated the philosophical assumptions about the bounded rationality decisions.

The purposive sampling technique was adopted for the summative evaluation of the final research artefact. During the interview in the problem awareness phase, SE owner-managers (participants) were requested to participate in the evaluation of the final artefact. The researcher followed-up by contacting the SE owner-managers interviewed during the problem awareness phase to participate in the evaluation of the OITDAT. The researcher received six confirmatory messages of participation from SE owner-managers and six SE owner-managers participated in the summative evaluation.

The interviews conducted during the evaluation of the artefact was a follow-up interview with the same SE owner-managers who had participated in the problem awareness phase. The researcher explained the objectives of the interview verbally before the commencement of the interview. The researcher demonstrated the artefact to the participants, and the participants were asked to use the artefact independently. The participants were then engaged in a discussion about the artefact.

The data collection in this phase was informed by DSR methodologies of evaluating design artefact. The evaluation process focused on three components, that is, the implicit evaluation of the EADF as a model artefact, the evaluation the OITDAT as an instantiation artefact, and the theoretical implication of the artefact as behavioural science integration in DSR. Appendix A4 shows the interview questions for the evaluation phase in this study. The average time spent with each participant was two hours. The discussion of the findings is presented in Chapter Eight.

The researcher conducted a thematic analysis to analyse the data collected from six Nigerian and South African SE owner-managers during the summative evaluation (Taras, 2005). The Nvivo version 11.4.1 was used to analyse the data collected. The thematic analysis process is described as follows (Clarke & Braun, 2013):

a. Data familiarisation: the familiarisation process began during the data collection process. The researcher conducted the interviews and took notes of some terms and concepts during the interviews. The researcher began to think of possible codes and themes for data analysis. The transcription of six verbal recorded interviews was conducted by the researcher (as illustrated in Figure 4-5). The transcription of each recorded interview took an average of two - three hours. During the transcription of the interviews, the researcher developed more understanding of the data. The participants' spoken words were directly transcribed word for word. Codes began to emerge during the data familiarisation process.

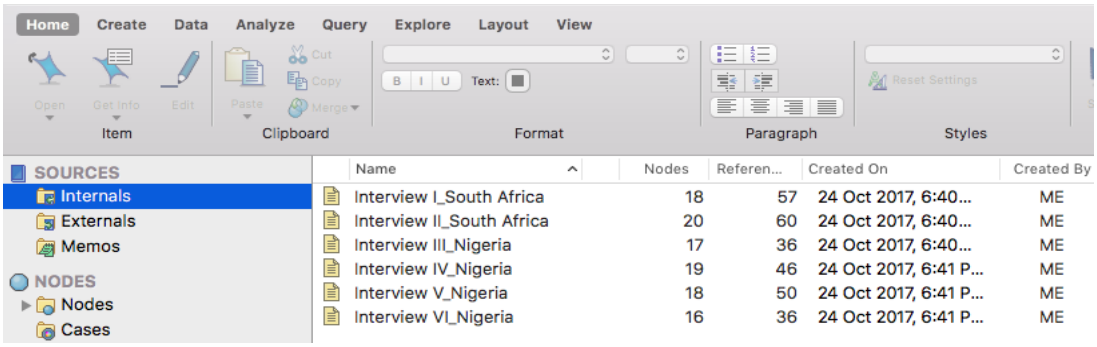

Figure 4-5: Interview Transcriptions

b. Generating initial codes: The coding process in this study was theory-driven by DSR approaches of evaluating artefact (Braun & Clarke, 2006). The summative evaluation in this study focused on three components: the evaluation of the EADF, the OITDAT, and validation of the research theoretical assumptions. This study generated the following initial codes: relevance, usability, functionality, completeness, accuracy, fitness with the organisation, reliability, and ethical consideration. Figure 4-6 illustrates the coding of the transcripts based on the initial coding. DSR emphasised the need to embed behavioural science and design science (Hevner, March, Park, & Ram, 2004). Hence, the theoretical assumptions discussed in Chapter Three were validated. The theoretical assumptions were coded as TA1, TA2, TA3, TA4, and TA5 to represent the theoretical assumptions highlighted in Chapter Three respectively.

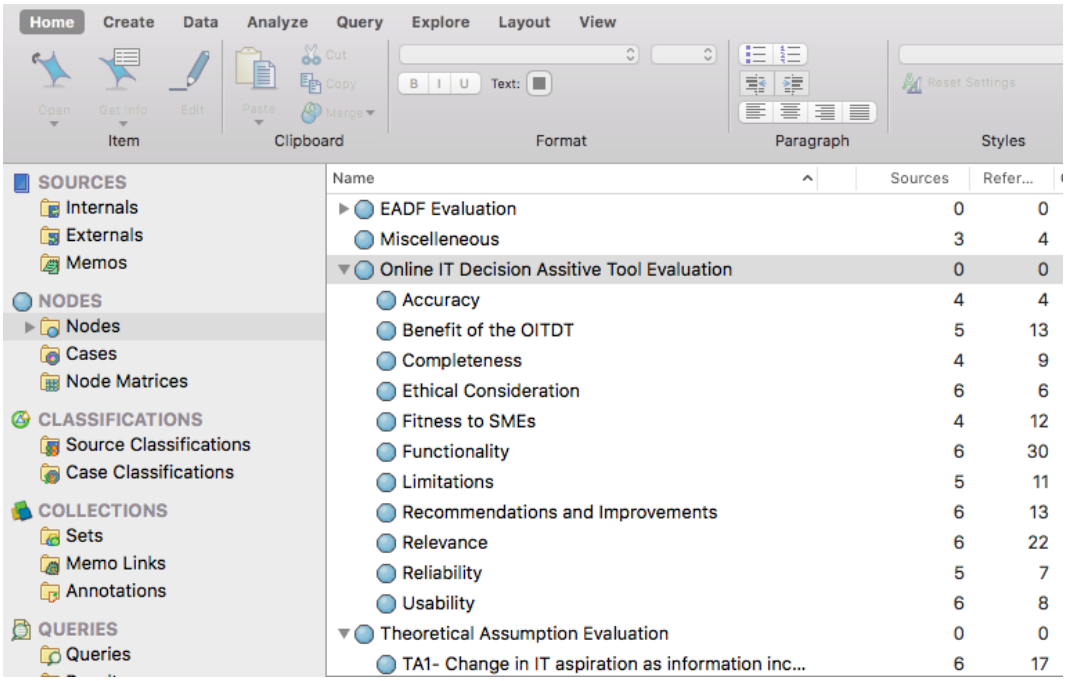

Figure 4-6: Generating Initial Code

c. Searching for themes: This phase broadened the analysis of the data collected. The initial codes generated were grouped into three broader categories with fourteen sub-categories of grouped codes. Figure 4-7 illustrates the mind mapping of the codes into categories to generate fourteen themes. The white rectangles represent the codes, the green rectangles represent the themes, and the yellow rectangles represent the three categories of analysis.

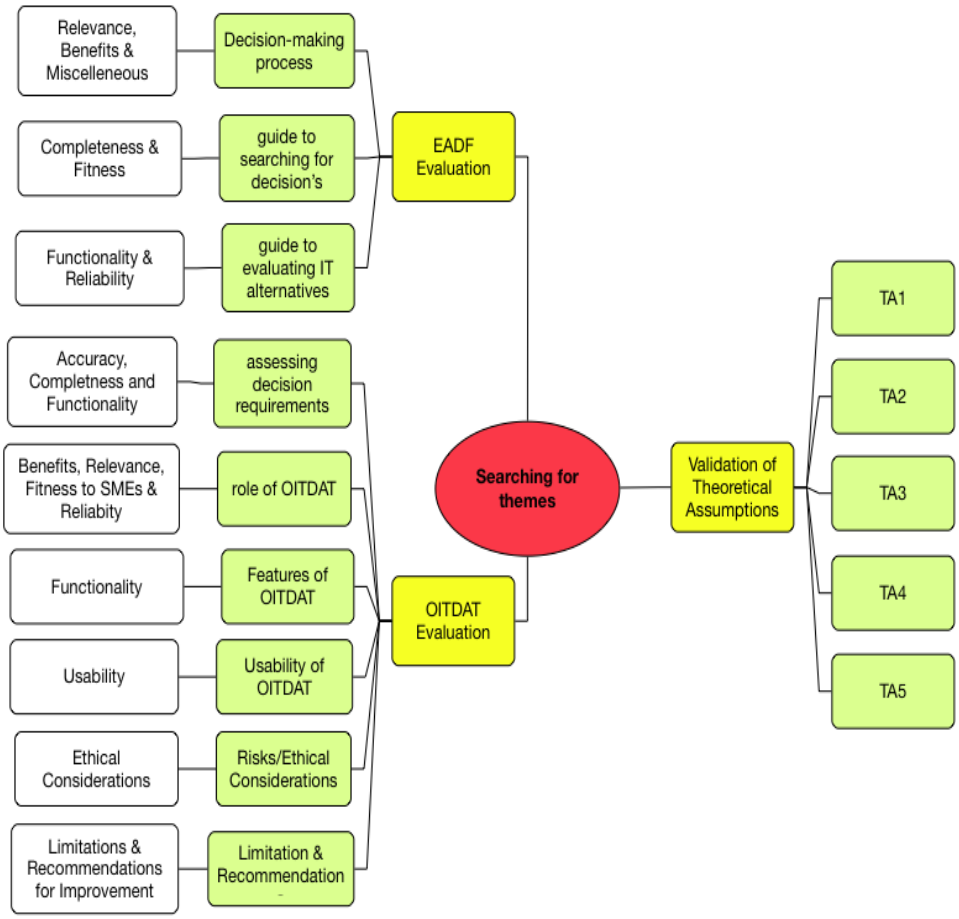

Figure 4-7: Mind Mapping to Generate Themes

d. Reviewing themes: The researcher read the content of the codes to ensure that codes are well grouped under the appropriate candidate themes (Clarke & Braun, 2014) and to ensure that the codes provided sufficient and coherent data for analysis. The researcher discovered interlinks between four themes and the content of the codes. The review process resulted in the merging of the “features of OITDAT” theme with “assessing decision requirements” theme. The codes were merged into one theme: “functionalities of the OITDAT”. The TA2 and the TA3 were also merged under one theme named, “relationship between multiple IT objectives and complex IT decisions" and time decision-maker spent searching for information. At the end of this phase of analysis, the themes were explicit for describing the findings of the summative evaluation.

e. Defining and naming themes: The researcher emerged with twelve distinct themes. The themes were named as shown in the Figure 4-8. The themes were defined and the researcher drafted memoranda to highlight the basis of discussing the analysis. The tree-map in Figure 4-10 shows the distribution of codes and references in each theme.

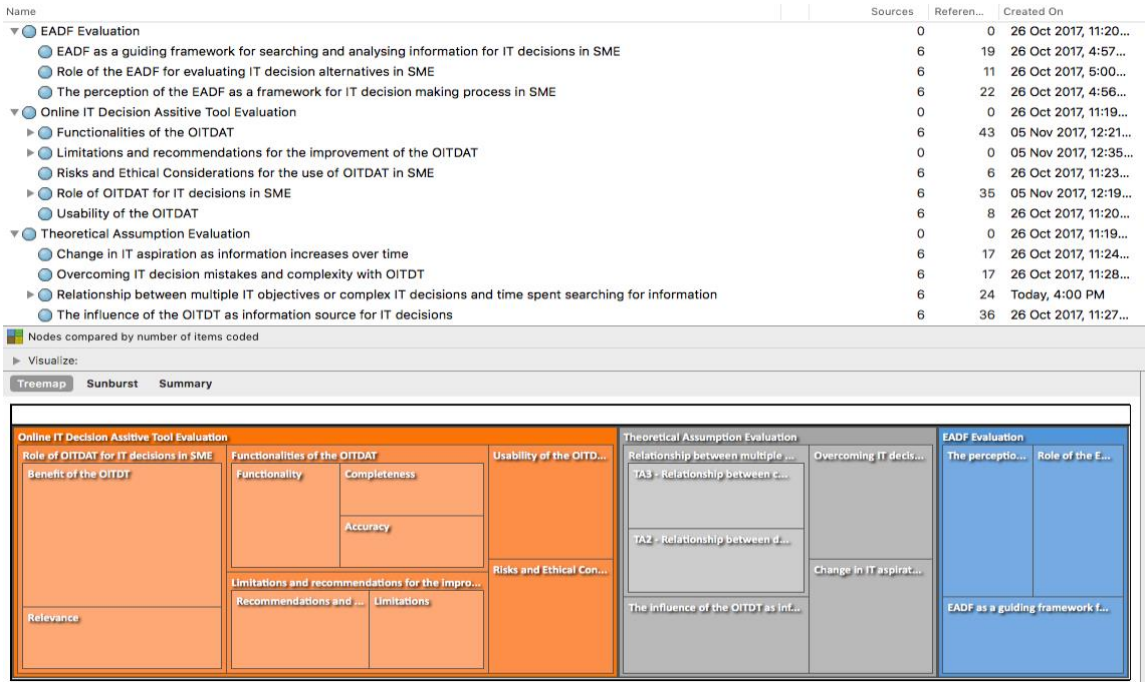

Figure 4-8: Defining and Naming of Themes

f. Producing the report: The objective of conducting summative evaluation in this study was to demonstrate how the enterprise architecture-driven artefact supports strategic IT decisions in SEs as claimed in the research objectives. The detailed analysis of findings and the discussion of the findings were presented in Chapter Eight.

4.4.5 Conclusion

The conclusion phase as described in Vaishnavi & Kuechler (2004) DSRPM suggests the documentation of the research contributions, identifying areas of improvement, and communicating the output of findings to the research audience. The conclusion phase of the DSR in this study is presented in Chapter Nine. The chapter described the learning outcomes from this study, the contributions (methodological, practical, and theoretical contributions), the limitations the researcher encountered, the recommendations of the SE decision-makers, and the researcher's recommendations for further studies. The research produced a detailed procedure for replicating and improving the designed artefacts produced in this study. Hevner et al. (2004) suggested that the quality of a good DSR is to allow future replication and improvement of the designed artefact by another researcher. This study adhered to the principles of DSR in documenting the conclusion phase.

4.5 Summary

This chapter discussed the research methodology, the paradigm, and the ontology adopted in this study. This chapter also distinguished between the different types of DSR methodologies, provided a justification for adopting the Vaishnavi & Kuechler's DSRPM, and presented how the chosen DSRPM was applied in this study. The qualitative research method was used in the process of gathering requirements for the development of artefacts and for the evaluation of the artefacts developed. Overall, this chapter described how this research was conducted. The next chapter describes how the researcher developed awareness of the research problem following the DSRPM.

5 Chapter Five – Problem Awareness

5.1 Introduction

This chapter is part of the problem awareness of the DSR methodology (Vaishnavi & Kuechler, 2012). This chapter presents findings from empirical studies conducted with eleven Nigerian and South African Small Enterprises (SEs). The researcher conducted interviews with eight Nigerian SE owner-managers and three South African SE owner-managers respectively. The interviews created a better understanding of IT decision-making process of SE owner-managers and the challenges decision-makers face when making IT decisions. The methodology employed in collecting the qualitative data has been described in Chapter Four (4). This chapter is organised in five main sections. The findings and discussion of the interviews from Nigeria is presented in Section 5.2. Section 5.3 highlights the findings and discussion of the interviews conducted in South Africa. The overall analysis of the findings is summarised in Section 5.4, and this chapter concludes with a summary section in Section 5.5.

5.2 A Study to Understand IT Decision-Making Process in Nigerian Small Enterprises

The primary objectives of this section is to understand SE owner-managers' IT decision-making processes, how they prioritise their criteria, decision-makers' information source, the potential or role of information to the decision-making process, and the issues that influence their IT decisions. The interviews conducted were open-ended and semi-structured interview (Blaikie, 2010; Ekanem, 2005). The participants of this study are described in Table 5-1.

Description of Participants					
Participant	*Business Type*	*No. of Emp.*	*Branches/Units*	*Year of Esb.*	*Age of SE*
1	Hospitality	58	3	2005	11
2	Traveling & Tourism	81	3	1999	17
3	Manufacturing	68	1	2002	14
4	Education	156	4	1984	32
5	Construction	102	4	1993	23
6	Agriculture	75	2	2001	15
7	Hospitality	144	1	1981	35
8	Automobile	53	1	2010	6

Table 5-1: Description of Participants

5.2.1 Findings from Interviews

This section presents the findings from the interviews conducted. This section is discussed under four themes that emerged in the analysis.

5.2.1.1 Business Goals that inform IT Decisions in SEs

The findings revealed that SE owner-managers interviewed do envision what they can achieve when they invest in IT. The study also revealed that SE owner-managers' IT objectives are often driven by their perceived relevance of the IT, the need to overcome specific business problems, and enforced government regulations. Table 5-2 depicts some comments when the SE owner-managers were asked about their intended motives for making IT investment decisions.

Participant	*Comments*
1	*"….the trend now, people no longer travel with cash and base on the cashless society policy. For you to have or retain your customers you must have a POS station that will enable them to make payment."*
2	*"It is obvious that one needs to have internet to survive in this our business. I don't know anyone who runs the same business without internet service."*
3	*"…..It has made things very easy for us. Before when they are sending us an invoice. It used to be through a courier which takes a lot of time."* *"…..However, if we can have a computerised system of clock in and out, I think it will checkmate the movement of staff. That is one major area I am having a problem."*
5	*"…….if the design you are submitting for tender doesn't comply with the Ministry of Land and Housing requirements, the tender application will not be considered…."*
8	*"Well, first of all, the software needs to be relevant to me, otherwise what is the point of buying a software if it is not relevant?"*

Table 5-2: Quote Statements (IT Business Drive)

5.2.1.2 Criteria for Making IT Decisions in SEs:

To understand how SE owner-managers decide on different IT solutions, the participants were asked how they choose each of the IT they use in their organisations. Table 5-3 summarises criteria for the different IT solutions used in their companies. The thick symbol '✓' represents the criteria the decision-makers consider when making certain IT decision.

	Criteria for Making IT Decisions	ERP	Productivity	Web Development	Mail Service	Computer Network	E-Payment System	Cloud Storage	Computers	Social Network	CRM System
1	Cost of implementing the IT Solution	✓	✓		✓	✓	✓	✓	✓		✓
2	Trust Vendors choice/suggestion on IT Solution		✓	✓		✓	✓		✓		✓
3	Service Support Agreement provided by Vendor	✓	✓	✓		✓	✓				✓
4	Accessibility & control of IT solution		✓	✓				✓		✓	✓
5	Time of Delivery - Vendor	✓			✓	✓				✓	
6	Flexibility of the IT solution	✓	✓		✓					✓	
7	Business Analytics Capabilities of IT	✓									✓
8	Data backup & recovery of business information		✓					✓			
9	Functionality is of utmost preference	✓		✓						✓	✓
10	Integration of the IT solution to the existing technologies				✓						
11	License - open source versus proprietary	✓			✓					✓	
12	Quality Assurance from vendors and consultants			✓		✓					✓
13	Resource - Technical Resources Required for Deployment		✓								
14	Security/Confidentiality of the IT Solution			✓	✓						✓

Table 5-3: Criteria for making IT Decisions

Table 5-3 shows that cost of implementation, trust of vendor, support services, and access to IT are the common criteria some decision-makers consider when investing in IT. The integration of organisational IT is not considered as criteria; neither was security consideration a requirement for making IT decisions. The use of IT solutions to manage customers' relationship is the predominant technology in the participating SEs. This study categorised the application that SEs used in managing organisation's customers as Customer Relationship Management (CRM) Systems. Most of the CRM systems identified in the SEs are proprietary and customised solutions.

5.2.1.3 IT Decision-Making Preferences of SE owner-managers

Prioritising requirements is a common challenge for the SE owner-managers interviewed. The participants claimed that choosing from IT alternatives is a difficult decision because of the proliferation of IT. The participants confirmed that they are often in situations where they are compelled to choose from a large option of different IT. The researcher seeks to identify the

owner-managers' preference when making IT decisions and the decision-makers were asked to list their preference from the criteria they mentioned (as illustrated) in Table 5-3. The findings revealed the following preferences: (i) cost of implementing IT choice, (ii) ease of use of the IT, (iii) IT skills requirement, (iv) profitability of IT decision (investment), and (v) availability of IT solution. Table 5-4 highlights some of the comments of the SE owner-managers. The cost of implementing IT was a persistent requirement for most of the SE owner-managers. The decision-makers trade-off other criteria for a cheap cost.

Participant	Comment
4	*We have to look for another alternative that can deliver the same work. In the process of looking for something cheaper, I stumble onto the school software online, and I pay for it immediately...The most important factors are the cost, then task at hand*
7	*It is the cost implication that is making it difficult to acquire these ITs.*
2	*I always go for things that are very good but have fair prices. I am out for profit, so I have to save cost as much as possible and ensure that we get value for money*

Table 5-4: Preferences of Decision Makers when making IT choices

5.2.1.4 Information Source of SE owner-managers when making IT decisions

This study investigates the decision-making process of small enterprises without a dedicated IT department or unit. The researcher asked the participants how they look for information that guides their IT decisions and to what extent they rely on their information sources. Table 5-5 summarises the responses of the decision-makers. The tick symbol (✓) indicates the information source(s) SE owner-managers rely on when making IT decisions.

Participant	1	2	3	4	5	6	7	8	Summary Number of ✓
Friend's Recommendation	✓	✓		✓	✓			✓	5
Personal Experience		✓	✓	✓	✓	✓			5
Online Enquiry				✓	✓	✓		✓	4
Vendor		✓	✓			✓			3
Business Network		✓						✓	2
In-House Staff				✓		✓			2

Table 5-5: Information source for making IT decisions

Table 5-6 presents some comments of the participants when the researcher asked the participants how they search for information that guides their IT decisions:

Participant	*Comments*
2	*"Unfortunately, I don't know much about this ICT, so I am very confident with what my friend suggests. I do not bother myself to find alternatives… You IT people are out to make money. So I rely more on the information my friend provide me."*
6	*I will say I rely on internal information source if I do not have any idea then I completely rely on my staff since I do not have IT, staff, in-house. Then I will consider outside source. I have a feeling that internal source understands my business better although the experts have more experience, I do not know.*
7	*"It was a friend that referred us to the provider."*
8	*"Well, I ask my friends or go on the internet…. Regarding reliance, I just use my common sense and the business idea."*

Table 5-6: Quote Statements (Information Source for making IT decisions)

Table 5-6 revealed that the SE owner-managers interviewed rely on vendors and friends' recommendations, and intuition (individual experiences) when making IT decisions. Two of the participants had a contrary opinion and claimed that they trust their in-house staff because they believe vendors are often financially biased when recommending IT to them.

5.2.2 Discussion of Findings

The assumption that small enterprises do not make strategic decisions is arguable and very subjective as discussed in (Ibrahim et al., 2001). This study revealed that the SE owner-managers that participated in this study set goals that have a strategic effect on their businesses. However, SEs operate in an agile and flexible environment. This implies that the definition of strategic thinking in the context of long-term goals becomes a relative term when compared to large organisations. This confirmed that strategic goals differ between large and small enterprises (Cragg et al. 2007).

The Nigerian SE owner-managers interviewed do pre-defined their objectives when they invest in IT. The findings showed that the overall goal of making IT investments in the participating small businesses is to attain business growth through better market outreach, gain competitive advantage, improve performance, and decrease the cost of production and logistics. This study identified that some SEs invest in IT that improves business productivity, customer management, resources management, collaboration, engaging in e-Commerce, and communicating with employees and business stakeholders. The IT goals in small enterprises align with the literature discourse on the role of IT in SEs (Apulu & Latham, 2011; Love & Irani, 2004). The findings showed the high usage of online presence and CRM technologies. Mary & Ofafa (2013) study revealed a similar trend of high usage of online technologies as a strategy for SE growth in Kenya.

This study discovered that the standards for assessing IT success in large organisations cannot be used to evaluate SEs because it will undermine the strategies of SEs considering the distinction between the two categories of enterprise (Ghobadian & Gallear, 1997). Presumably, SEs set IT investment objectives that lead to the attainment of business and IT goals. Though, the SEs interviewed in Nigeria do not have documented roadmaps and policies that visibly describe organisational IT goals. IT investment decisions are made by the business owners who base their decisions on verbal information, experience, and knowledge to resolve business problems and achieve business needs.

The management of IT in some small Nigerian enterprises is challenging due to the following:

1. Small enterprise owner-managers struggle to make informed IT decisions due to their lack of adequate IT knowledge. Decision-makers rely solely on external information to guide their IT choices.
2. SE owner-managers rarely integrate organisational IT which has resulted in SEs investing in redundant IT. This alluded to the non-existence of a holistic approach to business-IT alignment.
3. The SEs rely on verbal agreements with vendors and trust. Most of the IT that has failed in the SEs that participated in this study was partly because the vendors failed to provide agreed support service after implementation. The researcher argued that the lack of formal agreement and IT investment strategies led to the breach of contractual agreements.

This study confirms that IT decision-making in small enterprises is a quick and flexible process as argued in (Rantapuska & Ihanainen, 2008). SE owner-managers often set few criteria when making IT investment decisions. The overarching criteria for IT decisions identified in SEs interviewed are: cost of implementation, vendor's reputation, support services, and availability of the technology. Literature acknowledges that SEs' limited access to resources (such as finance, skill, and infrastructure) influences IT investment decisions (Ndiege et al., 2014; Salles, 2006). The SE owner-managers admitted that resource limitation is a criterion they consider when investing in IT.

On the contrary, most of the ITs identified in the SEs were not open-source but proprietary software applications. It was presumed that SE owner-managers would invest in open source and cloud-based solutions to limit their dependency on vendors and consultants, minimise the demand for IT workforce, and reduce the cost of IT implementation. The inconsistency was accorded to the decision-makers' limited access to information when making IT decisions. However, we recommend a further investigation to comprehend the contradiction in criteria identification and alternative selection.

Above all, the responses of the SE owner-managers revealed that they are not satisfied with their IT investment strategies. The SEs in this study are faced with internal challenges and dynamic environmental factors that necessitate SE owner-managers to make strategies that will help them overcome business constraints. The SE owner-managers in this study, make intuitive and satisficing IT decisions in their attempt to leverage IT for business gains. The small

enterprises are yet to achieve the full benefits of their IT investment and are willing to embrace a different strategy to IT investment decisions.

5.3 A Study to Understand IT Decision-Making Process in South African SEs

This is a further study to understand the IT decision-making process of SE owner-managers in South Africa. The researcher conducted interviews with three SE owner-managers in South Africa. The same data collection instrument (interview questions) used in Nigeria was used in conducting interviews with the South African participants. The interview in South Africa produced similar themes with the data collected in Nigeria. The SE owner-managers were selected based on their acceptance to a request for participation in this study. Table 5-7 describes the participants of this study. For the sake of anonymity and confidentiality, the names of the companies interviewed were concealed.

Participant	*Business Type*	*No of Emp.*	*Branches/Units*	*Year Esb.*	*Age*
1	Education	96	2	2005	11
2	Manufacturing	108	3	1999	17
3	Construction	79	1	2008	8

Table 5-7: Interview Participants

5.3.1 Findings from Interviews

This section explains the findings from the interview conducted with three South African SE owner-managers. The participants in this interview manage their enterprises and hereafter will be referred to as SE owner-manager. The subsequent subsections discuss the findings under five sub-themes as follows:

5.3.1.1 Business Goals that inform IT Decisions in SEs

The SE owner-managers interviewed evidently show some degree of thoughtful and objectivity when they decide to invest in any IT. The primary objectives identified amongst owners when they make IT decisions are: (i) to drive cost efficiencies, (ii) improve product development and service delivery, (iii) improve customer service experiences, (iv) improve operational activities and productivity, (v) improve innovativeness within the enterprise, and (vi) attain new business opportunities. Some of the SE owners unequivocally emphasised that they look for feasible IT solutions to overcome business challenges. However, the researcher deduced that SE owners make IT decisions based on their 'gut feelings' and conviction of what they perceived as

feasible and optimal. Table 5-8 highlights some of the comments from the SE owner-mangers and their perception of IT goals.

Participant	Comment
1	*"…. know the ICT you need to get things done faster and easier in your business. For instance, our website has helped us in reaching out to a wider customer audience …."*
2	*"There is no need to keep most recent technologies. I seek for a pragmatic solution, and I purchase tools that offer a feasible solution based on my experience to date."*
3	*"…..I make my decision based on my experience and word of mouth with trusted networks."*
2	*"After careful consideration of all the things said by the consultants, I decide on what I can afford."*

Table 5-8: Quotes from owners' perception of IT goals

5.3.1.2 IT used to Support Businesses in South African SEs

In some South African SEs certain technologies are commonly used which this study refers to as "general IT" as illustrated in Table 5-9. Certain technologies are industry-specific and are categorised as "advanced IT". Table 5-9 illustrates the different type of IT used in the South African SEs interviewed.

	Type of IT	Examples of IT Used in SMEs
General IT	Cloud Service	Google Apps, Email service
	Connectivity	ADSL connection & VOIP
	Electronic payment	Point of Sales (POS) terminal
	Online Presence	Website (online order/payment portal), social media platforms
	Communication	Mobile, bulk SMS Telephone & Fax
	Online Backup	Dropbox and Google Drive, Google Doc
	Marketing Strategy	Twitter, Facebook, Messengers, Instagram, LinkedIn
	Computer hardware	Laptops, PCs, Tablets and Phones
Advanced IT	Accounting Management	Payroll System, Finance Management System
	CRM System	Salesforce.com
	Resource Management	Human Resource Management & Supply Chain

Table 5-9: IT used in South African SMEs

The study revealed that some SE owner-managers (participants 1 & 2) use cloud services such as email services and online backup but are unaware that they are using cloud services. This study discovered that the increase in the use of cloud services and open source applications is due to efficient but costly internet connectivity. The SE owners acknowledged the significance of internet access but are dissatisfied with the high cost of the internet. SEs are yet to explore IT capabilities to attain new business opportunities. For instance, the communication infrastructures used by SEs interviewed are used mainly for correspondence with customers. The point-of-sale systems used by two of the participants in this study are used mainly for payment purposes. SEs are yet to explore how to mine data and analyse business information at their disposal.

An interesting discovery was how the South African SEs that participated in this study are creating a strong online presence through social media platforms. The SE owner-managers emphasised that most of their customers use social media, so it is a convenient way of reaching their customers. Hence, SEs are also using social media as a platform for marketing products and services. The participants of this study have created an active online presence on common social media platforms like Facebook, Twitter, LinkedIn, and Instagram. The participating SE owner-managers unanimously believed that social media provides a fast, easy, and cheap way of communicating with customers. According to participant 1: *"I don't think any business can survive without a website……online presence determines the genuineness of a company".* The SE owners are looking forward to improving their online presence, strategies to accommodate online ordering, online payment, and customer support.

5.3.1.3 Criteria for IT Decisions in SEs

This study indicates that decision-makers in South African SEs understood the need to define their IT requirements when investing in IT. The SE owners interviewed seem to have conflicting technical requirements. SE owner-managers emphasised the following criteria: compatibility, cost-benefit, adaptability, return on investment, functionality, sustainability, the potential risk of integration, durability, perceived relevance, and skill requirement. Above all, an online presence was the most used IT. The SE owner-managers were asked to clarify on other criteria for choosing an online presence technology (i.e. social media, website, and online payment systems). The decision-makers described the following criteria for online applications:

Participant	Criteria for IT Choice	Findings
1,2 &3	Relevance of IT	Perceived relevance of IT applications and hardware to business needs, bearing in mind the proliferation of hardware and software technologies in the market.
2 & 3	Internet connectivity	Internet connectivity was acclaimed to be the backbone for adopting online presence as an IT strategy for SEs. SE owner-managers state that cost, reliability, and speed of internet are paramount to the usage of online platforms. The decision-makers are seeking a broadband policy that will regulate the services offered by internet providers.
1, 2 & 3	Simplified user interface	Social media has been affirmed to be user-friendly and easy to use.
3	Security and privacy assurances	The owners highlight the security of business information/users and privacy concerns are pertinent to the enterprise owners when they select online presence applications.
1 &2	Compliance and regulation	The participants suggest that government should assist in enforcing regulations that will guide and provide safe online transactions.

Table 5-10: Criteria for making online presence decision

5.3.1.4 IT Decision-Making Preferences of SE owner-managers

SEs owner-managers were asked to prioritise their multi-variant criteria in other to understand the decision-makers' preference. It was revealed that the SE owner-managers in this study lack a formal approach to assessing and prioritising their criteria when making IT choices. However, the cost of IT, return on investment (ROI), and the SE owners' accentuated potential benefits of IT were the prefences for IT investment decisions in SEs.

Participant 2 emphasised that in addition to the preferences mentioned in Table 5-9, he looks for IT that has a long-term influence on his business. The complexity of IT has been considered a major setback which has led two of the SE owner-managers to abandon some previously implemented IT. The participants are looking forward to simple IT solutions that can cater for SEs with limited IT skills. Table 5-11 illustrates the comments from SE owner-managers regarding their IT preferences.

Participant	*Comment*
1	*"I always do some assessment of what I am investing and how the technologies can help me cut cost in my daily activities and business management."*
3	*"I use the free version of Google Drive and Dropbox –combined, and it has been sufficient at no cost."*
2	*"I am a bit passionate about IT, but I don't get clouded by the promises considering that I don't have sufficient skills, so I need assurances that the technology I am buying will provide a long-term benefit to my business with less complexity."*
1	*"I will consider complexity in my subsequent choices… for instance, we had to abandon the fin-enterprise (financial system) we bought a few years ago because it was too complex for my cashiers and accountant to manage and was costing us more than the benefits we anticipated."*

Table 5-11: IT preference of South African SME owners

5.3.1.5 Information Sources for IT Decision-Making Process in SEs

The participants rely on verbal and informal information when making IT decisions. The SE owners make several consultations to guide their IT decisions. This study deduced that the level and quality of information the decision-maker can access and assess informs their IT choices. The following information sources guide the participants' IT decision process in South Africa.

Information Source	Participant	Comments
Business network	1, 2 & 3	SE owner-managers make IT decisions based on discussions with business associates, friends, and family
Vendor's experience	1, 2 & 3	The SE owner-managers trust the knowledge of the vendors, believing that the vendors have sufficient knowledge of their businesses based on previous business relationships with vendors.
Consultancy	2	Owner 2 confirmed that his company once employed the service of a paid ICT professional to help in selecting a scalable CRM system which the owner considered as a successful decision.
Internet	1, 2 & 3	The use of internet surfing proved to be the common strategies for all SE owner-managers when making IT decisions. The decision-makers search on the internet for solutions when posed with a business problem that they believe IT can help them overcome. *"When we have problems that I believe can be solved with IT, I go on Google to search for best alternatives and people's view. If I am satisfied I go to the stores or contact one of my IT vendors [owner 3]".*
Customers' insight	2 & 3	The customers' request for better service has motivated some SEs to search for certain IT solutions. Owners 2 and 3 affirmed that they had made previous IT decisions that were informed by their customers' recommendations.

Table 5-12: Information source for making IT decisions in SMEs

5.3.2 Discussion of Findings

The findings in this study did not differ from the literature assumptions that SE owner-managers make IT decisions based on personal experience and satisficing (Bayrak, 2013; Tiwana et al., 2007). However, the assumption that SEs are not methodological when making IT decisions is arguable. The level of rigour can be avowed to be limited as argued in the theory of bounded rationality (Brouthers, Andriessen, & Nicolaes, 1998). IT strategies are short-term which can lead to implementation failure if organisations experience certain changes as a result of their IT investment. This study identified that some SE owner-managers focus on their present business needs and ignore the potential or the innovative opportunities that can be derived from new technologies based on their business's capabilities. The need for a continuous and iterative process of understanding the alignment between business and IT is eminent for SEs to attain optimal IT investment decisions as discussed in (Pedraza, Guerrero, & Lavín, 2011; Raymond & Bergeron, 2008).

The SE owner-managers interviewed are conscious of their IT investments and often make investments they perceived as relevant to their businesses. The cognizant process of IT choice demonstrates rationality towards IT choices amongst the SE owner-managers. Furthermore, the findings revealed that SE owner-managers with basic IT awareness are likely to make strategic IT decisions. As depicted in the findings, one of the SE owner-managers with basic IT awareness had more holistic criteria when defining his preferences for his IT choices. Decision-makers do not need sophisticated IT skills to make an informed IT choice. The decision process in SEs can be optimised with relevant information sources to guide the decision-maker as argued by James & Van Belle (2013).

The SE owner-managers can explore the various information sources to guide their IT decisions. It is paramount that decision-makers consider the relevancy and quality of the information they rely on when making IT decisions. The information sources the SE owner-managers in this study rely on to make IT choices often lack sufficient understanding and assessment of the contextual business environment. The SE owner-managers understand their business environment better than the vendor, friends, families, or customers. Hence, SE owner-managers should be responsible for assessing their businesses before investing in IT. Also, the participants of this study seek subjective information to overcome business problems at hand, which limits how SEs leverage IT. Decision-makers need to consider both internal and external business environmental factors that their IT choices can influence, and vice versa. A holistic strategy to IT-related decisions will help SEs to overcome the simplistic approach of solving a business problem with IT, resulting in the creation of unexpected business impediments. This study affirms that IT decisions in SEs are optimisable if decision-makers have access to business-specific information sources (Citroen, 2011; Rantapuska & Ihanainen, 2008; Salles, 2006).

Lack of knowledge is a major setback, as demonstrated by some managers who failed to realise that they are using cloud services yet confirmed the use of some cloud services. Thus, it is difficult for the decision-maker to adequately make informed choices when they are not conversant with the decision criteria and choice alternatives. This study confirmed the findings in (Ghobakhloo et al., 2012; Klaus, Rosemann, & Gable, 2000) and revealed that SE decision-makers attempt to complement their IT knowledge insufficiency by seeking for directions and guidance from technical personnel who have little or no insight into their businesses. SE owner-managers consult vendors or suppliers who are motivated by their personal interest.

In addition to insufficient knowledge about IT alternatives, decision-makers are not fully aware of the consequences of their IT investment decisions. The fear of technology failure is eminent amongst SEs owner-managers interviewed in this study. Businesses owners need assurance of being able to recover in the event of technology failure or the consequences of their IT decisions. Furthermore, decision-makers face difficulties when they are making new and unfamiliar IT decisions because they lack standards for assessing the success of their IT investments. In that regard, South African SE owner-managers are seeking government intervention to provide enforceable regulations that will guide their IT decision processes.

The South African government has previously initiated policies that are intended to guide ICT services to protect customers, larger, medium, and small enterprises. Some of the government ICT policies are the Electronic Communications Act 2005, Electronic Communications and Transactions Act 2002 to regulate electronic transactions, Protection of Personal Information Bill 2009, Promotion of Access to Information Act 2000, and the Consumer Protection Act 2011 to protect consumers against false advertising strategies and products and services. This study is unable to determine the extent of enforcement of the South African ICT policies because it is not the scope of this study. However, this emphasised that SE decision-makers are looking forward to policies that can guide their IT choices. This study recommends further studies to provide SE owner-managers with information sources that offer some guiding principles for IT choices.

The potentials of IT in SEs are still under-optimised. The SE owner-managers remained optimistic that IT is a potential value-adding tool for their enterprises as emphasised by Ismail et al. (2011). Some South African SEs are exploring the potential of IT despite the challenges of leveraging the optimal benefits. The SE owner-managers are willing to consider new IT relevant to their businesses. Presently, the use of social media and website (which this study refer to as online presence) is increasingly growing amongst SEs. The social media platforms have created a simple and cheap platform for SEs to reach out to potential and existing customers. This study corroborates the findings from a study conducted by PwC in 2015, which asserted that web presence has helped in sustaining over 150, 000 South African SEs employing an average of 1.6 million jobs (Botha, Van Dijk, & De Rijk-Uys, 2015). SEs now consider owning a “business website” as a requirement for starting and sustaining their businesses.

5.4 Analysis of Empirical Findings Based on Herbert Simon Decision Making Model

The objective of the empirical study was to provide a better understanding of the decision-making process, identify the decision challenges and possibilities of intervention. The Herbert Simon Decision-Making Model (DMM) described in (Phillips-Wren, 2013) was adopted to categorise the findings from literature and interviews. Table 5-13 summarises in high level the overall findings and the learning outcomes from the problem awareness phase of this study.

Table 5-13 also presents a recommended strategy to overcome the IT decision challenges based on the principles of enterprise architecture. The "IT decision-making" column in Table 5-13 highlights the steps SE owner-managers follow when making IT decisions based on the interviews conducted. Furthermore, Table 5-13 describes the practices, the strategies, and the key player of all the decision steps. Table 5-13 illustrates the main information sources of SE owner-managers. As illustrated in Table 5-13, the major responsibility of IT choice lies with the SE owner-managers, but occasionally decision-makers seek the service of consultants and vendors. The vendors are fully responsible for deploying most IT choices in SEs. The conceived recommended strategy for overcoming the challenges and improving IT decision-making process is shown in Table 5-13. The recommended strategies are abstractions from principles of enterprise architecture.

In conclusion, the findings of the empirical study provided a better understanding of the requirements for designing an artefact to support IT decision-making process. This study is premised on the bounded rationality theory. The empirical findings revealed the searching and satisficing behaviour of SE owner-managers when making IT decisions. Thus, this study aimed at providing a holistic approach to IT decision-making process of SE owner-managers by improving the decision-makers' access to quality and relevant information.

Herbert Simon's Decision-Making Model	IT Decision-Making Process	Decision-Making Practice	Information Source	Strategy	Responsibility	IT Decision-Making Key player		Findings from Interviews	Factors influencing IT success	Factors Affecting IT in Ses	IT Decision Challenges	Enterprise Architecture Strategy
Intelligence	*Objectives & Goals*	gut-feeling, reactive, heuristic solution, bootstrap	business network, experience, need-based research, vendor, staff, customer, supplier, consultant	objective	owner-manager & consultant	owner-manager, customer, government		perceived relevance, business needs, government policies	limited resources (capital & infrastructure), limited IT skills, competitive pressure, IT complexity, external pressure, unfavorable government policies	access to finance, poor infrastructure, inefficient government policies, high level of crime, low level of research	non-procedural, short-term goal, ad-hoc practice & access to limited information	Business - IT alignment
	Information gathering	subjective, trust, intuition		problem-centric		Customer, supplier, consultant, vendor, business partner						Formalised Information Searching & Source
Design	*Define Criteria*	short-term, problem & product oriented		limited rationality		owner-manager		cost, trust, accessibility, flexibility, security, privacy, confidentiality licensing, quality assurance				Business Process Assessment (business maturity) & IT Assessment (capabilities & constraint assessment)
	Identify Alternatives	vendor & consultant dependent, experience				owner-manager, vendor, consultant, business network		insufficient knowledge of alternatives & choice consequences				
	Identifying Preference	autonomous thinker				owner-manager	cost of IT, quality of service, ease of use, skills requirement, ROI, IT availability, integration, security, confidentiality & support					
Choice	*Evaluate Alternative*	vendor & consultant dependent, experience					informal approach (intuition & experience)					
	Choosing from Alternative	independent action, enthusiasm					intuition, satisficing, trust & experience					
Implementation	*Deployment*	vendor & consultant dependent, experience	-	tendering	Vendor	owner-manager & vendor	owner-manager, staff & vendor					IT governance
	Support		-				informal agreement with vendor					

Table 5-13: Analysis of Findings from Interview

5.5 Summary

The empirical findings on IT decision-making process in Nigerian and South African small enterprises have been presented in this chapter. This chapter is part of the problem awareness phase of the design science research methodology adopted for this study. The findings presented in this chapter is an addendum to literature requirements for developing IT decision artefact for SE owner-managers. The next chapter discusses the researchers' suggestions on how to overcome the IT decision-making challenges in SEs.

6 Chapter Six – Suggestion

6.1 Introduction

This chapter describes the conceptualisation and the development of the Enterprise Architecture-Driven Framework (EADF). The EADF is a conceptual framework for IT decision-making process in SEs. The EADF is aimed at assessing enterprises to ensure that decision-makers establish enterprise-wide criteria when making IT choices. Corvellec (2013), and Jabareen (2009) approaches to the development of a conceptual framework guided this study in the development of the EADF. This chapter is organised in nine main subsections. Section 6.2 justifies the need for the EADF and Section 6.3 describes the objectives of the EADF. Section 6.4 describes how the concepts and variables in EADF emerged; then Section 6.5 presents the description and the definition of the concepts and variables of the EADF. Section 6.6 describes how to use the EADF, and the validation of the EADF is presented in Section 6.7. Section 6.8 highlights the researcher's reflections on the EADF, and this chapter concludes with a summary section.

6.2 Justification for EADF

IT decision-makers in SEs start off the decision process with a strategic intent by seeking for technologies that are relevant to their business needs. The decision-makers search for information to guide their choices. The quality and amount of information SE owner-manager is able to acquire, plays a significant role in the decision-maker's choice. The information at the decision maker's disposal determines SE owner-manager's choice of IT, the selection of vendor to provide the chosen IT, the deployment and implementation strategies of the chosen IT, and how the IT is used to leverage business.

As demonstrated in Chapter Two and Chapter Five, decision-makers in SEs make IT choices based on incomplete information and spend less time assessing business and IT requirements. The bounded rationality approach to choice of IT has resulted in: (i) the lack of strategic plans to integrate business and IT, (ii) the unilateral perspective view and assessment of business process when defining criteria for IT choices, (iii) the lack of cohesion between organisational capabilities and the resources required for IT alternatives, (iv) limited and conflicting criteria when making IT choices, and (v) poor guiding principles, regulations, and standards to guide IT choices and enforce successful implementation and maintenance of choices.

This study acknowledges that existing approach like strategic alignment models, IT portfolio management, portfolio management, enterprise architecture frameworks, and other IT strategic frameworks, models and frameworks for IT choice, implementation and management for large organisations have proven successful in large organisations (Bernroider, 2008; Henderson & Venkatraman, 1993; Oh, Loong-Tatt Ng, & Teo, 2007; Tarcisius, Al-Ekram, & Ping, 2002). On the contrary, the application of the same approaches and techniques of strategic IT decision-making of large organisations has failed to yield a successful result in SEs. Literature has established that such frameworks, models, and methods are too complex and resource-consuming for SEs because of the characteristics of SEs. This study suggests that embedding the principles of the SITDM strategies of large organisations in a guided artefact can help SEs to overcome IT decision-making challenges.

6.3 Objectives of the EADF

The EADF is a representation of a set of compressed and inter-related strategies to guide decision-makers' choice of IT. The objective of the EADF is to provide a more thorough and holistic assessment of the entire enterprise when investing in IT. It is assumed that SE decision-makers have pre-defined approaches to IT choices. The EADF is not intended to re-invent the decision-making process but to provide a cognitive addendum to the pre-conceived IT choice process of SE owner-managers. The successful application of the EADF as a decision-making strategy will also broaden the decision-maker's perception on the type of information to search for when making IT decisions and improve the assessment of IT alternatives which will lead to a more optimal choice of IT.

6.4 Concepts and Variables Searching

A concept is a collection of variables that help in understanding the categorisation and relationships of a phenomenon. The concepts and variables that informed the development of the EADF emerged from the empirical findings from the problem awareness phase and the literature findings (as discussed in Chapter Five). Further analysis of the themes, concepts and variables from literature and empirical studies are represented in Table 6-1. Simon (1977) decision making model guided the classification of the IT decision-making challenges in SEs (Phillips-Wren, 2013). The EA principles were adapted to curb the decision-making challenges identified. The EA elements column in Table 6-1 highlights the EA principles that inform each

EADF concept. Table 6-1 summarises the mapping of the challenges, EADF concepts, and EA driving principles.

Simon Decision-making Model	Challenges of IT decision-making in SEs	EADF Concepts	Enterprise Architectural Principles
Intelligence	gut-feeling; reactive approach; bootstrapping; problem-centric; and access to limited information	*Business – IT Goal Assessment*	*Business Architecture Principles*
Design	short-term criteria; non-procedural criteria assessment; vendor dependent; insufficient knowledge of alternatives and choice consequences; insufficient information; and decision-makers are autonomous thinkers	*Business Process Assessment & IS Capability and Constraint Assessment*	*Information, Application & System Architecture Principles*
Choice	vendor/consultant dependent; intuition; satisficing; no documented service agreement; and ad-hoc practice of support	*Post Choice*	*IT Governance Principles*
Implementation	the informal approach to deployment; and lack of formal decision assessment strategy		

Table 6-1: Mapping of EADF Concepts

6.5 Definition of Concepts and Variables of the EADF

This section describes the concepts and variables in the EADF illustrated in Figure 6-1. The generic description of each concept is presented based on literature before the presentation of the contextualised definition of the concept and variables of the EADF.

6.5.1 Business-IT Goals Assessment

The alignment of business and IT goals (henceforward referred to as 'alignment') is the process of ensuring that organisations acquire, develop, and deploy IT choices that are consistent with business goals and organisational (internal and external) influencing factors (Kyobe, 2008). Alignment is significant in achieving successful IT investment in organisations (Cragg, Tagliavini, & Mills, 2007; Henderson & Venkatraman, 1993; Kyobe, 2008). However, achieving successful alignment is still challenging to organisations (Gutierrez, Orozco, & Serrano, 2009). There is no consensus on how to achieve business alignment in organisations. The most important consideration is to ensure that organisational IT strategy aligns with business strategy. Kyobe (2008) argued that alignment should not be conceived as a rational planning process, rather as a linkage between various organisational concepts. Henderson and Venkatraman (1993)

strongly argued that there is no one universally best-fit strategy to formulate business and IT alignment strategy.

This study adopted a widely accepted model of strategic alignment model (SAM) (Alyahya & Suhaimi, 2013; Avison, Jones, Powell, & Wilson, 2004; Cragg et al., 2007; Hämäläinen & Liimatainen, 2008; Silvius, De Waal, & Smit, 2009). SAM is a plausible alignment strategy for SEs, but the nature of activities in SEs suggests that operational alignment is more significant to achieve alignment (Cragg et al. 2007). SEs are more operationally oriented because of the dynamic environments in which SEs operate (Levy et al., 2002). SEs have employed incremental alignment strategies to successfully compete with larger organisations (Gutierrez et al., 2009). Hitherto, studies have demonstrated the adoption of a linear approach of alignment in SEs because of the complexities of the existing models and the resource limitation of SEs (Croteau, Solomon, Raymond, & Bergeron, 2001; Gutierrez et al., 2009; Kyobe, 2008; Pedraza et al., 2011). Figure 6-1 illustrates the linear approach of alignment discussed in (Kyobe, 2008) and adopted in this study.

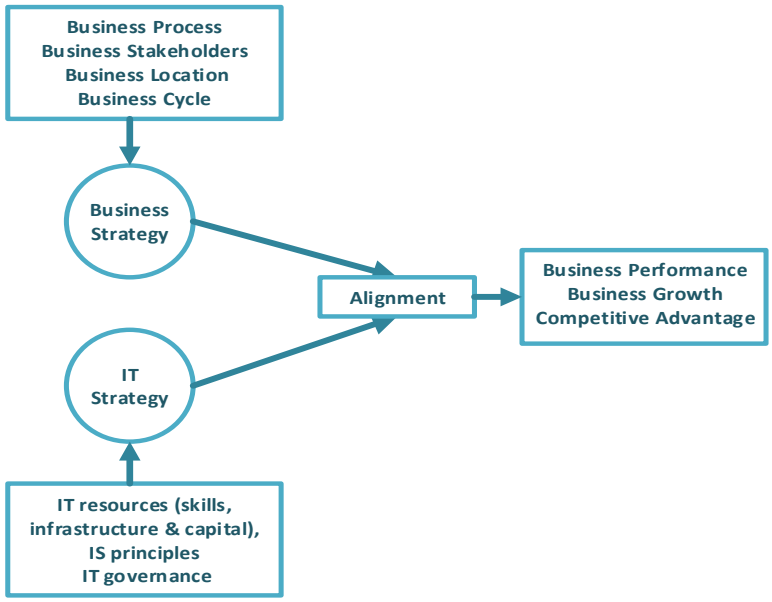

Figure 6-1: Linear Alignment Process for SE (Source: Kyobe, 2008)

In the EADF, the business-IT goals assessment is perceived as a continuous and iterative process that is subject to organisational factors and IS infrastructures. Business and IT strategies are the centerpiece of the business-IT goal assessment. Business strategy is the process of setting out basic long-term goals (usually 3-5 years) of an enterprise, the adoption of a plan of action and the allocation of necessary enterprise resources for achieving set goals. IT strategy is the process of acquiring, developing and implementing technology plans to

achieve organisational goals (Kyobe, 2008). Hence, this study postulates the following guidelines to achieve alignment in SEs:

1. There is no unified approach to achieving alignment because businesses have varying needs, capabilities, criteria, and constraints.
2. The organisational external and internal factors significantly influence business alignment.
3. The business goal should precede IT strategies. However, businesses can seek innovative and competitive advantage through new opportunities with IT capabilities.
4. The business and alignment strategies should be realistic (that is, specific, measurable, achievable, relevant, and time-bound).
5. The alignment goals should be perceived as an evolving and continuous activity.

6.5.2 Business Process Evaluation

The goal of decision-makers when they invest in IT differs depending on business strategy, vision, and business needs. The value chain describes the organisational processes and the combination of activities that deliver products and services from conceptualisation to final delivery to consumers (Kaplinsky & Morris, 2001). These activities include planning, production, sales, marketing, delivery, procurement, and support. Porter (1985) systematically examined how firms can achieve competitive advantage through the interaction of activities in a firm using value chain model. Competitive advantage is better understood by looking at the discrete activities of an organisation and comprehending how each activity contributes to firm's relative cost and differentiation (Porter, 2001). Organisations can only gain and sustain business growth, achieve competitive advantage, and improved performance by understanding how the overall firm's value chain fits (Porter, 2001). Value chain differs across different industries. Porter (2001) suggest that firms have nine generic activities that are interlinked in a characterised way. Porter (1985) developed a generic model that described the activities of an enterprise. This EADF abstracts the concepts of the value chain model.

The business process evaluation is defined as a flexible strategy that explicitly describes the business process, allows the comparison of competitor strategies, the creation of competitive advantage and comprehension of organisational issues when making IT choices (Kaplinsky & Morris, 2001). Table 6-2 defines the list of variables (business processes) that should be considered when assessing business processes for IT decisions.

Activity Category	Activity Type	Definition
Primary Activities	Strategic Planning	The process of envisioning, defining, directing, allocating resources to achieve a set goal.
	Production	The process of combining various inputs (materials, know-how and money) to make something tangible for consumption (output as goods).
	Service	The process of combining resources (knowledge and time) to provide an intangible end-product.
	Marketing	The process of identifying, formulating and implementing strategies to obtain potential customers, and effectively managing and sustaining existing customers.
	Sales	This process involves the ordering of goods or services by a consumer from a business who ensures that the management of customers' order.
	Delivery	This outbound logistic process is the order fulfilment and distribution of customers' order by a business.
	Customer Support	The process of assisting customers resolve issues, caring for customers concerns, maintaining and upgrading products or services to satisfy and retain customers.
	Procurement	The activity that involves the purchasing of materials, supplies, consumables and other resources by the organisation.
Supporting Activities	Human Resource Management	The process of identifying, recruiting, training, developing and managing the workforce (human capital) of an organisation.
	Accounting & Finance	The operational activity that document, plan, monitor and implement strategies to manage all transactional activities in an organisation.
	Technology Development	The management of the equipment, hardware, software, and technical expertise that support activities in an organisation.

Table 6-2: Definition of Business Activities in SMEs

The EADF separates primary activities and supporting activities to provide an enterprise-wide view of organisational activities and analysis of the activities (Porter, 2001). This will guide small business owner-managers on how to prioritise their resources when making IT investment decisions. Decision-makers will be able to prioritise between primary and supporting activities when investing on IT. The decision to prioritise preferred activities is subjected to the decision-maker's cognitions, preference, business awareness, and organisational requirements. It is difficult to present a specific approach on how SE owner-managers prioritise business processes but the identification and assessment of enterprise processes will allow small business owners to: (i) create interlinks between different organisational activities, (ii) assess enterprise capabilities, constraints and maturity base on organisational IT needs and strategies, and (iii) identify the strong and the weak activities that will drive business through IT investment.

6.5.3 IS Capabilities and Constraints Assessment

The IS capabilities and constraints assessment is the evaluation of organisational IT infrastructures (that is, business information, software-applications, hardware), people (organisational IT skills and stakeholders), organisational IT resources (IT budget, customers' attributes, market structure) and the business cycle (how IT influences business operations). Capability is the ability an enterprise possesses and constraints are the external factors that inhibit an enterprise from pursuing and attaining its goals (TOGAF 2015, pp: 23-24).

Information Technology (IT) is described as any tool (hardware, or software) that facilitates the identification, collection, processing, presenting, storing, transferring and distribution of information or any other form of electronic mediated communication (Barba-Sánchez et al., 2007). Information Systems is perceived as a combination of systems capability, people, and the methodologies of implementation and development (Benbasat & Zmud, 2003; Hevner & Chatterjee, 2010). The TOGAF (2015) concepts of capabilities and constraints are recommended for assessing SEs' IS capabilities and constraints.

SEs should identify their IS capabilities and constraints before deciding on the IT to choose. To successfully assess SEs' IS capabilities and constraint, decision-makers can develop internal maturity guidelines for assessing the ability of an enterprise to exercise varying capabilities, identify factors that are required to leverage the capabilities, and provide decision-makers with insight for pragmatic decisions (TOGAF, 2015). SEs can develop different internal maturity benchmarks to suit their specific business needs. The objective of the IS capabilities and constraint assessment is to explicitly identify organizational IS capabilities and constraints that can influence or hinder the attainment of business-IT goals.

6.5.4 Enterprise Principles

The TOGAF Architectural Development Model (ADM) informed the enterprise principle phase in the EADF. The enterprise principle is a significant recommended in ADM (TOGAF, 2015). The enterprise principles harmonise decision-making across the entire enterprise with the aim of fulfilling the organisational mission. The enterprise principles guide the use and deployment of IT resources, defines the underlying guidelines for making future IT investment decisions, and ensure the consensus of different elements of an enterprise (Nightingale, 2009; TOGAF, 2015). The EADF describes enterprise principles as guidelines and rules that inform the way an enterprise achieves its business goals and mission. Enterprise principles should be strictly

adhered to and should be subject to infrequent amendment. The decision-maker should adopt certain enterprise principles to guide the organisation in defining criteria, evaluating alternatives, and choosing IT. The three components of enterprise principles adopted for this study are, *'name'*: a phrase that is simple, unambiguous, easy to remember, and represents the key idea of the principle. Secondly, *'statement'*: a definite and unambiguous clause that easily communicates and explicitly depicts the meaning of a principle. Thirdly, '*rationale'*: the description of how the principle relates to the business, explaining the benefit of the principle and how principles can apply to the enterprise. Decision-makers in SEs should be able to apply the principle to guide them in making IT decisions that have conflicting benefits or objectives. Five categories of enterprise principles are suggested in the EADF to guide IT investment decisions in SEs. The enterprise principles suggested in the EADF are: general business principles; business-information principles; software-application principles; technology-infrastructural principles, and security principles. The following guidelines should serve as a roadmap to SEs owners' when developing principles for IT decisions (TOGAF, 2015):

1. Comprehensible: the underlying assumptions of a principle should be easy to grasp, unambiguous and understood clearly across the enterprise, to avoid intended or unintended violation of the principles.
2. Robust: Principles should be of good quality, vigorous and precise, to sufficiently guide business owners in making complex and controversial IT decisions.
3. Complete: Principles should cover every potential aspect that involves the management of IT in an organisation.
4. Consistent: Principles should not be conflicting and incongruous in such a way that adhering to one principle leads to the violation of other principles.
5. Stable: Principles should be amended infrequently.

6.5.5 Post-Choice

Post-choice Governance is the activity decision-makers enagage after deciding on the preferred IT alternative. The post-choice includes the implementation, support strategies, and decision assessment. The post-choice phase of the EADF is meant to offer SEs with a formal implementation and support strategies. The EADF does not provide specific guidelines for developing strategies for implementation and assessing IT investments. The aim of this phase is to enlighten SE decision-makers on the need to have strategies for implementing specific IT

investments, having an agreed service level agreement with IT vendors or suppliers, and the need to assess IT investment with intended business goals. In employing the EADF, the decision-maker can define business specific strategies depending on business needs, enterprise IT investment, business capabilities and constraints, organisational maturity and business goals. The successful implementation of this phase will allow business owners to leverage their current IT investment and create potential business opportunities.

6.6 Description of the EADF

The EADF is a prescriptive framework for SITDM process. The decision-maker initiates an IT decision to overcome certain business challenges or to explore potential business opportunities. The EADF suggests that the business goal (business strategy) and IT goal (IT strategy) is a directional process that needs to be re-assessed as business and IT goals (strategies) change to remain aligned. Conducting an iterative linear-alignment will allow the decision-maker to merge certain business goals, adopt a single IT for multiple goals, and leverage potential/implemented IT for possible business opportunities. In Figure 6-2, the four inward arrows pointing into the alignment phase indicate that the other phases of the EADF can inform the refinement of the alignment process. Linearly, the outcome of the alignment process leads to the business process evaluation process.

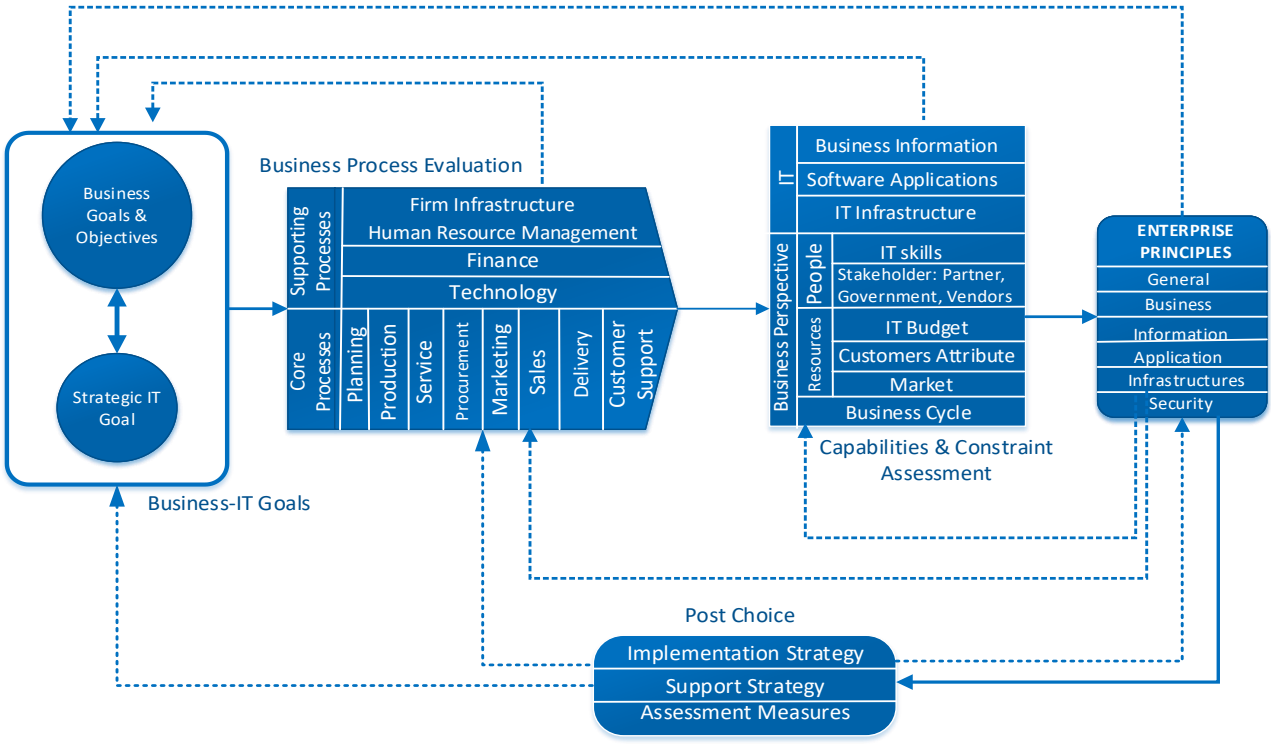

Figure 6-2: Enterprise Architecture-Driven Framework

The business process evaluation categorised the business processes into core and supporting activities. The objective of categorising the processes is to indicate the significance of prioritising activities when making IT decisions. The EADF suggests the assessment of the decision-maker's business-IT strategies with the different business processes. The decision-maker can assess the organisational business processes against internally developed maturity levels for consistency. The two inward arrows into the business process evaluation indicate that the enterprise principles can influence the decision-maker's aspiration(s) and the post-choice shows that the success/failure of implemented IT choice can result in the re-assessment of business processes. The successful completion of the business process evaluation leads to the assessment of the organisational IT capabilities and constraints.

The EADF suggests the evaluation of business-IT strategies and business process maturity with the organisational IS resources. The IS capabilities identified nine major components that decision-makers can assess when making IT choices. The objective is to map the IT strategies with organisational IS, or the IT the organisation can acquire. The IS capabilities and constraint assessment is not a unidirectional process. The enterprise principles are assumed to refine the acquisition of organisational IT. The decision-maker should identify practical best alternatives at this stage.

The process of making preferred choices should be guided by developing internal enterprise principles. The enterprise principles are guidelines and policy statements that the decision-maker should strictly adhere to when making a choice. The enterprise principles need to be robust and non-conflicting. The EA is a good reference for decision-makers when creating enterprise principles. Organisations can always contextualise the principles to fit their specific organisational needs. The outward arrow from the post-choice phase shows how the phase feeds into the business-IT goals and business process evaluation phases as a continuous process.

6.7 Conceptual Validation of the Enterprise Architectural Driven Framework

This section describes the validation and demonstration of the applicability of the EA framework with the selected IT decisions which this study refers to as strategic IT decision because of the long-term impact of the IT choices to small businesses. The goal of this section is to examine the validity of the proposed EADF with real-world IT decisions of SEs. The need to manage customer relationships and establishing online presence were common decisions

in SE selected to demonstrate the validity of the EADF. The IT decisions were assessed based on the five perspectives of the EADF. The validation of the EADF is based on literature. The components of the EADF guided the searching and the reviewing of literature. The researcher focused on manufacturing, retail, and service industries as identified in the empirical studies. The subsequent sections detailed the validation of the EADF.

6.7.1 Customer Relationship Management

The decision to manage customer relationships with IT appeared as one of the common IT decisions of small enterprises in Nigeria and South Africa. The SE owner-manager invests in different types of tools to manage their customers. The findings discussed in Chapter Five revealed the identification of redundant ITs. The objective of demonstrating the EADF with Customer Relationship Management (CRM) decisions for SEs is to inform decision-makers of the key considerations for choosing a CRM system, identifying the criteria for selecting a vendor, understanding the viability of a CRM system for a business, determining the types/levels of CRM system that suits decision makers' business, and to identify the best implementation strategies for the choice of a CRM system.

CRM systems helps a business to identify potential customers through marketing, manages customer relationships, retains existing customers in order to drive sales, and analyses customers' data to make informed business decisions that can improve business relationships with customers and ensure business growth (Anderson, Jolly, & Fairhurst, 2007; Gao & Zhang, 2008; Kevin, Soo, & Poon, 2007). The management of customer relationships involves the analysis of customers' data. CRM systems help businesses to gain insight into the characteristics of their customers, reduce costs, recognise customers' value, provide quality service, and modify business activities to better serve customers (Arab, Selamat, Ibrahim, & Zamani, 2010). Figure 6-3 shows how the EADF is applied to CRM decision-making process.

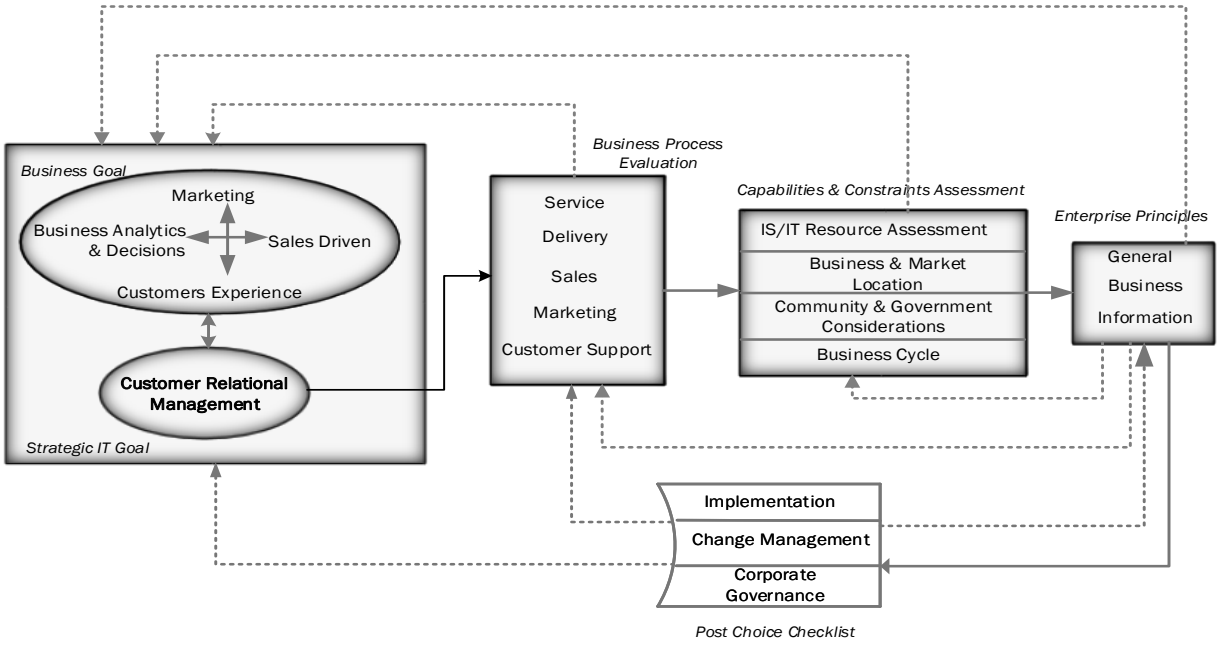

Figure 6-3: EADF applied to CRM Decision Making Process

6.7.1.1 Business-IT Goal

Businesses differ in service delivery, culture, business goals, environment, and strategies. It is impractical to assume a general goal and objectives for a business to maximise all the benefits of a CRM system. Table 6-3 suggests potential strategic objectives small business owners (in manufacturing, retail, and service industries) should consider when choosing a CRM system. The word 'priority' represents the relevance of the objectives to the corresponding industries. The objectives for managing customer relationship will always differ in SEs, therefore, Table 6-3 is not an exhaustive list but a guide to enlighten the decision-makers.

Business Objectives for CRM System	Manufacturing	Retail	Service
Automation Sales Process	Priority	Priority	Priority
Customer acquisition and retention	Priority	Priority	Priority
Customer acquisition and retention	Priority	Priority	Priority
Customer analysis	Priority	Priority	Priority
Customer loyalty programmes		Priority	Priority
Customer segmentation		Priority	Priority
Customised service delivery			Priority
Data Mining		Priority	Priority
Effective communications	Priority	Priority	Priority
Improve marketing effectiveness (real-time promotional & personalization)	Priority	Priority	Priority
Improve the quality of product	Priority	Priority	
Intellectualization, and standardisation of products and processes	Priority	Priority	Priority
Knowledge management	Priority		Priority
Monitoring of production process	Priority		

Business Objectives for CRM System	Manufacturing	Retail	Service
Organise activities in a more systematic approach	Priority	Priority	Priority
Product management (quality, branding, packaging & guarantee management)	Priority	Priority	
Reduce engineering lead-time	Priority		
Reduce labour cost	Priority		
Reduction of cost of sales		Priority	
Service management			Priority
Widely distributed workforce			Priority

Table 6-3 - Business Objectives for Customer Relationship Management Decisions

i. Manufacturing Industry

Manufacturing industries often have channelised uninterrupted routines essential to the functioning of the organisation. CRM system can increases production revenue, reduce labour cost, improve the quality of products, reduce engineering lead-time, organise activities in a more systematic approach, inter alias (Kevin et al., 2007). Gao & Zhang (2008) argued that a CRM system helps organisations realise process automation, intellectualisation, and standardisation of products and processes. CRM system offers businesses the opportunity to manage products' quality, branding, packaging, guarantee management, and evaluation of performance.

ii. Retail Industry

The increased globalisation, market saturation and business mergers facing retail industries make it a very dynamic environment (Anderson et al., 2007). A CRM system helps in segmenting customers through information gathering and analysis, promotion of sales, personalised marketing, customer acquisition and retention such that customers tend to create an emotional bond with stores, and reduction of cost of sales and retaining old customers (Arab et al., 2010). CRM system improves marketing effectiveness through real-time promotional effort and personalisation, create incentives for customers, manage customer loyalty initiatives, build product brand, conduct customer analysis with initiatives such as spending pattern and profitability analysis, and monitoring strategies for customer acquisition and retention (Anderson et al., 2007).

iii. Service Industry

Service industries offer intangible goods. Customers are at the forefront of operation in service industries; it is significant to create an environment that nurtures customers' relationships and preserves knowledge within the enterprise (Luck & Lancaster, 2013). Customer value management, knowledge management, effective communications, widely distributed

workforce, and customised service delivery are significant checklist measures for a CRM system (Foss, Stone, & Ekinci, 2008). CRM systems should support the streamlining of complex process and automation of workflow. Cost reduction, distributed data, increased customer satisfaction, better customer retention, and an increase in loyal customers, are benefits of using a CRM system (Luck & Lancaster, 2013).

6.7.1.2 EADF Maturity Levels for CRM Decisions

Small enterprise owner-managers do not usually have sufficient skills and may not be able to ascertain the possible CRM system alternatives that will suit their current and future business needs, although, they have a good understanding of their business processes and vision for their prospective business. The EADF recommends the assessment of five business processes to determine the maturity level of an enterprise for a CRM system choice. This study proposed a *maturity levels for CRM decision* to guide business owners on the potentials of CRM system, bearing in mind the current/future business processes of an enterprise. Figure 6-4 represents the EADF maturity levels for CRM decisions in SEs.

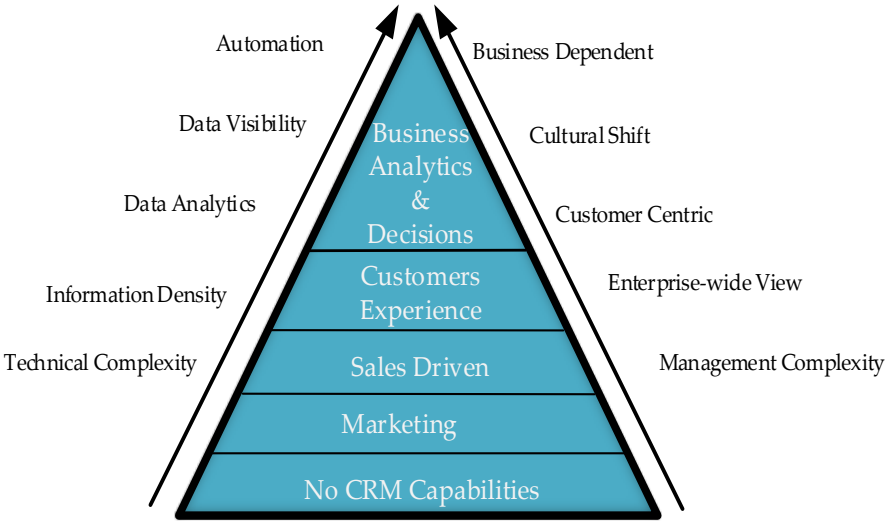

Figure 6-4: EADF Maturity Levels for CRM Decisions

i. No CRM Presence

This phase assumes that a business might not have the capabilities of using a CRM system. The nature of the business or resource constraints might be the hindering factors for a business not suited for any CRM system's implementation. A business with few customers or small customer record that can be managed with a spreadsheet should not be investing in CRM system.

ii. Marketing

This is the entry level into CRM system usage where the aim is to support marketing and understanding of the purchasing habits, opinion, and preferences of customers. This includes profiling customers' needs to achieve effective targeted marketing and the development or improvement of products/services to satisfy or win more customers. This type of CRM initiative is activity-based and creates a visibility of data between the sales, customers' service, and marketing departments. The focus at this stage is on managing customers' information to drive marketing campaigns and possibly sales, but less emphasis is on analysis of customers' data.

iii. Sales-Driven

The sales-driven level of CRM focuses on better customer relationships, which can lead to an effective identification of customers' needs through customer profiling, including increasing sales by timely delivery of product or service, suggesting alternatives or enhanced products/services to customers, and better management of customers' purchases. Sales-driven CRM level supports tactical operations and integrates processes from sales, customer services, and marketing departments. This phase of CRM system's implementation provides a holistic view of customers across different departments. Customer data, information analysis, and workflow processes that cross departmental boundaries and allows sharing of information to support the management of customer relationships, are criteria for choosing sales-driven CRM system.

iv. Customers Experience

The customer experience phase of CRM system's implementation is to achieve improved customer experience and often support multiple communication channels like mobile phones, emails, social media, knowledge management systems, and more. The focus is to provide a better service experience to customers. To optimise business performance with this type of CRM systems, businesses need to develop customer-centric capabilities and actively integrate the systems into daily operations. A strategic initiative and change in customer experience strategy and cultural shift are anticipated. Also, a successful customer relationship is not an inside-out perspective but rather companies need to understand that good customer experience is from the customers' perspective. CRM systems in this stage should provide real-time and on-demand customer information regardless of where the data resides. Extension of customers view from departmental to enterprise view, information analysis, linking the

objectives of choosing a CRM system to business objectives, and customers segmentations are checklists for this type of CRM decision.

v. Business Analytics and Decisions

This highest maturity level of implementing a CRM system supports business intelligence and allows business owners to make critical business decisions. Analytical CRM systems should drive business objectives. Businesses planning to adopt this level of CRM should have strategies to differentiate customer-centric capabilities and simultaneously redefine those capabilities to achieve a leading role with CRM systems. This level of maturity provides an enterprise-wide view of companies. Analysed data are collected using correlation, pattern recognition, and data mining techniques. The result of analysed data is presented to managers to make more informed business decisions, solving business problems, and improving marketing strategies. Database profiling of customers and product recommendations, customer segmentation, the creation of marketing campaigns based on predictive behaviour of customers, proactive responses to customers' need by understanding their evolution, are criteria for business-centric CRM systems. At this stage, the performance measure of the CRM system is revenue focused, and the intelligence is more predictive.

6.7.1.3 IS Assessment for Deploying CRM Systems

The level of IS that exists in an organisation as well as organisational maturity should determine the type of CRM technology a business should adopt. This study recommends three approaches for deploying a CRM. The on-premises deployment, cloud deployment, and hybrid deployment. Table 6-4 summarises the requirements that businesses can consider before deciding.

	On-Premises Deployment	Cloud-based Deployment	Hybrid Deployment
Control of System	Yes	No	Partial
Deployment Time	Slow	Fast	Slow
Flexibility & Customisation	Unlimited	Limited	Relatively Limited
Infrastructural Requirement	Sophisticated	Reduced	Sophisticated
Initial Setup Cost	High	Relatively Low	High
Installation & Configuration	In-house/Vendor	Vendor	In-house/Vendor
Internet Connectivity	Not Required	Required	Required
Reliance on Internal Support	High	Low	High
Remote Access to CRM systems	No	Yes	Based data access
Return on Investment	Slow	Fast	Slow
Scaling of CRM Systems	Complex	Easy	Complex
Sensitive Business Data	Recommended	Not Recommended	Recommended
Service Level Agreement	Required	Required	Required
Subscription	Fixed	Fixed/ Per Usage	Fixed/ Per usage

Table 6-4- EADF Criteria for CRM Deployment options

i. On-Premises Deployment of CRM System

The *on-premises deployment of CRM* system is the deployment a CRM system within the enterprise's premises. Businesses are responsible for the installation, configuration, and maintenance of the software on internal infrastructure. The purchasing of the necessary hardware and supporting software and licenses constitutes the initial capital outlay. Ongoing support of the environment will also increase the operating costs, as the servers will need to be maintained by internal support staff or vendors. The requirements for disaster recovery need to be considered when selecting this option, as the implementation and maintenance are the responsibilities of the enterprise.

On-premises deployment offers the reassurance that the business application or data is residing within an infrastructure where the business owner has full accountability, responsibility, and control of the system. Organisations that have existing infrastructures can integrate an “on premises” CRM system, which offers greater flexibility and customisation. In selecting an “on premises” deployment option, the drawbacks that need to be considered are: the initial upfront cost is higher, return on investment is longer, heavy reliance on internal supports or vendors, and the complexity of maintenance and scaling.

ii. Cloud-Based Deployment of CRM System

The *cloud-based deployment of CRM system* moves the application and data from the internal infrastructure and makes use of existing infrastructure offered by a service provider. The application, data, infrastructure, security, upgrades, and code all reside with the chosen service provider. Users access and interact with the application through the internet and the up-front cost of infrastructure and supporting software is reduced.

Cloud deployment offers lowered initial setup cost because solutions are typically subscription-based which reduces the need for a capital outlay of IT infrastructure, time, and skills. The vendors are responsible for the installation, configurations, customisation, software updates and upgrades, which eliminate the need for extensive internal IT involvement. This option offers users flexibility of usage and payment because the subscription is based on usage, thus improving quality and time to get value from the system. The challenges of cloud-based deployment are that customer’s data is stored and maintained outside the control of companies which poses a potential risk to the business. Enterprises should ensure that they establish clear accountabilities with the vendor around service availability, reliability, performance, storage, backup, the risk of data loss and recovery.

iii. Hybrid Deployment of CRM System

The *hybrid deployment of CRM* system gives the businesses the option to make use of elements of the on-premises and cloud deployments to suit their specific requirements. This gives businesses the flexibility of the subscription-pricing model of a cloud deployment, yet retains complete control over data internally behind secured infrastructure. The decision to keep the hybrid setup or move into an on-premises or cloud deployment model lies with the users. Businesses that adopt hybrid deployment will be able to take advantage of the affordability of the chosen CRM system, which is hosted in the cloud, and the data being stored and managed locally. Hybrid clients are fully responsible and accountable for the management, security, and privacy of business data. When deploying a hybrid CRM system, businesses should consider the increased dependency on an internal IT workforce or vendors to set up and maintain the internal portion of the CRM system. Preferably, IT skills should be outsourced to an external vendor which will increase the operating cost.

6.7.1.4 EADF Recommended Architectural Principles for CRM Decisions

Architectural principles should guide business owners in enforcing procedures, policies, and rules for implementing a CRM system. This study recommends but does not limit businesses to these principles. Table 6-5 highlights architectural principles (name) and the applicability of the principles based on the maturity of a business and the deployment option. Business owners and decision-makers should contextualise (rationale and implications of the principles) the principles to suit their business. This will formalise the implementation process of a CRM system in small enterprises.

Enterprise Domain	Principle	Maturity Levels					Deployment		
		No CRM	Marketing	Sales Driven	Customers Experience	Business Analytics	On-Premise	Cloud	Hybrid
General	Business-IT alignment	✓	✓	✓	✓	✓	✓	✓	✓
	Common use of IT solutions						✓	✓	✓
	Compliance with Law		✓	✓	✓	✓	✓	✓	✓
	Consistency of IT						✓		✓
	Enterprise process automation					✓			
	Equitable use interface						✓		✓
	Learnability						✓	✓	✓
	Non-proliferation of Technology	✓	✓	✓	✓	✓			
	Productivity is a priority		✓	✓	✓	✓			

Enterprise Domain	Principle	Maturity Levels					Deployment		
		No CRM	Marketing	Sales Driven	Customers Experience	Business Analytics	On-Premise	Cloud	Hybrid
	Quality is a priority		✓	✓	✓	✓			
	Realistic Solutions					✓	✓		✓
	Simple IT solutions						✓		✓
	Simplify re-invented processes			✓	✓	✓			
Business	Customer Focus		✓	✓	✓	✓			
	Opportunity to market		✓	✓	✓	✓			
	Publish Business Goals	✓	✓	✓	✓	✓			
	Quick response to customers			✓					
	Response to Threat					✓			
Information	Information Openness		✓	✓	✓	✓			
	Data Backup						✓		✓
	Data protection						✓	✓	✓
	Information Confidentiality						✓	✓	✓
	Real-time Integration						✓		✓
Application	Compliance to Standards		✓	✓	✓	✓	✓	✓	✓
	Documentation						✓	✓	✓
	Open source preference							✓	
	Scalable application						✓		✓
	Service Level Agreement is mandatory						✓	✓	✓
Infrastructure	Centrally secured infrastructure						✓		
	Control of infrastructure						✓		✓
	Reusable infrastructure						✓		✓
	Scalable infrastructure						✓	✓	✓
Security	Cos-effective security						✓		✓
	Enterprise security ownership						✓		✓
	Security is organisational responsibility						✓		✓
	Security re-assessment						✓	✓	✓

Table 6-5-Recommended Architectural Principles for CRM implementation

6.7.2 Online Presence

Online presence is an alternative online business channel to service business stakeholders and to develop a brand reputation to deliver instrumental goals to visitors of the web (Agarwal & Venkatesh, 2002). Online presence is the process of creating and maintaining a digital footprint on the internet and presenting and attracting online customers to products or services. Online presence comprises of a new set of internet systems that connects business to customers and suppliers, enabling trade across a computer network (Judith McKay, Marshall, & Prananto, 2000). Online presence involves the administration and running of a business using the

internet, marketing and messaging strategy, and the representation of the business on the World Wide Web.

Most of the SEs in Nigeria and South Africa invest in online presence technologies. This study refers to technologies like the company's website, social media/social network, online payment systems, and marketing strategy tools (such as Twitter, Instagram, LinkedIn) as online presence. The empirical findings revealed that the online presence tools are mostly used by all the South African and Nigerian small enterprises. The dominance of online presence tools motivates the demonstration of the EADF with online presence decision of SE owner-managers.

The aim of demonstrating the EADF with the online presence decisions is to apply the EADF to guide the decision-makers' understanding in addressing the questions of how, why, when, where, who, and what is required to invest in any type of online presence IT solution. This section addresses the question of when and why an enterprise should/should not invest in an online presence technology, the type of online presence that suits a particular business, and the best implementation strategy. Figure 6-5 illustrates the application of the EADF to guide online presence decisions of SE owner-managers.

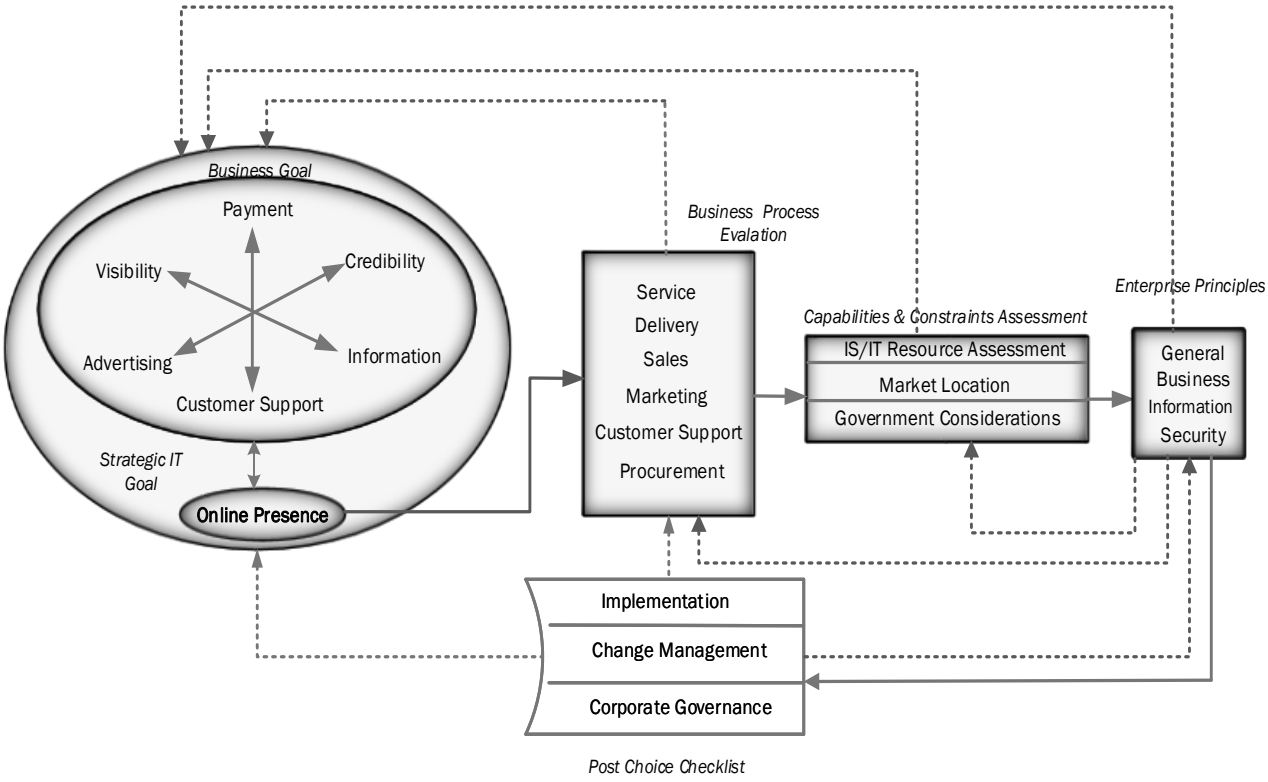

Figure 6-5 – EADF applied to Online Presence Decision Making Process

6.7.2.1 Business/IT Goal

An online presence provides general business opportunities across manufacturing, retail and service industries. SE owner-managers can be motivated to invest in online presence technology to achieve any or all of the following goals:

i. Creating business accessibility.
ii. Building product or service brand.
iii. Creating a greater audience.
iv. Providing 24/7 business access.
v. Providing a platform for reviewing product/service.
vi. Building a relationship with customers.
vii. Lowering advertising cost.

6.7.2.2 Business Process Evaluation and Online Presence - CMM

Businesses may choose the category of online presence that suits their business processes based on the assessment of business and resources capabilities. Figure 6-6 represents a maturity level based on the EADF for SEs. The horizontal axis shows the relationship between the maturity levels and the complexity of implementing online presence in small enterprises. The vertical axis highlights the relationship between the certain business criteria and implementation of online presence.

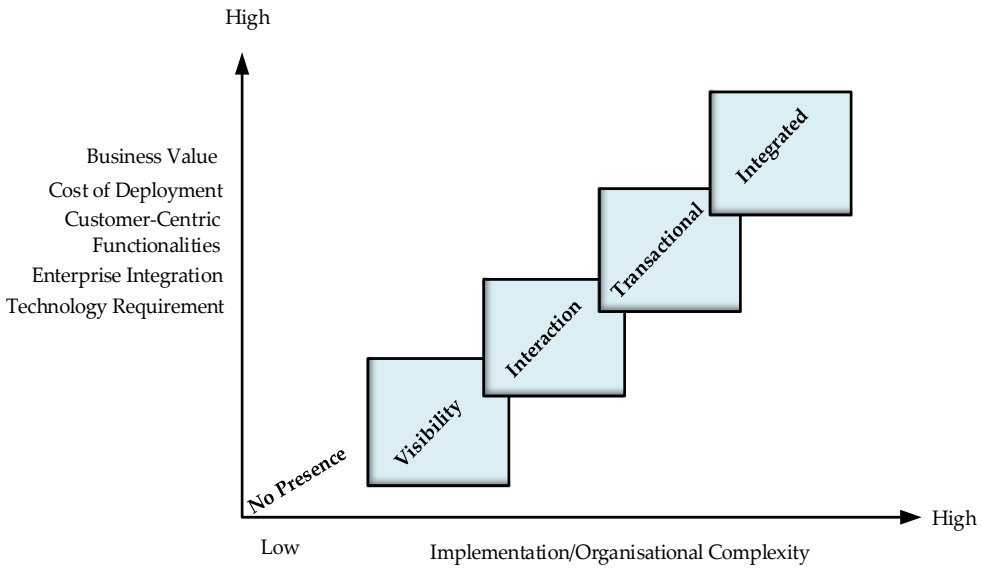

Figure 6-6- EADF Maturity Level for Online Presence Decisions

i. No Presence

In this phase, the organisation has no online presence. Organisations in this stage may not feel the need to have an online presence because it is not relevant to their business, SEs in this category lack IT skills or feel uncertainty around the cost benefit or issues of risks and security. The IT skills in this kind of organisations are predictably limited and, most likely, personnel are driven by their motivation to use IT (McKay et al., 2000).

ii. Visibility

This stage involves the creation of a basic website, presence on social media platforms solely to display information about the company, brochures, catalogues, advertisement, contact information, or static information. This is the most common usage of an online presence and it is usually an experimenting and learning phase for businesses in developing an online presence. This stage most commonly includes a static website, with no site reporting, tracking or analysis of information, and communication is one-way (from the company).

iii. Interaction

This is the development of a website, social media platform or any internet-based platforms that users can access to communicate with the business. The communication between business and customers is two-way. The aim is to provide dynamic, specialised, and frequently updated information. An online enquiry option, chat rooms, forums, request for information, response to request or survey, FAQs, resolving a case or complaint, account enquiries, searching for information, are examples of features available at this stage of maturity.

iv. Transactional

This type of online presence marks a significant change in business activity of an organisation (McKay et al., 2000). This refers to the online service that allows customers to conduct business activities with companies. It can entail one or multiple features like ordering goods or services, make an online payment, order tracking, submitting applications, and other features of interactive online presence. This is a two-way communication and automates specific activities of businesses.

v. Integrated

This is the stage where the business has vertically and horizontally integrated its services online across all departments. There is an expectation of full automation and unification of different business processes. The integrated phase requires technology that is more sophisticated. Customers get personalised online service delivery, and users can access different services

from a central system at any given time. Provision of end-to-end electronic transactions, integration of business applications like CRM, ERP, HR Management Systems, sharing of information across all business units, collaboration, automated advice, and problem resolution are requirements for an integrated online presence.

Table 6-6 highlights some criteria SE owners need to assess when making online presence decisions.

	NO PRESENCE	VISIBILITY	INTERACTION	TRANSACTIONAL	INTEGRATED
Communication	N/A	One-way	Two-way	Transactional	Enterprise-Wide
IT Budget	Individual Assets	Primitive Investment by Organisation	Focused Investment	Defined Investment Strategy	Strategic Investment
IT Skills	No Defined Personnel	Designated Staff (Extension of working skulls)	Team-based (Development of Individual Skills)	Team-based	Specialised
IT Usage	Very Limited	No Formal Structure	Technology Confidence	Sophistication (Full-fledge Internet Trading)	Sophistication & Centralization
Maintenance	N/A	Low	Moderate	High	Very High
Ordering System	Physical	Initiate Order (via Emails, Phone)	Initiate Order (via Emails, Phone, Chat)	Initiate, Complete & Track Order (Online)	Initiate, Complete & Track Order (Online)
Organisational IT Strategy	No Deliberate Initiative	Uncoordinated Initiative (Cautious activity or nothing to lose)	Coordinated Approach (Expand Market, Create Channel or Customer Relation)	Opportunistic & Entrepreneur Approach (influence organisational activities, process & structure)	Integrated Initiative
Payment System	Traditional (Cash & Cheque)	Traditional	Traditional & Electronic	Traditional & Electronic	Traditional & Electronic
Recommended Deployment	N/A	Internal Deployment	Internal Deployment	Out-Source	Out-source
Required IT System	Email, Internet	Internet, Email, Domain	Internet, Email, Database, Domain	Ordering System, Payment System, Internet	Online Processes & Services, Data Mining, Data Warehouse
Strategy Business	Wait & See	Effective Information Dissemination	Information Gathering & Dissemination	Online Business Transaction	Information & Process integration, Coordination & Control
Support Multiple Business Outlets	No	Yes	Yes	Yes	Yes

Table 6-6- Summarised Criteria for Online Presence CMM

6.7.2.3 IS Assessment for Online Presence Deployment

Web hosting appears to be the familiar common website deployment option. This study argued that online presence also includes the creation of an account on existing platforms like Facebook and Twitter for marketing and communication purpose. It is not mandatory that online presence will involve the design, development, and hosting of a website. This study suggests four types of online presence deployment for small enterprises as shown in Table 6-7. being: Social Media (SM) platform, Shared Server (SS) platform, Virtual Private Server (VPS) platform, and Dedicated Server (DS) platform.

	Social Media Platform	Shared Server Platform	VPS Platform	Dedicated Server Platform
Physical space scenario	Open Space	Renting a room	Renting a unit	Renting a house
Resources (CPU, Disk space, Memory, IP)	Very limited	Shared	Shared with dedicated portion	Dedicated
Security	Very limited	Limited	Moderate	High
Speed	Not a criterion	Slow	Moderate	Fast
Server	Not assigned	Shared	Dedicate portion	Full control
Support	Limited	24/7	24/7	24/7
Cost	Free	Affordable	Expensive	Highest Cost
Customisation	Very limited	Limited	Moderate	Full
Privacy	None	Low	Moderate	Exclusivity
Performance	Not a criterion	Slow	Relatively High	High
Control	None	Low	High	High
Backup	Not guaranteed	Available	Available	Available
Technical Maintenance	Not required	Not required	Required	Required
Subscription	Free/Fixed	Fixed	Fixed	Fixed
Type of Online Presence	Visibility	Visibility & Interaction	Transactional	Transactional & Integrated

Table 6-7: EADF Recommendation for Online Presence Deployment

i. *Social Media Platform*

This is the most common and cheapest option of online presence. It easy to setup and often does not require technical skills. Users create an account and can advertise and communicate with customers. The popular platforms include Facebook, Twitter, LinkedIn, Instagram, Pinterest, and YouTube. Certain features require users to make some subscription payment. The confidentiality in social media platform is very limited, and businesses have less control of the system.

ii. *Shared Server Platform*

All resources are shared with other users on the same server space at a lower cost. It is economical and very affordable and suitable for a startup or business that needs a simple online presence like websites and blogs. This type of online presence deployment is like renting a room in an apartment and every other common space or facilities, like playground or parking, has to be shared with neighbours. The performance is relatively slow because the CPU, memory, and storage space are shared with another client. This is not an ideal option for online transactions because security is minimal and traffic is likely to be high.

iii. *Virtual Private Server (VPS)*

Resources are shared with other users but on a dedicated server space. The client can be on the same server, CPU, or hardware. The VPS allows clients to occupy their space on the server, so security is high. Relating this to renting a unit in a complex where you have some space to yourself but the client is responsible for maintaining the rented property.

iv. *Dedicated Server Platform*

The client can choose the kind of operating system they want to use, the software that needs to be installed on servers, preferred hardware, and can decide on the required storage space. With a dedicated server, users have full access to the resources they pay for with full control of the entire system. The four deployment options are often hosted on the cloud server by vendors. Most often, service providers offer the users the opportunity to choose flexible payment options of either monthly, annually, or pay per usage. Small businesses should avoid the setting up internal servers for online presence applications because of the high complexity and resources required.

6.7.2.4 EADF Recommended Architectural Principles for Online Presence Decisions

Table 6-8, highlights some architectural principles that decision-makers can consider as guiding principles for an online presence. Business should contextualise the principles to suit their business by stating how the principles will apply to their business. This will formalise the implementation process of online presence technologies in small enterprises.

Enterprise Domain	Principle	Capability Maturity Model					Deployment			
		No Online Presence	Visibility	Interaction	Transactional	Integrated	SM Platform	SS Platform	VPS Platform	DS Platform
General	Business-IT alignment	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Common use of IT solutions				✓	✓		✓	✓	
	Compliance with Law	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Consistency of IT				✓	✓				✓
	Enterprise process automation				✓	✓				
	Learnability		✓	✓	✓					
	Non-proliferation of Technology	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Productivity is a priority		✓	✓	✓	✓				
	Quality is a priority		✓	✓	✓	✓		✓	✓	✓
	Shared IT Resources						✓	✓	✓	
	Simple IT solutions						✓	✓	✓	✓
	Simple user interface			✓	✓	✓				✓
Business	Customer Focus		✓	✓	✓	✓				
	Long-term focus goal				✓	✓				
	Quick response to customers			✓	✓	✓				
	SMART Business Goals	✓	✓	✓	✓	✓				
Information	Currency of information		✓	✓	✓	✓				
	Data Backup							✓	✓	✓
	Data protection							✓	✓	✓
	Information Confidentiality				✓	✓		✓	✓	✓
	Information Stewardship		✓	✓	✓	✓				
	Real-time Integration				✓	✓				
	Shared Information				✓	✓				
Application	Compliance to Standards		✓	✓	✓	✓	✓	✓	✓	✓
	Documentation		✓	✓	✓	✓		✓	✓	✓
	Service Level Agreement is mandatory							✓	✓	✓
	Software flexibility		✓	✓	✓	✓				
	Software interoperability							✓	✓	✓
	Software stewardship		✓	✓	✓	✓				
Infrastructure	Centrally secured infrastructure							✓	✓	
	Reusable infrastructure							✓	✓	✓
	Scalable infrastructure							✓	✓	✓
Security	Audit Trail			✓	✓	✓		✓	✓	✓
	Confidentiality			✓	✓	✓		✓	✓	✓
	Consistent security policy			✓	✓	✓		✓	✓	✓
	Security is organisational responsibility				✓	✓				✓
	Security re-assessment				✓	✓		✓	✓	✓

Table 6-8 - Recommended Architectural Principles for Online Presence

6.8 Reflection

This study has presented a conceptual framework that will guide the SE owner-managers' IT decision-making process. The EADF is a plausible and generic approach that can guide SE owner-managers when making strategic IT investment decisions in manufacturing, service, and retail industries. The framework was conceived based on empirical findings. The researcher

applied the principles of enterprise architecture, strategic alignment, and business process as intervention strategies to overcome the IT decision-making challenges in SEs. The objectives of the suggestion phase of the DSR led to the development of the EADF which (i) provides SE owner-managers with a formalised IT decision process, (ii) guides the information seeking of decision-makers when making strategic IT decisions, (iii) serves as benchmark framework for strategic IT decisions in SEs, and (iv) supports business owners in achieving strategic IT investment decisions and avoiding the intuitive and bounded rational approach to strategic IT decision-making.

This chapter describes the development of the EADF and highlights a theoretical demonstration of the EADF as the first substantiation techniques for assessing the validity of the EADF as an artefact. The recommended guidelines of the EADF employed in demonstrating the activities, criteria, and anticipated outcome for two-selected IT decisions (CRM and Online Presence). The conceptual validation proved the relevance and the feasibility of the EADF as a strategic IT decision framework in SEs. The maturity levels developed, the capability assessments illustrated, and the architectural principles recommended in Section 6.7 affirmed the potential of the EADF as a guideline for IT choices. The EADF serves as a guiding lens to SE owner-managers to identify their information needs when making IT decisions as demonstrated with CRM and Online Presence decisions. The demonstration of the EADF with CRM and Online Presence decisions elucidate the plausibility of the EADF for other IT decisions like ERP, internet connectivity, hardware purchase, and so on. Furthermore, the validation of the EADF affirmed that the EADF would enlighten the SE decision-maker on the criteria for making IT choices, the best strategy for selecting preferences, as well as how to sustain and leverage IT investments.

It is important to note that the EADF is a plausible approach to achieve strategic IT decision-making process in SEs. However, the conceptual demonstration of the EADF poses the argument of the correlation between the relative cost and the potential benefits to decision-making in SEs. The amount of time required to search for the extensive information based on the EADF is not proportionate to the perceived benefits, especially when IT choice process is based on intuition. On the contrary, the aim of conducting the holistic assessment is not to provide a quick recommendation for a specific IT solution based on intuition but to demonstrate and create awareness of more comprehensive alternatives. The SE owner-managers become aware of the EA principles and guidelines as a strategy for alignment as they

adopt the EADF. This serves to improve the decision-makers' cognition, and increases the learning experience of the decision-maker (Ogarca, 2015; Raffaldi et al., 2012).

The guidelines provided in this chapter can be described as a theoretical approach and assumptions because the conceptual demonstration of the EADF lacks practical demonstration as an intervention for SEs' strategic IT decision-making process. The EADF is a holistic approach of formalising IT investment decisions with limitations, such as (i) the EADF is an interlinked and iterative process that the researcher conceived based on SEs' dynamic environment, but the application of the EADF will likely be too complex for informal SEs to adopt; (ii) the successful application of the EADF depends on the SE owner's cognition, and (iii) the empirical findings revealed that SE owner-managers are strategic in defining their business goals but the predicted challenge is the ability of the SE owner-managers to develop enterprise-specific criteria, alternatives, standards, and maturity benchmarks as suggested in the description of the EADF (Apulu & Latham, 2011; Drew, 2003).

Findings revealed that one of the challenges of IT success in SEs is the lack of a formalised decision-making process as discussed in (Alyahya & Suhaimi, 2013; Levy et al., 2002) and evident in the empirical findings. Hence, it is likely impossible for SE managers to follow the EADF approach when making IT decisions methodologically. To fully achieve the goal of developing the EADF, this study suggests the development of an artefact (method, model, or instantiation) that is premised on the EADF. The artefact will simplify the application of the EADF for optimal IT decision-making in SEs.

6.9 Summary

This chapter successfully presents an enterprise architecture-driven framework as a suggestion to intervene in the IT decision challenges of SEs. The EADF has been validated and demonstrated with two prominent decisions in SEs. The reflection presented iterates the need for an instantiation artefact that will ease the application of the EADF for SE owner-managers because of the characteristics of SEs. The next chapter presents the design and development of an instantiation artefact informed by the EADF presented in this chapter.

7 Chapter Seven – Design and Development

7.1 Introduction

This chapter presents how the EADF was used to develop an artefact that supports SE owner-managers in making optimal IT decisions. The artefact was demonstrated with two common yet complex IT decisions that emerged in the empirical study (as discussed in Chapter Five and Six). The artefact focused on three types of industries: manufacturing, retail, and service companies. This chapter describes in detail, three iterations that the research conducted to develop an IT decision-assistive tool, the methodologies, the formative evaluations, and the learning outcome from each evaluation process. The formative evaluation focuses on users' perspective, artefact content, and design process to improve the development of the final prototype (Venable, Pries-Heje, & Baskerville, 2012). This chapter is structured in five main sections. Each of the main sections describes the iterative process involved in this study. The chapter concludes with a summary section which describes the overall outcome the iteration in this study.

7.2 First Iteration: Manual IT Decision Artefact (MITDA)

The first iteration involved the design of sets of business-oriented questions with corresponding answers to each question. Each answer is assigned recommendations based on the principle literature and researcher's experience. The EADF guided the design and generation of the recommendations. The responses from which the decision-makers are expected to select is based on the EADF maturity levels for CRM and Online Presence decisions presented in Chapter Six.

The researcher generated questions, answers, and recommendations for the business-IT goals phase, the business process evaluation phase, and the capabilities & constraints assessment phase of the EADF. The researcher also developed a set of enterprise architectural principles and categorised the principles based on the five perspectives discussed in Chapter Five, being, general, business information, software/hardware, technology, and security principles. The enterprise architecture principles recommendations are categorised based on the maturity level created, industry type, type of IT decisions, and business objectives.

The content of the MITDA was populated with questions, feedback, and recommendations based on literature and EADF guidelines. The researcher was responsible for choosing the

appropriate and relevant questions and feedback based on referenced literature related to the EADF. The focus of the researcher was to demonstrate that the decision-maker can make optimal decisions by searching for information based on the EADF. Figure 7-1 shows the structure and components of the MITDA.

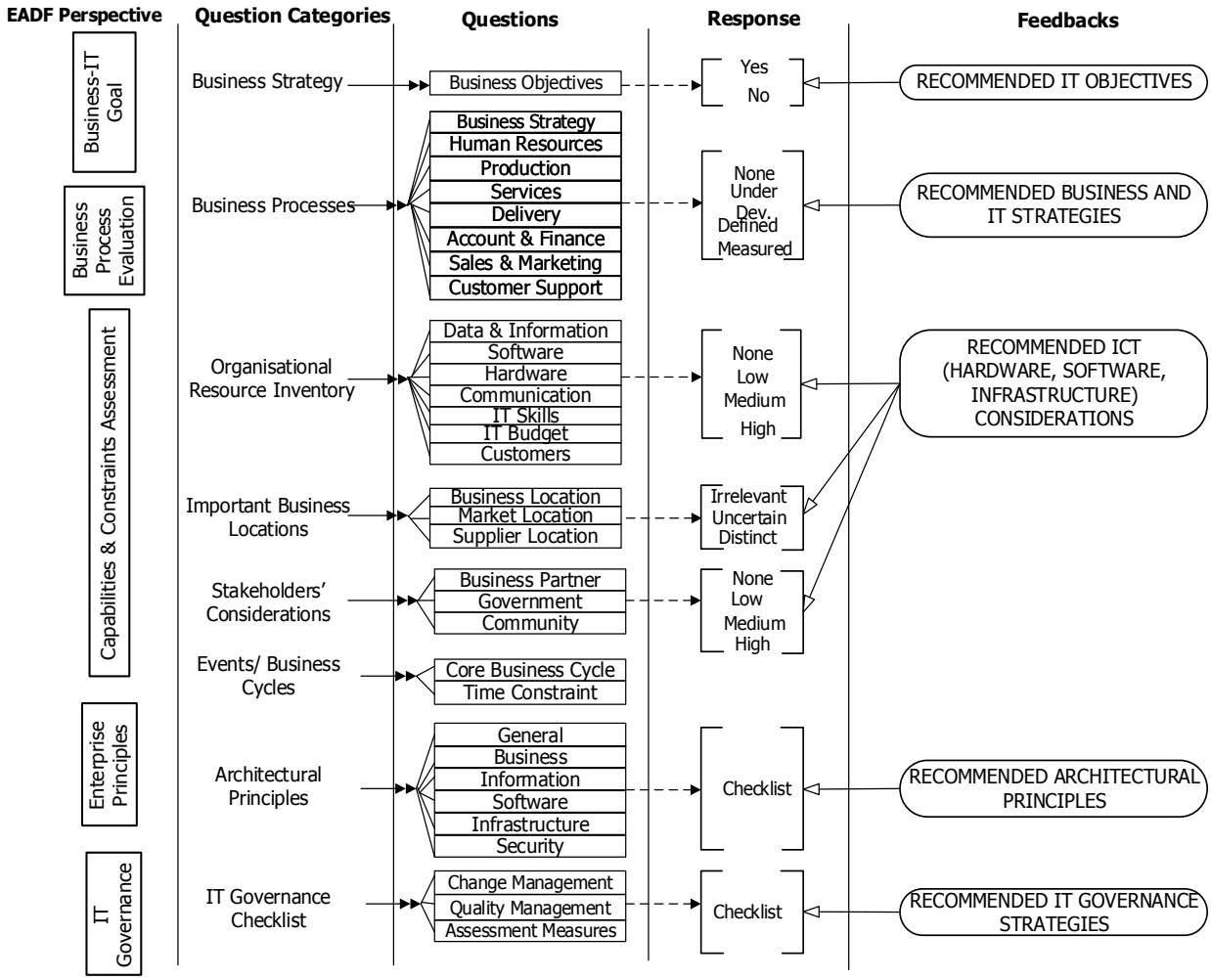

Figure 7-1: Structure of the Manual IT Decision Artefact

Figure 7-1 illustrates how the EADF was employed to generate various categories of questions for the MITDA and the structure of the MITDA. The ''questions categories'' heading in Figure 7-1 illustrates the researcher's conceptualisation of the information that corresponds to the EADF phase. The "question categories" identifies the distinct set of questions that were compiled to ascertain the decision-makers' criteria. The "response" section highlights the response the decision-maker must choose for each category of questions. The responses are a combination of scale options, Yes/No, and checklists. The "feedback" section depicts the type of recommendations that a decision-maker gets by responding to each category of questions.

The business-IT goal phase focused mainly on the business objectives of SEs and how IT can help SE owner-managers leverage their business goals with IT. This is premised on the assumptions that SEs make operational strategies (Alyahya & Suhaimi, 2013; Kyobe, 2008). The business process phase focused on the different activities of an enterprise as described in Chapter Four. Hence, the decision-maker responded to questions that applied to their business (e.g. retail, service, or manufacturing industry). The IS capabilities and constraints phase of MITDA listed three key factors for assessment (that is, organisational IT resources, the impact of IT investment on business locations, the influence of IT investment on stakeholders' requirements for the IT investment on business cycle). The enterprise principle phase offers recommended principles based on the type of industry and enterprise maturity level for a given IT decisions. The IT governance phase presents the decision-maker with relevant recommended resources to guide their choice and management of IT. Figure 7-1 was demonstrated with two types of IT decisions, that is, the online presence and CRM decisions. The next section describes how the MITDA was demonstrated with CRM and online presences.

7.2.1 Demonstrating the MITDA with CRM and Online Presence Decisions

The detailed content of the design specification of CRM and the online presence decisions with the MITDA is presented in Appendix A5. The aim of demonstrating and populating the MITDA with questions, responses, and recommendations was to ensure that decision-makers are enlightened on the type and level of information they should seek when making CRM and online presence decisions. The MITDA was formatively assessed by three enterprise architecture professionals with extensive experience in enterprise architecture. The researcher presented the research concept in a workshop and requested for volunteers with a minimum of 3years experience as EA practitioner to assessed the MITDA. The volunteers were all based in South Africa. The EA practitioners were contacted via emails, and the artefact was emailed to them for content assessment. The next section summarises the suggestions from the three enterprise architecture practitioners.

7.2.2 Formative Evaluation of the MITDA

This section presents a summary of the formative evaluation of the MITDA. The evaluation focused on users' perspective, content validation, and design process (Hevner et al., 2004).

The suggestions have been grouped under two major categories; strength and weakness of the artefact as shown in Table 7-1.

Strength/Weakness	Evaluation Perspectives	Summary of Evaluation
Strength	Content Valuation	Business-Oriented Content: The questions in the MITDA are business-oriented which the decision-makers will easily comprehend because the business owner-managers have a good understanding of their businesses. The technicality of the content is moderate such that non-IT business owner-managers can make sense of tool.
	Users' Perspective	No Technical Requirement: Decision-makers do not require IT skills to use the MITDA because the artefact does not have any technical requirement. The simplicity of the artefact will make it relevant for SE owner-managers.
Weakness	Content Valuation	Not Industry-Specific: The MITDA focused on CRM and online presence decisions but failed to distinguish between types of industries. The information needs of manufacturing, retail, and service industries differ even if they make similar IT decisions. Hence, some questions and recommendations in the MITDA were irrelevant in some context.
	Content Valuation	Feedback Duplication: The recommendations and feedbacks in the MITDA were duplicative. Meaning, some questions have similar recommendations.
	Design Evaluation	Not Explicit: The connections between the questions and the recommended feedbacks were not very explicit. The architectural principles and the IT governance strategies did not provide any prescriptive recommendations to decision-makers. The business owner-managers lack the sufficient IT skills to identify the most relevant principles and governance strategy.
	Design Evaluation	The user of the artefact should respond to an average of 40 questions and read the recommended feedbacks based on the codes generated for each response is time consuming.
	Design Evaluation	The researcher had to continuously intervene and describe the procedure for using the MITDA. The usage of the artefact was dependent on the researcher's intervention.
	Design Evaluation	Lack Algorithm: There is no standardised decision tree (algorithm) to explicitly describe the steps to follow in using the MITDA.
	Design Evaluation	Design Complexity and Error Prone: The lack of algorithm for the MITDA makes it difficult to reproduce the artefact without the intervention of the researcher, which defies the design science principles (Hevner et al., 2004). The researcher also found it tedious to add new IT decisions or update existing content.

Table 7-1: Formative Evaluation of the MITDA

7.2.3 Learning Outcome from First Iteration - Awareness of Problem Revised

The MITDA demonstrated the relevance of a tool to support SITDM in the SEs interviewed in this study. The outcome of the first iteration confirms the viability of the intended artefact. However, the challenges identified in the formative evaluation denotes that the researcher needs to refine the MITDA so that the artefact becomes more explicit, easier to use with a defined algorithm, and devoid of any design complexity (Peffers et al., 2007; Vaishnavi & Kuechler, 2012). The evaluation depicts significant need for design improvement of the artefact. Hence, the researcher refined the artefact in a second iteration.

7.3 Second Iteration – Semi-Automated IT Decision Artefact (SITDA)

In this iteration, the content of the MITDA was restructured and organised in a spreadsheet. Ragsdale (2000) describes the use of spreadsheet as a technique for presenting a decision support systems. The 'indexing' technique was introduced in the second iteration. The indexing allows the unique identification of questions, feedback, and recommendations. The indexing techniques makes it easier to re-use questions, feedback, and recommendations. Thus, the questions, responses, feedback, and recommendations were number-coded using Arabic numerals. The indexing serves as primary key and the identification of questions, feedback and recommendations became easier. The introduction of the 'index' allowed for the easy cataloguing of the content of the artefact, speeding up the searching and updating of the content. It also eliminated duplication and simplified the re-use of re-occurring questions and feedbacks. The spreadsheet supports DSS development because the packages are (i) sophisticated in handling data and graphic capabilities; (ii) support "what if" analysis functionalities; and (iii) facilitate the development of DSS (Power & Sharda, 2007). Figure 7-2 illustrates the refinement of the structure and content of the SITDA.

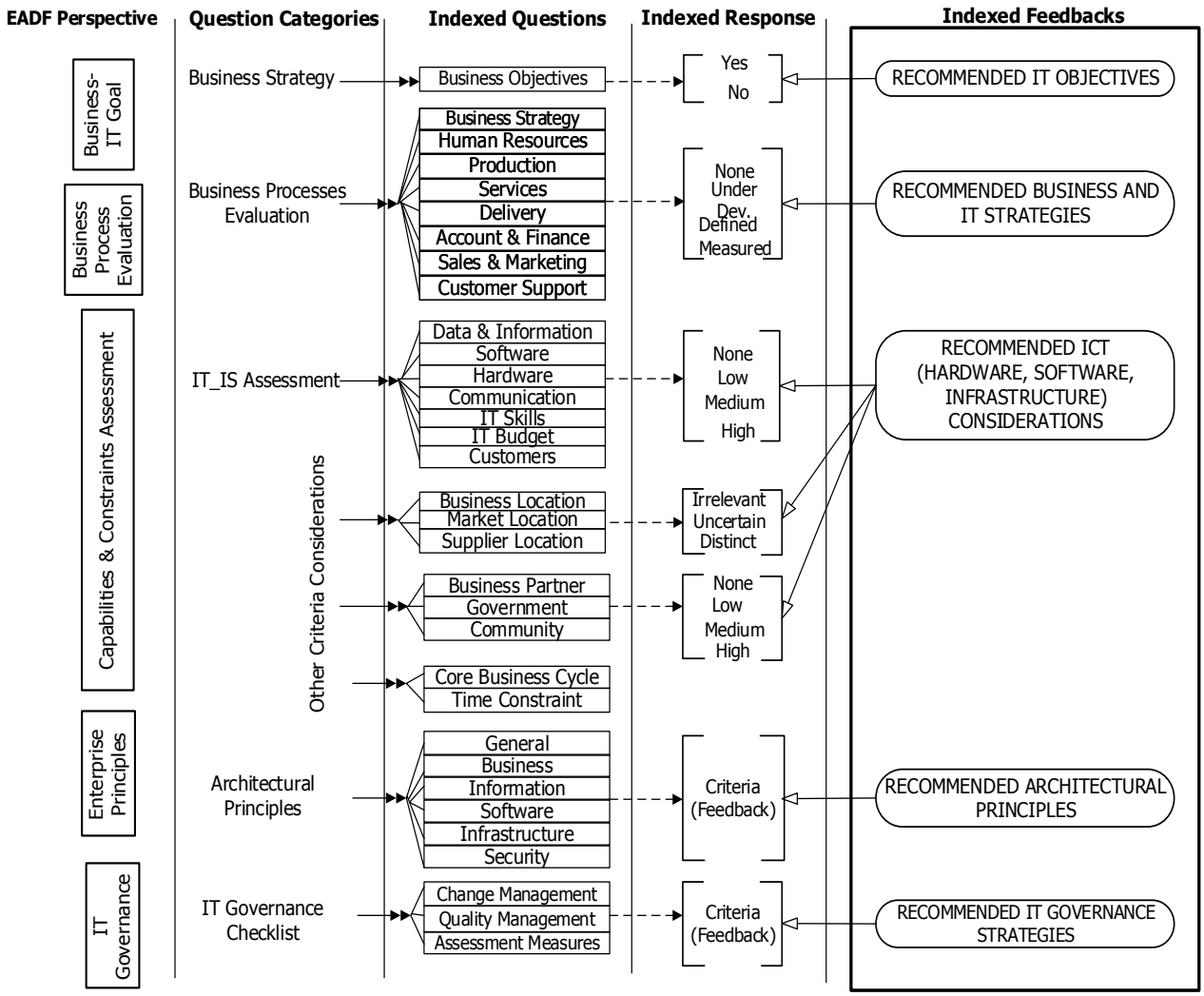

Figure 7-2: Structure diagram of Semi-Automated IT Decision Artefact

The indexing techniques helped in structuring the flow of SITDA. It was easier to explicitly document the process of how to use the SITDA, and the design of a UML use case diagram demonstrated the interlinks of the content. Feedback for all the questions was saved in one workbook of a spreadsheet as depicted with the rectangle under feedback in Figure 7-2. Figure 7-3 and Figure 7-4 are flow chart and Use case diagrams (respectively) showing the flow and interaction of the activities of the SITDA.

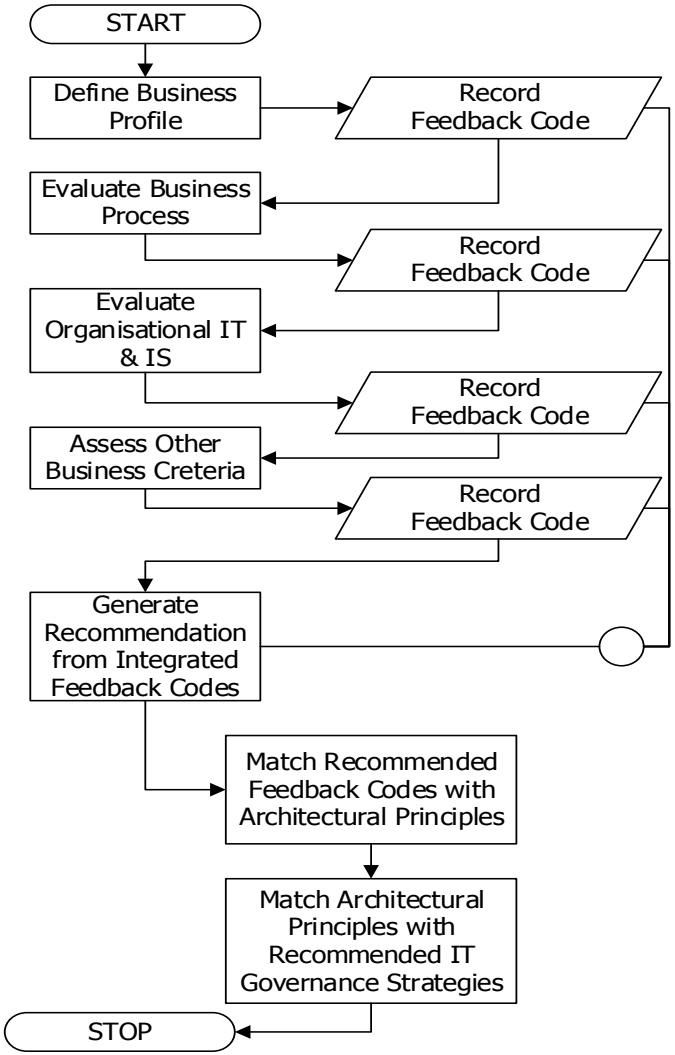

Figure 7-3: Flow Chart for SITDA

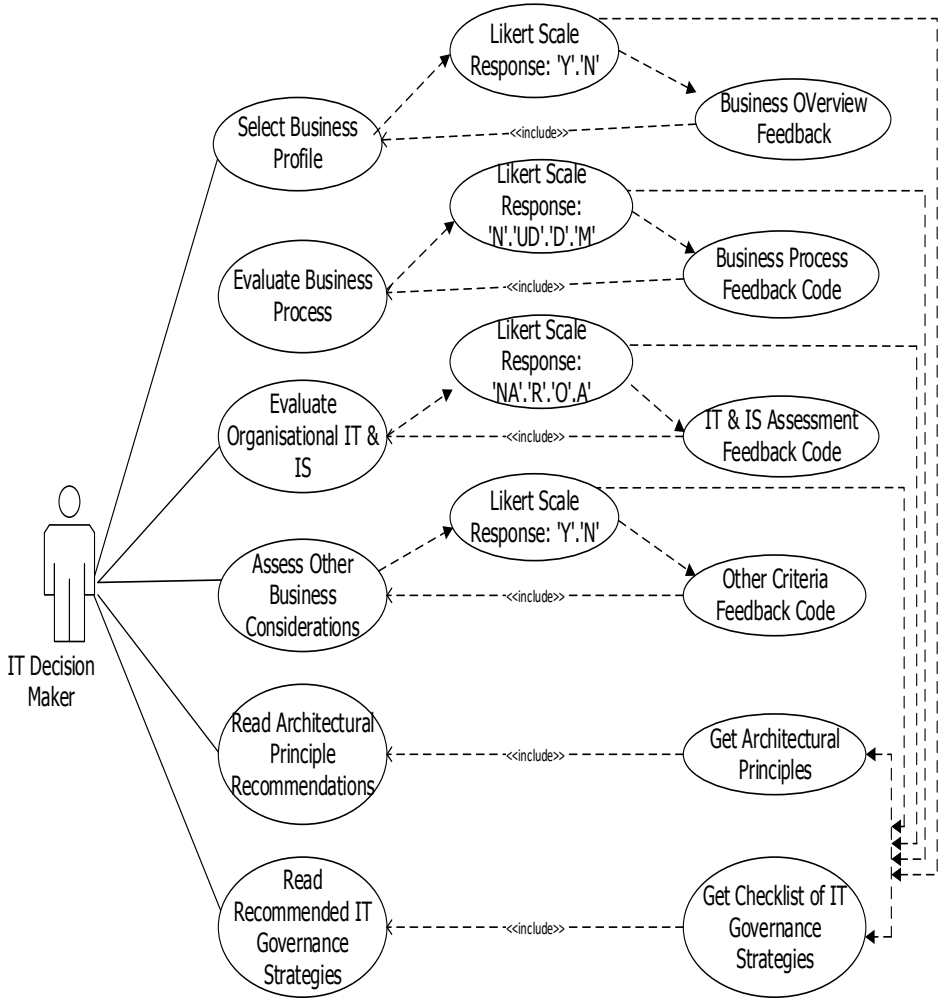

Figure 7-4: Use Case Diagram for SITDA

7.3.1 Demonstrating the SITDA with CRM and Online Presence Decisions

To demonstrate the SITDA with some selected IT decisions, a reference table was created with feedback for each category of questions. For each decision type (CRM and online presence), the artefact developer (the researcher, IT expert or vendor) can create a separate table for questions and the feedback for each category of question, then the questions are included in the reference table. The indexing technique (primary key - *) is used to reference the feedback for each question. Figure 7-5 illustrates the table structure for the CRM and Online presence decisions in this iteration.

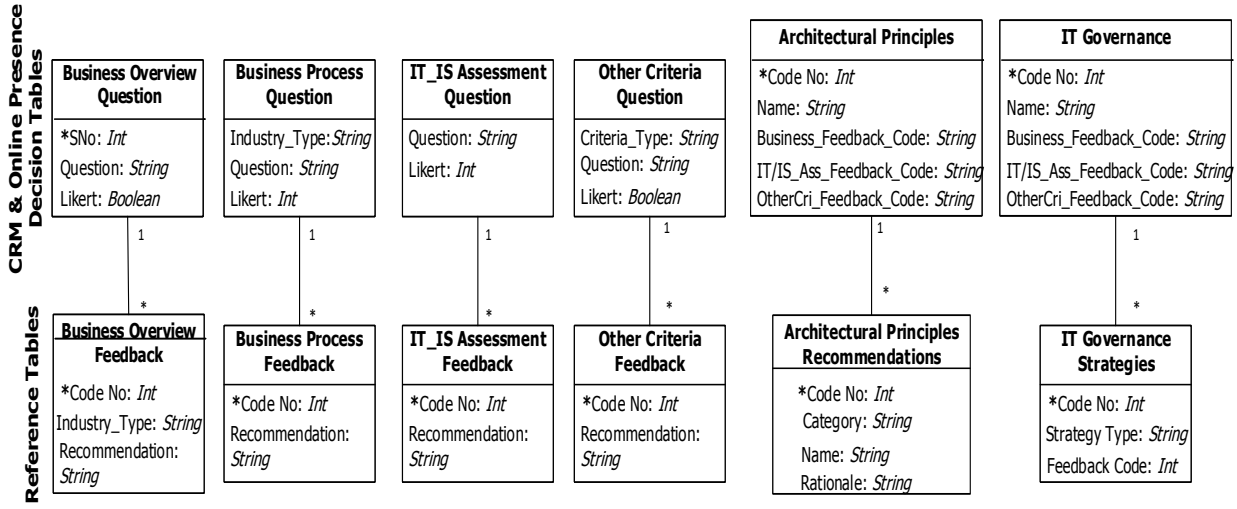

Figure 7-5: UML Table Structure for SITDA

The content of the CRM and online presence decision tables are populated in the same table as illustrated in Figure 7-5. The SITDA support the grouping of questions based on industry (i.e. manufacturing, retail, and service companies) as illustrated in the "Business Process Question" table. The three industries had different categories of questions to respond to with varying recommendations. Appendix A6 illustrates the content of the SITDA demonstrated with CRM and Online Presence decisions.

7.3.2 Formative Evaluation of SITDA

The SITDA was evaluated formatively with the researcher's supervisor and two postgraduate students with limited IT background. The postgraduate students were requested to evaluate the SITDA based on the content relevance, usability and design-value (Hevner et al., 2004). Table 7-2 summarises the outcome of the evaluation of the SITDA.

Strength/Weakness	Evaluation Perspectives	Summary of Evaluation
Strength	Design Evaluation	Process Documentation: The indexing of the questions in the SITDA made it easier to document the processes and the flow of the artefact. This allowed the documentation of the design of a flowchart diagram and use case diagram for the artefact.
	Design Evaluation	Replication is feasible: Replicating the content of SITDA with new IT decisions was feasible but seems tedious. The algorithm provided a clear roadmap for populating the artefact with new decisions.
	Design Evaluation	Content Update: The indexing of the spreadsheet made updating of the content of the artefact easier. It was more flexible to update feedbacks when some questions are changed.
Weakness	Design Evaluation	Not interactive: The artefact was not very interactive for self-usage. The decision-makers have to read through a guide to use the SITDA. The users found it a bit laborious to use the SITDA.
	Design Evaluation	Manual Recording of Responses and Feedbacks: The artefact-users had to manually record the responses from each question and compare the responses with the reference tables.
	Design Evaluation	The SITDA is only sustainable for 5-10 IT decisions. The management of different spreadsheets for every IT decision does not seem viable. The artefact will become complex and messy when IT decision options increase.
	Users' Perspective	The time required: The process of using the spreadsheet was time-consuming. It is unlikely to encourage decision-makers of SEs to use the artefact. This is deduced from previous studies (discusses in Chapter Three), that SME owner-managers are time-bounded when making IT decisions.

Table 7-2: Formative Evaluation of the SITDA

7.3.3 Learning Outcome from Second Iteration - Awareness of Problem Revised

The SITDA satisfied the requirement for easy replication as emphasised in DSR methodologies (Hevner et al., 2004; Vaishnavi & Kuechler, 2012). The content of the SITDA was well-structured and the referencing and re-use of questions and feedback made easier when compared to the MITDA. However, the SITDA does not seems like an artefact that can be used easily by SE owner-managers because of the effort that is required to document responses and matching those responses with different recommendations. This implies that the SITDA was not sufficiently scalable and not user-friendly for the intended audience. Though the development phase is a proof of concepts, it was important to develop a user-friendly and scalable

prototype. Therefore, the researcher proceeded to produce an online IT decisions assistive tool by implementing the recommendations from the second iteration.

7.4 Third Iteration - Online IT Decision-assistive Tool (OITDAT)

The OITDAT is intended to offer decision-makers with unrestricted access (anytime and from any location) to a decision support system for IT choices. The development of an automated and interactive IT decision-assistive tool to support SE decision-makers is driven by the characteristics of SE owner-managers described in (Brunetto & Farr-Wharton, 2007; Love & Irani, 2004; Salles, 2006). Also, the findings from the data gathered during the interviews showed that most SEs are using at least one online presence technology. It implies that a web-based (online) artefact will offer a more pragmatic intervention to IT decision making challenges in SEs (Alhassan & Van Belle, 2017a).

The OITDAT is the third phase of a prototype design to demonstrate the EADF as an artefact to support the SEs' IT decision-making process. This demonstrates the research rigour to achieve the research objectives (Hevner et al., 2004; Markus, Majchrzak, & Gasser, 2002). The OITDAT focuses on two major IT decisions, that is, CRM and Online presence decisions. Decision criteria were ranked and assigned to relevant feedback and recommendations. The process of the OITDAT commenced with a well-conceptualised Use Case diagram and a planned web-structure. The UML diagram presents a graphical representation of the system that is under design, implementation or functional. The structural and the behavioural diagrams are two major categories of UML. The Use Case diagram is a behavioural diagram that illustrates the action a system or subsystem can perform with the external users which are named as actors (Rumbaugh, Jacobson, & Booch, 2004). The Use Case diagram provided a comprehensive view of the system and allowed the demonstration of a scenario which brings to light any missing functional requirement (Bruegge & Dutoit, 2009). Figure 7-6 is a UML Use Case diagram that depicts the privileges of the three main actors of the OITDAT as follows:

1. The Designer – the researcher who develop the OITDAT.
2. The Content Provider - the person who applies the EADF concepts to populate the OITDAT with IT decisions. That is, a consultant, content manager, or IT specialist.
3. The User - the SE owner-manager who uses the OITDAT.

The designer of the OITDAT has populated the artefact with two types of IT decisions to prove the validity of the concept. However, the content provider will have the privilege to upload

more IT decision for SE owner-managers. The content providers can upload new IT decisions in XML or Spreadsheet Format. Appendix A7 shows the various features of the OITDAT that can be accessed by the three parties.

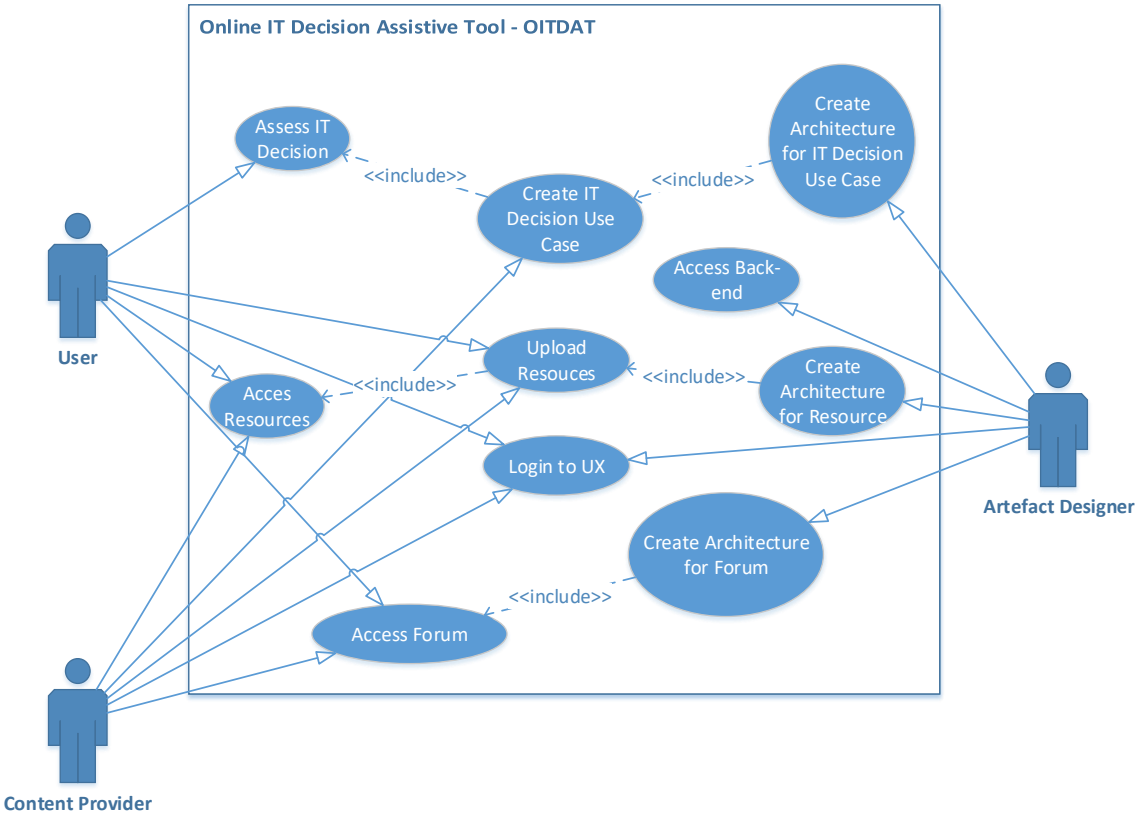

Figure 7-6: UML Use Case for OITDAT

As illustrated in Figure 7-7, the decision-maker (who is assumed to be the SE owner-manager or the User) can perform an IT decision assessment, access the forum, and view or add resources to the portal. The artefact developer or manager (the researcher or IT professional) can follow the guidelines to add an IT decision assessment, create a forum, and add resources to be viewed on the website.

The web structure diagram shows a conceptual model of the proposed website. The objective of designing a web structure is to create a pictorial structure of the website and assess the relationship between the web pages. The planning stage of web development is significant in developing a website (Van Duyne, Landay, & Hong, 2002). As illustrated in Figure 7-7, the OITDAT composed of four key components such IT decision assessment, back-end (admin), resources, and forum. The IT decision assessment is the section that allows SE owner-managers (User) to evaluate their IT decisions against business criteria, capabilities, and preferences. The back-end is the Designer's and Content Provider's (administrator) interface where the assessments and feedback are populated. The forum is intended to provide open platform for

discussing different IT decisions issues relating to SEs. The resources section is a collection of useful materials that can guide decision makers in their IT choices. As shown in Figure 7-7, the users need to login with their credentials to assess their business for any IT decision, enabling the OITDAT save their responses. The responses of the users are saved onto the system for subsequent analysis or if their criteria changes.

Django, a Python web framework, was identified as a programming tool for the development of the OITDAT. The justification for the choice of Django/Python has been described in Chapter Four. All questions, responses, feedback, and architectural principles in the SITDA were converted into a structured database as illustrated in the entity relationship (ER) diagram in Figure 7-8. The Appendix 7 depicts some screenshots from the online IT decision website hosted on "www.ea4ses.epreludeis.com".

This study is a cross-sectional study and the researcher is bounded by time. Thus, after effecting all the recommendations from the second iteration, the researcher concluded the development process and proceeded to conduct a summative evaluation of the OITDAT. A successful development of an artefact is assessed by the contribution of the artefact to solving a real life problem (Hevner & Chatterjee, 2010; Markus et al., 2002; Peffers et al., 2007; Vaishnavi & Kuechler, 2012). This study proceeded to evaluate the OITDAT with SE owner-managers.

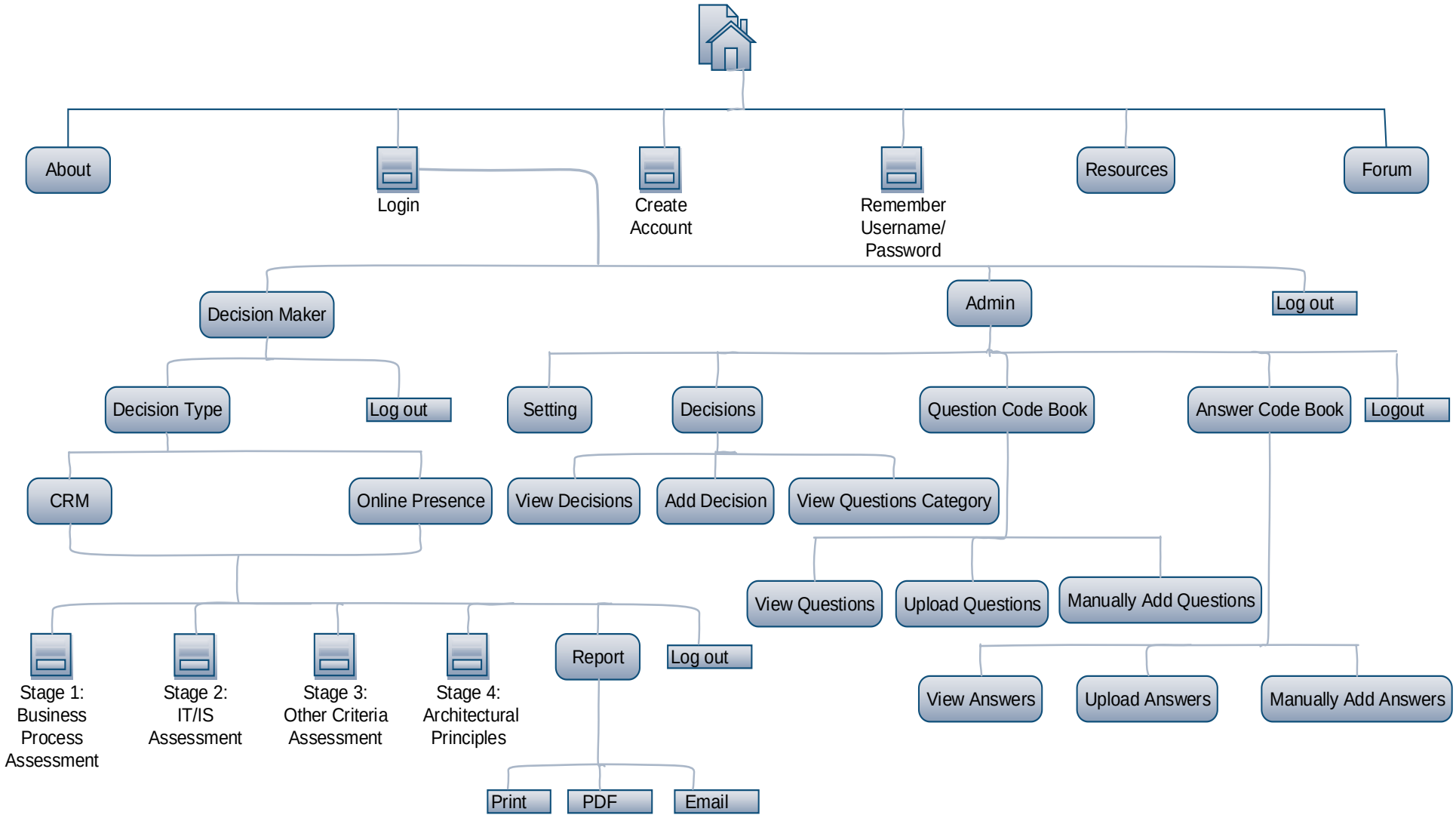

Figure 7-7: Web Structure Diagram for Online IT Decision-Assistive Tool

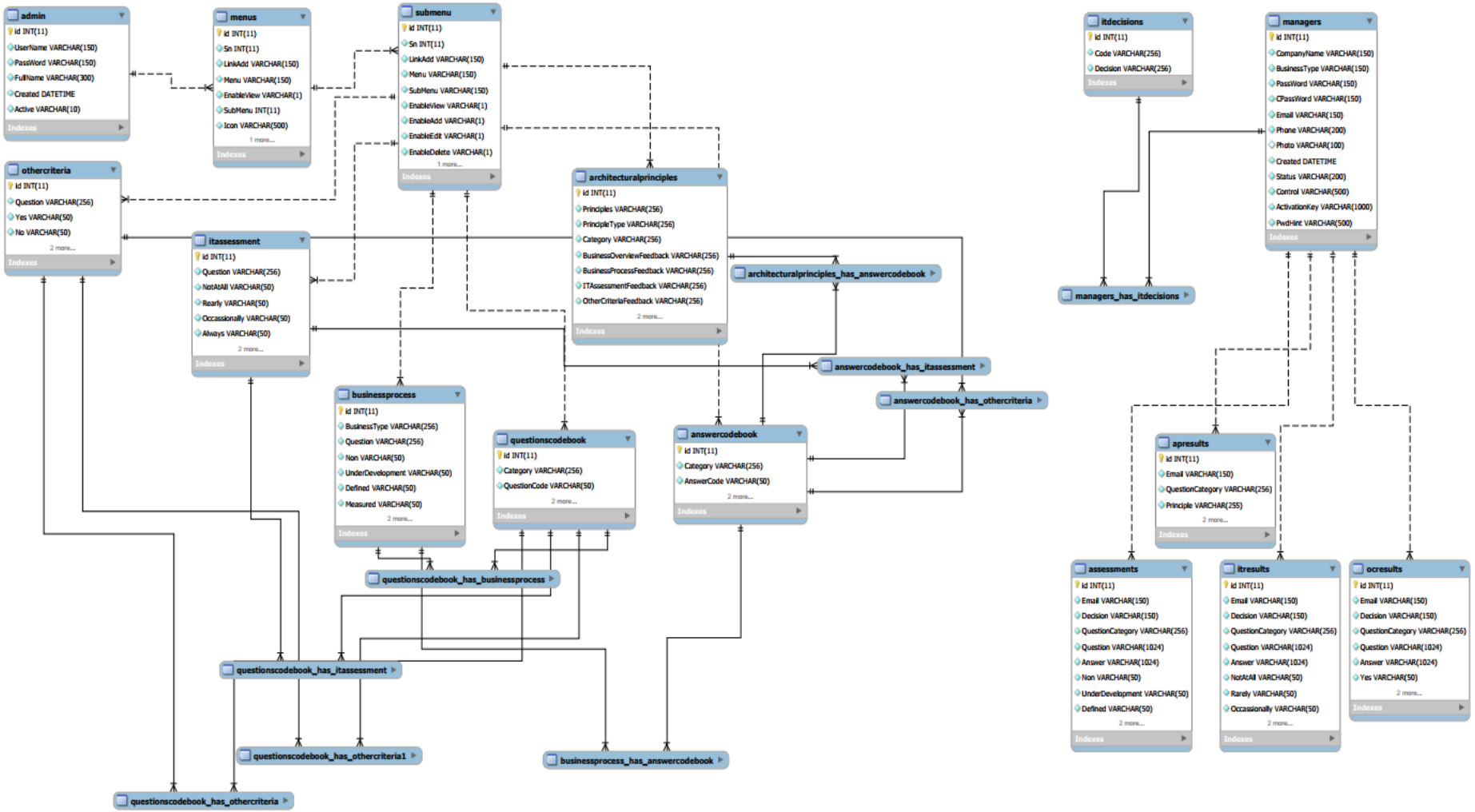

Figure 7-8: Entity Relationship Diagram for Online IT Decision-Assistive Tool

7.5 Summary

This chapter presented in detail the procedures that led to the development of the OITDAT after three iterations of design and development. This chapter described the formative evaluation conducted to refine the MITDA and SIDTA, respectively. The next chapter describes the evaluation of the OITDAT with some selected SEs owner-managers. The evaluation of the OITDAT is considered as the summative evaluation. The findings from the summative evaluation are discussed in Chapter Eight.

8 Chapter Eight – Evaluation

8.1 Introduction

This chapter discusses the summative evaluation of the designed artefacts as suggested in the Vaishnavi & Kuechler (2012) DSR process model. The researcher adopts the formative and summative evaluation approach. The formative evaluation process was imbedded in the design and development chapter in Section 7.2.2 and Section 7.3.2. Chapter eight discusses the summative evaluation (henceforth referred to as "evaluation") of the Enterprise Architecture-Driven Framework (EADF) and the Online IT Decision-Assistive Tool (OITDAT). Artefact evaluation is a key activity that demonstrates rigour in DSR and puts the 'science' in design science (Venable et al., 2012). The evaluation phase in this study provides evidence that the artefacts developed achieved the objective of the design which substantiate the assertions presumed in the suggestion phase of the DSR in this study. Section 8.2 provides a brief overview of the evaluation process and the participants. The findings of the interviews conducted with six SE owner-managers (also referred to as Users) are presented in Section 8.3. Section 8.4 discusses the findings and Section 8.5 summarises this chapter.

8.2 Evaluation of the EADF and the OITDAT

This study developed two types of artefacts as discussed in Chapters Six and Seven. The EADF as a framework to guide the Strategic IT Decision-Making (SITDM) process and serves as framework that informs the development of the OITDAT. Table 8-1 shows the demography of the SEs that were interviewed for the evaluation of the OITDAT. Section 4.4.2.2 describes the sampling process and Section 4.4.2.3 explains the data collection process of the evaluation phase.

User	Business Type	No of Emp.	Year of Est.	Age	Country
I	Construction	82	2008	9	South Africa
II	Manufacturing	102	1999	18	South Africa
III	Agriculture	81	2001	16	Nigeria
IV	Travel & Tourism	78	1999	18	Nigeria
V	Hospitality	94	2005	12	Nigeria
VI	Automobile	56	2010	7	Nigeria

Table 8-1: Demography of Participants

8.3 Findings from the Evaluation Interviews

This section discusses the findings of the interviews conducted with SE owner-managers. The appendix A4 shows the questions that were posed to the SE owner-managers during the evaluation interview. The methodology adopted in analysing the findings from the evaluation phase has been presented in Section 4.3.34 of Chapter Four. The findings of the evaluation phase of this study is discussed under three main themes as described in Section 4.4.3.2. The SE owner-managers that participated in this study are referred to as "User".

8.3.1 Evaluation of the EADF

The evaluation of the EADF was published in two conference proceedings. The first phase of evaluation is discussed in (Alhassan & Van Belle, 2016) and the second evaluation of the EADF is presented in (Alhassan & Van Belle, 2017b). The evaluation discussed in this section is the third evaluation process of the EADF imbedded in the OITDAT and the evaluation is based on the SE owner-managers' perspectives.

8.3.1.1 Perception of the EADF as a framework for SITDM process in SEs

The users admitted to the potential benefits of the EADF as a roadmap to analyse their business needs and to guide their discussion with their IT providers. The word "insightful" was repeatedly used by five of the users interviewed. The users believed that the EADF will broaden their strategic goals when they are investing in IT. According to user I, the EADF is "*…. insightful by revealing some potential business opportunities"*. The user II emphasised that the concept of EADF will be beneficial to other SEs outside South Africa. User II based his assertion on his interactions with small business owners outside South Africa and the fitness of the EADF for SE's context.

8.3.1.2 EADF as a guiding framework for searching and analysing information for SITDM

The six users attested that the framework will ease their process of searching for information when making Strategic IT Decision (SITD). Users III and VI emphasised how the EADF formalises their information search and analysis process. "*Now, I don't have to search for random information but a more structured information*" (User VI). The EADF appealed to the users because it offers decision-makers a guide to reduce their dependency on vendors, friends, and consultants. Users I, II, III, V, and VI mentioned how the EADF will minimise SE owner-managers

reliance on external information sources (that is, vendor and consultant) to translate their business requirements. The use of the EADF to extend SE decision-makers business requirements was highlighted as a significant role of the EADF by user I, II, and IV.

8.3.1.3 Role of the EADF for evaluating IT alternatives in SEs

This study discovered that the users do not only rely on external information sources to guide their IT choices but also depend on the vendors and consultants to analyse business requirements before proceeding to search for information (Alhassan & Van Belle, 2017a). All the users confirmed that the EADF provides a guideline for analysing business requirements. The ability of SE owner-managers to align business requirements and IT needs was a challenge identified amongst SE owner-managers interviewed in the problem awareness phase. The EADF was perceived as a guideline that reduces the difficulties of understanding how to analyse the information acquired from external sources. "*The EADF artefact has improved my ability to process alternatives for my IT choices and scrutinise business requirements before I make any IT decision"* (User VI).

8.3.2 Evaluation of the Online IT Decision-Assistive Tool

8.3.2.1 Role of OITDAT for SITD in SEs

The findings in this section are discussed under the following sub-themes: the benefits of the OITDAT, the relevance of the OITDAT, and the reliance on the support of OITDAT. Section 4.4.3.2 describes the grouping of the themes based on thematic data analysis technique.

i. Benefits of the OITDAT

The users perceived the OITDAT as a useful tool that can influence strategic IT choice. Five of the participants interviewed commented on the numerous ways the OITDAT can benefit their SITDM process. Table 8-2 summarises the comments of the users.

Benefits of the OITDAT	User I	User II	User III	User IV	User V	User VI
Reduces the IT Skill Gap in SME	✓				✓	✓
Potential DSS for SITD	✓	✓				
Better Analysis of IT Alternatives	✓			✓		✓
Improved Information Searching	✓	✓	✓		✓	✓

Table 8-2: Benefits of OITDAT

ii. Relevance of the OITDAT

The OITDAT was unanimously accepted as a relevant tool for the SITDM process in SE. However, user III was reluctant in admitting to the innovativeness of the OITDAT because the IT decisions demonstrated with the tool were not relevant to his agriculture business. According to user III who is a farm owner stated that, "*the current decisions you have demonstrated aren't relevant to me but might be relevant to other businesses. Just that my company has not grown to that extent of using CRM systems.*" Other users described the OITDAT as relevant, impressive, insightful, and a creative strategy to support SEs' SITDM process. The importance of the OITDAT was emphasised because it provides a detailed level of analysis of the users' business requirements. The OITDAT was also acknowledged to offer users with a sufficient level of detailed recommendations, thereby simplifying the choice process. The following comments in Table 8-3 highlights the perceived relevance of the OITDAT.

User	Comment
I	*"The system is a great starting step towards the development of a decision support system for IT",*
II	*"…it is insightful by revealing some potential business opportunities"*
III	*"Like every DSS it provides one with a guide then it left for the decision-maker to adhere to the recommendation. So, is the web-tool relevant? I will say to an extent"*
IV	*"I am thrilled by the artefact and its suggestion"*
V	*"I will say it is very relevant tool that supports IT decisions"*
VI	*"Extremely relevant, I am very impressed with this software"*

Table 8-3:Relevance of the OITDAT

iii. Reliance on the support of OITDAT

This study assessed users' trust and confidence on the information and recommendations provided by OITDAT. The users' response revealed that the OITDAT can substitute the external information source for SITD in SEs. This study describes external information sources as friends, vendors, and consultants. User III emphasised how the OITDAT will eliminate users' dependency on vendors and the business network because the OITDAT provides comprehensive and concise information. In addition, user IV from Nigeria stated that the OITDAT's recommendations surpass the advice from vendors. *"The artefact is a good initiative. I consider your system as a consulting service because that is what we pay the consultant to help us analyse…translate business requirements to technical or IT needs",* (User I). *Also,* "*Impressive, this software enlightened me on somethings that my vendors will never mention to me. For instance, the architectural principles that will guide how I negotiate with them and recommendations to integrate some IT instead of buying",* (User IV). The confidence demonstrated by user IV shows the level of trust the decision-

makers have in the OITDAT. Also, users I, II and VI revealed how the "architectural principles recommendation" in the OITDAT will serve as a benchmark for subsequent SITDs. The optimism of the users suggests that OITDAT can serve as an alternative to external information sources for SITD in SEs.

8.3.2.2 Functionalities of the OITDAT:

The findings showed that the users considered the OITDAT as a very useful tool that supports SITD because of some features of OITDAT. User IV stated that OITDAT provides precise and concise information. Furthermore, "*…it eliminates the difficulties of analysing the information I acquire online, from friends, or business network*" (User II). The users described the features of OITDAT in different terms as highlighted in Table 8- 4.

S/N	OITDAT Functionalities	User I	User II	User III	User IV	User V	User VI
1	Analysis of business requirements		✓		✓		✓
2	Analysis of IT alternatives	✓				✓	✓
3	Overcome the lack of IT specialist in SEs	✓	✓	✓	✓	✓	✓
4	Business-oriented questions	✓				✓	
5	Concise information	✓	✓	✓	✓		
6	Criteria assessment			✓		✓	
7	Criteria definition			✓			
8	Detailed information to support IT choice	✓			✓	✓	✓
9	Quick access to information source		✓			✓	✓
10	Online 247 access to the OITDAT	✓					
11	Eliminate cost of searching for information				✓	✓	✓
12	Expert advice (recommendation)		✓	✓	✓	✓	
13	Holistic assessment of business & IT requirements	✓		✓		✓	
14	Recommendations based on business maturity	✓			✓		
15	Relevant architectural principles	✓	✓	✓		✓	✓
16	Strategic perspective of IT choice	✓	✓	✓			✓
17	Systemic analysis of information		✓		✓		
18	Timely assessment of IT decisions	✓	✓				✓
19	Translating business requirements to IT need		✓	✓			

Table 8-4: Functionalities of OITDAT

8.3.2.3 Technical Risks and Ethical Considerations for the use of OITDAT in SEs

The users collectively confirmed that the OITDAT does not pose any technical or professional risks to them nor to the SEs. Some of the users suggested that vendors or consultants may perceive the OITDAT as a threat because the tool will make them less relevant in their decision-making process. The ethical consideration was to ascertain the level of trust on the recommendations by OITDAT. The users considered OITDAT as a decision support system, so it is the responsibility of the decision-maker to accept or reject the recommendations of the OITDAT. The following quotes emphasised on the SE owner-managers understanding of the ethical consideration of the OITDAT. *"Well I see it as a DSS. Like every DSS it provides one with a guide then its left for the decision-maker to adhere to the recommendation."* (User III). *"…so, if one has a tool that analyse the consequences, then it is up to you to decide – agree or disagree with the outcome.*" (User IV)

8.3.2.4 Usability of the OITDAT

In this study, the usability of the OITDAT is perceived as the ease of use of the OITDAT and the simplicity of the user's interface. The OITDAT was developed with consideration to the level of technical-orientation of the intended users. All the users confirmed that the OITDAT was very explicit, easy to use, with simplified interface, and the content of the OITDAT was well structured. On the contrary, the user III stated that the OITDAT is not very interactive and claimed that it will be difficult to use the OITDAT without the researcher's intervention. According to user III, "*this (OITDAT) is fairly simple and easy to use but not interactive. I think I will get a bit confused if I have to use the website by myself.*"

8.3.2.5 Limitations and recommendations for the improvement of the OITDAT

This section presents the limitations of OITDAT and the users' recommendations on how to improve the OITDAT.

a) The users suggested that the OITDAT should be demonstrated with more IT decisions like ERP, cloud storage, and cloud backups. However, users II, III and IV feel enlightened by the two IT decisions demonstrated with the OITDAT.
b) Two of the users claimed that they were not familiar with some terms like architectural principles and maturity level the first time they used the OITDAT.

Table 8 -5 summarises the limitations identified by the users.

Limitations	User I	User II	User III	User IV	User V
Lack of product/vendor recommendation	✓	✓			
Ambiguous words/terminologies	✓			✓	
Demonstrate OITDAT with more IT Decisions		✓	✓		✓
Non-interactive User Interface (UX)		✓	✓		

Table 8-5: Limitation of the OITDAT

The users also provided some recommendations to improve the OITDAT as follows:

a) The users suggested that the researcher needs to populate the OITDAT with more decisions.
b) The users acknowledged that the time constraint of the PhD will not allow the researcher to populate the OITDAT with more IT decisions. However, some of the users suggested that the researcher should invest more time on the development of OITDAT after the PhD program.
c) The user II and user III recommended that the researcher should make the OITDAT available for free or for minimal cost.
d) The users recommend the introduction of dictionary to explain complex terminologies.

The table below highlights some comments of the SE owner-managers.

User	Comment
III	*"….. make it more interactive ……."*
IV	*"You might consider having a dictionary of words to explain some concepts."*
V	*"I hope we can have access to this website when we need it."*
II	*"…. I want to believe that enterprises from outside South Africa will also find this system very useful."*
II	*"This is a very good tool that I suggest you strongly invest in even after your PhD."*

Table 8-6: Recommendations for the improvement of OITDAT

8.3.3 Validation of Theoretical Assumptions

This study investigates how the use of the OITDAT by the SE owner-managers contribute to the theory of bounded rationality. Thus, the users' response to some questions described in Appendix A4 informs the validation of the theoretical assumptions postulated in Chapter Three of this study. The subsequent sections describe the findings obtained from the users of the OITDAT.

8.3.3.1 Relationship between multiple IT objectives or complex IT decisions and the time the decision-maker spends searching for information

This theme validates Simon's decision-making theory on the amount of time the decision-makers spend searching for information when the decision-maker has multiple objectives to achieve in

a choice (Simon, 1972). The findings revealed the challenges the decision-makers face when searching for information to satisfy their business-IT goals. All the users confirmed that, when they make SITDs, the decision-makers spend more time searching for information when they want to attain multiple goals with a specific strategic IT choice. Table 8-7 highlights some responses of the users about SITD complexities in relation to the time the decision-makers spend searching for information to support their decision processes.

User	Comment
III	*"Actually, there is the correlation between the goals and the information I search for choice. I will say the more goals for IT choice, I tend to spend more time searching for every bit of information. I tend to search for less information when I have to make a simple choice like data subscription."*
IV	*"More goals more time and more thoughts. The general thumb rule of life applies…. In my opinion, having too many alternatives to choose from makes it trickier to decide. This results in more time been wasted weighing the different IT alternatives."*
V	*"…. I end up wasting much time analysing options but, with few or less complex choices, one can afford to make a quick and random choice with less time spent on searching for information or for the best alternatives."*

Table 8-7: Multiple IT Objectives and Decision Complexity

8.3.3.2 Change in IT aspiration as information increases over time

This study determines whether the objectives of SE decision-makers in this study change as they access more relevant information via the OITDAT. Findings from the problem awareness phase revealed that some SE owner-managers are not maximising their organisational IT resources, resulting in the purchase of redundant technologies. Thus, this study enquired if the OITDAT has increases the decision-makers' aspiration over some selected IT solutions. Table 8-8 shows some users' comments.

User	Comment
I	*"I didn't realise that there are different levels of implementing CRM systems…… I learned the categorization of the CRM system's implementation"*
IV	*"I currently have a payroll system with a website but they are two separate entities. Now I know that I need to integrate the two softwares. I am now considering using a starter level CRM system after using your artefact."*
V	*"….. the artefact has broadened my view about what I can do with my existing websites, my POS system, and online reservation system. I can now seek for ways to integrate everything into one major system."*

Table 8-8: Change in IT Aspiration

However, user II was reluctant to admit that the OITDAT had influenced his IT aspiration because the IT decisions demonstrated with the tool were of less relevance to his business. However, the users acknowledged that the "architectural principle" was previously an unfamiliar concept but had now become a familiar and useful concept to guide their choices of strategic IT and a benchmark to negotiate with vendors. According to user IV, "…. *this is my first time of hearing of "architectural principles", but now it makes sense to me*".

8.3.3.3 The influence of the OITDAT as information source for SITD

The users considered OITDAT as an innovative tool that provides information for SITD. All the users perceived the OITDAT as a useful decision-assistive tool that provides expert information for SITDs. The feature that all the users emphasised as being influential was the timely analysis of their business requirements and the recommendations generated by OITDAT. Thus, the users considered OITDAT as a potential alternative to conventional information sources, such as consulting service, vendor, internet search, and business network.

8.3.3.4 Overcoming SITD mistakes and complexities with OITDAT

The objective of developing the OITDAT is to support SITDM. The findings in Table 8-9 revealed how the users assumed that the OITDAT will help decision-makers overcome decision mistakes and complexities.

Overcoming SITD mistakes and complexities with OITDAT	User	Comment
Overcoming IT Decision Challenges	I, IV	"*This tool will help us overcome ICT investment challenges we do experience*", User I
Simplifying SITD Complexity	I, IV, V, VI	"*If I am to make a more complex IT choice and I have access to this artefact or this artefact provides the support, I will say the choice process will not be complex*", User IV
Analysing Decision Criteria	II, III, VI	"*…your system does the computation and analysis of the information. It eliminates the stress of me analysing the information I acquire online, from friends or business network*", User II
Architectural Principles as Guiding Policies for Selecting Vendor/Product	I, II, III, VI	*"I can use the architectural principle recommendations to guide my subsequent discussion with contractors",* User I *"……I can use the principle recommendations to assess my choices",* User II

Table 8-9: Overcoming Decision Mistakes and Complexities

8.4 Discussion of Findings

This study argued that enterprise architecture principles can guide SITDM process of SE owner-managers. The findings of the summative evaluation affirmed that the EADF is a potential decision strategy to improve SITDs in SEs. The elements of enterprise architecture informed the development of EADF. The EADF was perceived by the decision-makers in SEs as an insightful tool that guides SITDM. The SE owner-mangers interviewed considered the EADF as a SITDM framework that can holistically assess business needs, determine organisational IT capabilities, and provide a roadmap for aligning business and IT as suggested in (Van Belle & Giqwa, 2013).

The EADF holistically assessed all the organisational elements to provide a recommendation to SEs. Findings from this study revealed that SE owner-managers perceived the EADF as a SITDM framework that provides a detailed guide to the information decision-makers search for when

making strategic IT choices. This affirms the discourse that enterprise architecture provides an enterprise-wide alignment of business-IT (Wißotzki & Sonnenberger, 2012). This study suggests that SE owner-managers can make strategic decisions when they are aware of the factors that will influence their decision outcomes (Alhassan & Van Belle, 2017a; Kyobe, 2004; Salles, 2006). The style of operation in SEs often hinders the methodological approach to the decision-making process. The characteristics of the SEs interviewed prompted the development of an instantiation (OITDAT) artefact to fully implement the guidelines of the EADF.

This study evaluated the OITDAT based on SE decision-makers' perspectives to determine the benefits, relevance, usability, functionalities, risks, and limitations of the OITDAT as an artefact (Hevner, March, Park, & Ram, 2004). The evaluation of the OITDAT was crucial to ascertain whether the OITDAT fulfils the research objectives and the challenges identified in the problem awareness phase of the DSR in this study. Also, the artefact evaluation was conducted to confirm, enhance, or disprove the feasibility of embedding the EADF in the design of OITDAT (Vaishnavi & Kuechler, 2012; Venable, Pries-Heje, & Baskerville, 2012).

The OITDAT was perceived by most of the SE owner-managers as a tool that could improve the process of searching for information to support SITD and could provide the decision-makers with a better approach to analyse IT alternatives. The OITDAT formalised the decision-making process of the SE owner-managers interviewed as posited by Oh et al., (2007). The deficiency of IT skill is a common challenge in Nigerian and South African SEs (BER & SEDA, 2016; SMEDAN & NBS, 2013) but the OITDAT is affirmed to be a tool that mitigates the lack of IT skill in SEs. Hence, the OITDAT can be assumed as a potential decision support system for IT decisions in SEs.

Literature discourse and the empirical findings in the problem awareness phase of this study (Alhassan & Van Belle, 2017a) recommends the development of an IT decision artefact. The SE owner-managers reliance on the OITDAT further buttressed the necessity of an IT decision-assistive tool in SEs. It is evident that participants of this study do not doubt the relevance of the OITDAT as a SITD assistive tool. The acceptance of the OITDAT can be accorded to the functionalities the OITDAT provides the SE owner-managers. This study also affirmed that the enterprise architectural principles can guide the decision process of some SE. The concept of enterprise architectural principles is considered as a very useful technique for formalising IT decision-making process in SEs, which supports the assumptions of Van Belle & Giqwa (2013).

Venable (2006) suggests that the Design Science (DS) researcher should ensure that artefact in DSR poses minimal technical or professional risk to the users. The findings revealed that OITDAT

does not pose any professional or technical risk to the SEs nor the SE owner-managers in this study. However, some of the respondents considered OITDAT as a threat to vendors and consultants because the tool eliminates decision-makers' dependence on external information sources. The ethical consideration assesses the potentials of the OITDAT providing a wrong guidance. The SE owner-managers in this study understood the consequences of using a decision support systems and are aware that the OITDAT only provides recommendations and onus lies on the decision-maker to make the final choice. The concerns about the party that bears the responsibility of misleading guidelines indicate the need to include a disclaimer statement in the OITDAT. Furthermore, the evaluation reveals that the OITDAT was considered as a non-interactive tool, with some ambiguous words, which fell short in recommending specific products or vendors, and was not demonstrated with sufficient SITDs. Despite the complaints, the users acknowledged the relevance of the OITDAT as a proof of concept for research but recommended that the suggestions should be implemented when the researcher deploys the commercial version of OITDAT.

The bounded rationality theory is the theoretical lens underpinning this study. The evaluation of the artefact validated that the SE decision-makers' aspirational changes after accessing the OITDAT, indicating that the OITDAT helps in reducing decision complexities, and the multiplicity of goals influences the time the decision-maker spend searching for information. In other words, the theoretical prepositions in this study were proven to be true. The satisficing and biased approach to strategic IT decision-making process in SEs can be reduced with OITDAT because the tool holistically assesses enterprise-wide criteria and constraints.

The summative evaluation concludes the design science research methodologies in this study. The evaluation phase of the DSR demonstrates that the enterprise architecture principles can guide SITDM process in SEs. The demonstration of the two artefacts developed in this study confirmed the assertions of the researcher in using EA-driven artefacts to support strategic IT decision-making processes in Nigerian and South African SEs.

8.5 Summary

This chapter presented a background to the summative evaluation of the artefacts developed in this study. Chapter Eight provided detailed findings of the evaluation process. This chapter discussed the perception and influence of the EADF and OITDAT in SEs' IT decision-making

process. The theoretical assumptions in this study were shown to be valid. This chapter finalised this study and the researcher presents the conclusion of this study in the next chapter.

9 Chapter Nine – Conclusion

9.1 Conclusion

Information Technology is a significant investment decision in small enterprises in Nigeria and South Africa. Deciding on organisational IT determines the ways small businesses operate and also influences the long-term business plans of SEs. The process of choosing the type of IT to adopt poses some challenges to the decision-makers which hinders the optimal utilisation and derivation of IT potentials in SEs. The main obstacle that limits how IT is leveraged in SEs is the information source that guides the entire choice process. SEs will derive a better value from IT investments if the decision-makers have access to quality, structured, and comprehensive information. Improved information source should provide an overall assessment of the criteria of the decision-makers.

The empirical findings revealed that the Nigerian and South African SE owner-managers that participated in this study make IT decisions in a bounded rational approach. The decision-makers attempt to achieve optimality in their IT investments, but they are limited to information from vendors, consultants, business networks, friends and seldom internet search. The level and quality of information that guide the SE owner-managers choices are not comprehensive because the decision-makers lack IT skills to align their business needs with preferred IT solutions. Thus, the selection of IT products and services in SEs is subject to vendors' recommendation, cost factor and the decision-makers' intuition. SE owner-managers understand their strategic business requirements, but they are not able to decide on the best IT to achieve their business goals.

The approach to IT investment decisions in the SEs that participated in this study necessitated the development of a more integrated and robust framework that will guide a thorough assessment of business components. The enterprise architecture based business-IT alignment framework and Simon's decision-making model are the basis for the development of the Enterprise Architecture-Driven Framework (EADF) for IT decisions in SEs. The framework developed allows the assessment of business requirements of SEs holistically and strategically. The demonstration of the EADF with two common IT decisions of SE owner-managers and the evaluation of the EADF with IT professionals, conference attendees, SE owner-managers and research supervisor affirms the potentials and relevance of the EADF as an IT decision-making

framework for SEs. The EADF emphasised the enterprise principles as a roadmap to guide SE decision-makers' process of searching and assessment of information when making IT decisions. The successful application of the EADF by the SE owner-manager in this study transforms the SEs' IT decisions to be more strategic and thorough.

SEs are flexible entities that are always willing to explore creative business strategies, but the characteristics of SEs and the lack of sufficient resources limits the successful adoption of the EADF as an IT decision-making roadmap. Thus, the EADF framework was implemented by designing an innovative online assistive IT decision system. The instantiation of the EADF helps to overcome the limitation of SEs' inability to fully implement the EADF. The development of the Online IT Decision Assistive Tool (OITDAT) was achieved after three design iterations. The OITDAT prototype was deployed as a web-platform for six SE owner-managers in Nigeria and South Africa to evaluate the design relevance and fitness of the OITDAT for SEs. The automation of the EADF as a web-based decision support systems proved to be the preferred approach to get SEs to use EADF for IT decision-making process. The characteristics of the SEs in this study revealed that to implement a complex framework or any intervention successfully, it is better to automate and embed the framework in an automated tool for simplicity and ease of use.

The acceptance of OITDAT by SE owner-managers denotes that EA is a useful technique for guiding IT decision-making. The EA allows SE owner-managers to establish enterprise-wide requirements for IT decisions. The SE owner-managers in this study can make a more optimal choice when they have a better understanding of their business' capabilities and constraints. The EA guides the SE owner-managers on the type and level of information to search. Thus, the selection of IT alternatives becomes more strategic because various business prospects are put into perspective with a long-term plan. The bounded rationality assumptions proved to be valid for SEs. The aspiration of SE owner-managers changed as they access a more integrated information through the OITDAT. The decision-makers were able to decide on their current IT needs and what they can achieve with the same IT in future. The EA thinking process has begun to resonate amongst the SE owner-manager in this study through the EA driven artefacts. The outcome of this study affirmed the assumptions of the relevance of EA in SEs.

9.2 Research Contributions

This study a made a theoretical, practical, and methodological contribution in Information Systems, IT decision-making process and enterprise architecture. The contributions of this study are discussed as follows:

9.2.1 Theoretical Contribution

This study provided a better understanding of IT decision-making processes in SEs based on bounded rationality theory. The particularisation of Simon's theory of bounded rationality to the selected SEs in Nigeria and South Africa contributes to the validation of the bounded rationality theory. This study ascertains the search and satisficing behaviour of the SE owner-managers interviewed when they make IT decisions. The findings in this study correlate with the assumptions of Simon's bounded rationality theory. This study adheres to the bounded rationality theory of decision-making.

This study also theoretically corroborates how enterprise architecture principles can support the decision-making process in small enterprises. The combination of the principles of enterprise architecture and Simon's decision-making model resulted in the development of a generic enterprise architecture-driven framework for IT decisions in SEs. The conceptualisation of the EADF revealed that the framework could guide any type of IT decision-making processes in SEs. The EADF was conceptualised with two complex but common IT decisions of SE and implemented in the development of an online IT decisions support system.

The application of the weighting technique to rank the criteria of decision-makers before recommending best alternatives and enterprise principles demonstrates the relevance of decision analysis techniques for SEs. The contribution of the artefacts to decision analysis technique of SEs indicate a theoretical contribution of this study. This study demonstrates the successful application of decision analysis based on weighting and ranking of criteria in some small Nigerian and South African enterprises.

9.2.2 Practical Contribution

The EADF and the OITDAT are two artefacts developed in this study. SE owner-managers, enterprise architecture professionals, and IT decision experts were involved in the development and evaluation the two artefacts. The EADF is a strategic decision-making framework that is useful to (i) information systems researchers because the artefact can serve as a basis for;

developing an enterprise architecture-driven intervention for IT investments in SEs, developing IT decision support systems, or a guide to further improve strategic IT decisions in SEs; and (ii) the EADF artefact provide SE owner-managers with guidelines for searching and analysing information that support IT investment decisions. Also, the deployment of the OITDAT as an open source and web-based tool allows the following; (i) SE owner-managers can use the OITDAT to support their IT decisions anytime and from any location without any technical requirement or incurring any cost, and (ii) the OITDAT can be populated with additional IT decisions (use cases) by content managers, IT researchers, consultants, vendors, or any stakeholders willing to support IT decision-making process in SEs.

9.2.3 Methodological Contribution

The design of an enterprise architecture-driven artefact for SEs' strategic IT decision-making process using design science approach provided an insight into the long overdue suggestion for an EA thinking in SEs. This study affirmed that design science research methodology combined with a pragmatism philosophical stance can guide researchers in developing IT artefact that will improves IT investments decision-making process in small enterprises. The Vaishnavi and Kuechler's design science research methodology is a widely used methodology and has proven to be relevant in the development of IT decision-making artefacts in SEs. This study demonstrated the robustness and the applicability of design science research methodology in the context of a developing economies, and taking into account the peculiar and dynamic characteristics of SEs in developing countries.

9.3 Limitations of this Study

The identification of research limitation is an indication that the researcher has a good grasp of the study and recognises the need for further improvement. Table 9-1 summarises some challenges encountered in this study, how the limitations influence this study, and how the researcher overcomes the limitations.

Limitation	Implication	Intervention
Difficulty in getting SE owner-managers to participate in this study.	Firstly, it limits the total number of participants in the data collection to eleven for the problem awareness phase and twelve participants (that is the SE owner-	Firstly, the data collection in the problem awareness was aimed at creating a first-hand understanding of the problem to support literature discourse and as a strategy of gathering requirements for the development the artefact. Secondly, the researcher ensured that the small enterprises that participated includes three major type of industries:

	managers, EA Professionals and Postgraduate Students) for the evaluation of the artefacts. Secondly, this could have hindered the generalisation of the research outcome.	manufacturing, retail, and service industries. This allowed the researcher to collect sufficient data that could be generalised. Thirdly, the EADF artefact was presented in two international conference and published in a conference proceeding. Fourthly, this study focuses on design science research aspect of this study. Fifthly, this study adopted a pragmatism philosophy by ensuring that the participants that participated in the requirement gathering were involved in the evaluation of the final prototype artefacts.
The number of IT decisions demonstrated with the EADF and OITDAT is limited to two cases.	This robustness of the OITDAT can be questioned.	The researcher selected the most important but complex IT decisions that emerged in the interviews with SE owner-managers in Nigeria and South Africa. Secondly, this study is a proof of concept; and thirdly, the OITDAT has been designed as a web-based and open source to allow any stakeholder to populate relevant IT decisions for SEs.
The data collection focuses on SE owner-managers.	Tendency towards a bias to the needs of SE owner-manager and ignoring the input of the vendors, consultants and other stakeholders.	Firstly, the researcher's focus was to understand the IT decision from the decision-makers' perspective. Secondly, this study recommends a further study to investigate the requirements for successful IT decision in SEs from the consultants and vendors' perspectives.
The evaluation of the OITDAT is limited to qualitative data.	Applying various user experience data collection and analysis method to demonstrate triangulation.	This study is a pragmatic study and focused on the participants of the study. The use of additional data source (such as questionnaire, log data from the tool, observations, expert panel interviews etc.) will produce more comprehensive, holistic and even objective picture regarding the OITDAT.
No prior research studies to guide this study.	There is no existing study that has applied the enterprise architecture to develop an IT decision framework for small enterprises.	Firstly, this study adopted a pragmatic philosophy to allow the researcher to explore any workable strategy to address the research questions. Secondly, the adoption of a research rigour and thorough evaluation as suggested in DSR methodologies guided the research strategy in this study to overcome limited available reference studies.
Longitudinal effect of time.	The researcher bounded by timeline of completing the PhD program.	Firstly, the research was based on timeline approved by the faculty. Secondly, this study is a proof of concept as emphasised in DSR in which the researcher was able to demonstrate the potential of EA in SEs. Thirdly, the OITDAT has been made open source for stakeholders who intend to contribute to the study.
The artefact does not provide practical recommendation of products and vendors.	Limits the level of support the OITDAT offers to the SE owner-managers.	Firstly, this study focused on improving the quality of the information SE decision-makers access. Secondly, after conducting summative evaluation, the researcher refined the EADF to include a technique for choosing IT alternative as shown in Appendix A9.

Table 9-1: Research's Limitations

9.4 Recommendations for Further Studies

The artefacts in this study were developed based on the data collected from SE owner-managers, EA professionals, non-IT postgraduate students, the research supervisor, and the researcher's insight. This study recommends a further investigation to determine if the EADF can be improved by collecting data from the vendors' or consultants' perspectives. The vendors and consultants are stakeholders that might offer significant recommendations to improve the decision-making process in SEs.

The OITDAT should be demonstrated with additional SE owner-managers from different countries outside South Africa and Nigeria. The countries selected in this study is not an actual representation of the Sub-Saharan African countries. The business culture, SE owner-managers' cognition, and government policies in other countries may vary and could influence the outcome of a similar research. The decision style of the SE owner-managers is influenced by several factors which this study might not have captured exhaustively in the process of data collection. Thus, the generalisation of the EADF will be strengthened if the EADF can be seen to be relevant in other small enterprises in other countries.

The OITDAT has been made open and web-based to allow other stakeholders to provide additional resources and update the content of the OITDAT to support IT decision-making process in SEs. The SE owner-managers recommended that the OITDAT should be implemented in practice and not only for PhD research. This confirms the relevance of the OITDAT and the potentials of the OITDAT to improve the IT decisions process in SEs. Thus, this study suggests the inclusion of IT decisions like choice of Enterprise Resource Management (ERP) systems, internet service provider, inventory systems, data backup and recovery, cloud-based resources, advertisement and marketing systems, and tele-communication infrastructure.

The OITDAT provided SE owner-manager with comprehensive information that can guide optimal choice, but the OITDAT does not recommend vendors or products that match the decision-makers' criteria. The EADF and OITDAT can be improved to include the analysis of selecting best-fit vendors or products based on the requirements analysed. This study presented a provisional-extended EADF to include the decision tree as shown in Appendix A9. The decision tree is hoped to match the SE owner-managers' criteria with the attributes of a product or vendor and should recommend the best-suited alternatives to the decision-maker.

The EADF is state of the art IT decision artefact, and the functionality of the EADF can be demonstrated in different platform. The OITDAT is a web-based instantiation of the EADF but the researcher suggests that the EADF can be instantiated as a mobile application for SE owner-managers to ease the access to a tool that supports IT decisions in SEs. The use of mobile phones is high and common in SE. The SE owner-managers will find it easier to use the OITDAT or any artefact that embed the EADF as a mobile application.

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Appendix

Appendix A1: Research Introduction and Consent Form

Department of Information Systems
Leslie Commerce Building
Engineering Mall, Upper Campus
OR
Private Bag X3 - Rondebosch - 7701
Tel: +27 (0) 21 650 2261 Fax: +27 (0) 21650 2280
Internet: http://www.commerce.uct.ac.za/informationsystems/

15th October 2015

Dear _____

I would like to invite you to participate in an academic research case study on the evaluation of enterprise architecture driven design artefact to support strategic IT decisions in _____ in Nigeria and South Africa. This research has been approved by the University of Cape Town (UCT)'s Commerce Faculty Ethics in Research Committee.

The aim of this study is to develop and evaluate an enterprise architecture artefact that will support small enterprise owners in Nigerian and South Africa to make strategic IT decisions, by conducting one-on-one interviews.

Your participation in this research is voluntary. All information will be treated in a confidential manner and used exclusively for the purpose of this study. No individual names will be recorded or published. You will not be requested to supply any identifiable information, ensuring anonymity of your responses. You can choose to withdraw from the research at any time for whatever reason, in accordance with ethical research requirements.

The one-on-one interviews will take approximately 60 minutes at _____'s premises in _____. If you are willing to participate in this study, kindly sign the attached form and return to me at your earliest convenience.

Should you have any questions regarding this research, please feel free to contact me on 073 433 9643 or email: alhmoh004@myuct.ac.za

Thank you for your time and participation.

Sincerely,

Mohammed Alhassan Enagi
PhD Research Candidate
Department of Information Systems
University of Cape Town
Email: alhmoh004@myuct.ac.za

Professor Jean Paul Van Belle
Research Supervisor
Department of Information Systems
University of Cape Town
Email: jean-paul.vanbelle@uct.ac.za

Research Participant Consent Form

I, _____, consent to participate in the research on evaluation of enterprise architecture driven design artefact to support strategic IT decisions in _____ in Nigeria and South Africa.

I am aware that participation is voluntary and that I may choose to withdraw from this study at any time, should I choose to do so.

_____ _____

Signature Date

Appendix A2: Ethics Approval from UCT and SMEDAN

UNIVERSITY OF CAPE TOWN

FACULTY OF COMMERCE

Igniting Knowledge and Opportunity

Commerce Faculty Ethics in Research Application Form

Any person planning to undertake research in the Faculty of Commerce at the University of Cape Town is required to complete this form **before collecting or analysing data**. If any of the questions below have been answered YES, and the applicant is NOT an Honours student, the form it should be submitted to the supervisor (where applicable) and from there for approval by the Faculty EIR committee: Ms Samantha Alexander (samantha.alexander@uct.ac.za).

It is assumed that the researcher has read the UCT Code for Research involving Human Subjects (Available at http://web.uct.ac.za/depts/educate/download/uctcodeforresearchinvolvinghumansubjects.pdf) in order to be able to answer the questions in this form.

Students must include a copy of the completed form with the dissertation/thesis when it is submitted for examination.

1. PROJECT DETAILS		
Project title: Enterprise Architecture Driven Design of an Artefact to Support Strategic Information Technology Decision Making in Small Organisations in Nigeria and South Africa		
Principal Researcher/s: Mohammed Alhassan Enagi	**Email address(es):**	alhmoh004@myuct.ac.za
Research Supervisor: Prof. Jean Paul Van Belle	**Email address(es):**	jean-paul.vanbelle@uct.ac.za
Co-researcher(s):	**Email address(es):**	
Department: Information Systems		
Brief description of the project: The research investigates how an enterprise architecture driven artefact can support strategic IT decision-making process in small sub-Saharan African enterprises. The scope of this research is limited to small enterprises in South Africa and Nigeria where IT plays a supporting role with moderate information intensiveness. The efficacious completion of this study will rationalize strategic IT decision-making process in small organisations based on the principles of enterprise architecture.		
Data collection: (please select) ☑Interviews ☐Questionnaire ☐Experiment ☑Secondary data ☑Observation ☐ Other (please specify): _____		
Have you attached a research proposal OR a literature review with research methodology? (please select) ☑Yes ☐No		

Com Ethics_V4

2. PARTICIPANTS		
2.1 Does the research discriminate against participation by individuals, or differentiate between participants, on the grounds of gender, race or ethnic group, age range, religion, income, handicap, illness or any similar classification?	YES	NO ✓
2.2 Does the research require the participation of socially or physically vulnerable people (children, aged, disabled, etc.) or legally restricted groups?	YES	NO ✓
2.3 Will you be able to secure the informed consent of all participants in the research? (In the case of children, will you be able to obtain the consent of their guardians or parents?)	YES ✓	NO
2.4 Will any confidential data be collected or will identifiable records of individuals be kept?	YES	NO ✓
2.5 In reporting on this research is there any possibility that you will not be able to keep the identities of the individuals involved anonymous?	YES	NO ✓
2.6 Are there any foreseeable risks of physical, psychological or social harm to participants that might occur in the course of the research?	YES	NO ✓
2.7 Does the research include making payments or giving gifts to any participants?	YES	NO ✓

If you have answered **YES to any of these questions**, please describe how you plan to address these issues (append to form):

Affiliations of participants: (please select)

☑ Company employees ☐ Hospital employees ☐ General public ☐ Military staff ☐ Farm workers ☐ Students

☐ Other (please specify): _____

Race / Ethnicity:

Are you asking a question about race/ethics in your questionnaire?

☐ Yes ☑ No

Which race categories have been used?

Have you included the option: "Prefer not to answer" as part of your race/ethics question?

3. PROVISION OF SERVICES

Does your research involve the participation of or provision of services to communities? NO
If your answer is YES, please complete below:

3.1 Is the community expected to make decisions for, during or based on the research?	YES	NO ✓
3.2 At the end of the research will any economic or social process be terminated or left unsupported, or equipment or facilities used in the research be recovered from the participants or community?	YES	NO ✓
3.3 Will any service be provided at a level below the generally accepted standards?	YES	NO ✓

If you answered YES to any of these questions, please describe below how you plan to address these issues.

3. ORGANISATIONAL PERMISSION

If your research is being conducted within a specific organisation, please state how organisational permission has been/will be obtained:

Have you attached the letter from the organisation granting permission? (please select)

☐ Yes ☑ No, but this **will be** obtained before commencing the research ☐ Not applicable

Are you making use of **UCT students** as respondents for your research? (please select) ☐ Yes ☑ No

If yes, have you contacted Executive Director: Student Affairs for permission? (please select) ☐ Yes ☐ No

Was approval granted? (please select) ☐ Yes ☐ No ☐ Awaiting a response

Are you making use of **UCT staff** as respondents for your research? (please select) ☐ Yes ☑ No

If yes, have you contacted Executive Director: Human Resources for permission? (please select) ☐ Yes ☐ No

Was approval granted? (please select) ☐ Yes ☐ No ☐ Awaiting a response

Contact Emails: Executive Director: Human Resources (Miriam.Hoosain@uct.ac.za)
Executive Director: Student Affairs (Moonira.Khan@uct.ac.za)

4. INFORMED CONSENT

What type of consent will be obtained from study participants?

- ○ Oral Consent
- ☑ Written Consent
- ○ Anonymous survey questionnaire (covering letter required, no consent form needed)
- ○ Other (please specify)

How and where will consent/permission be recorded?

Have you attached an informed consent form to your application? ☑ Yes ☐ No

5. SPONSORSHIP OF RESEARCH

If your research is sponsored, is there any potential for conflicts of interest? NO
If your answer is YES, please complete below

4.1 Is there any existing or potential conflict of interest between a research sponsor, academic supervisor, other researchers or participants?	YES	NO
4.2 Will information that reveals the identity of participants be supplied to a research sponsor, other than with the permission of the individuals?	YES	NO
4.3 Does the proposed research potentially conflict with the research of any other individual or group within the University?	YES	NO

If you have answered **YES** to any of these questions, please describe how you plan to address these issues (append to form)

6. RISK TO PARTICIPANTS
Does the proposed research pose any physical, psychological, social, legal, economic, or other risks to study participants you can foresee, both immediate and long range? (please select) ☐ Yes ☑ No **If yes, answer the following questions:** 1. Describe in detail the nature and extent of the risk and provide the rationale for the necessity of such risks 2. Outline any alternative approaches that were or will be considered and why alternatives may not be feasible in the study 3. Outline whether and why you feel that the value of information to be gained outweighs the risks
1.
2.
3.

I certify that I have read the the Commerce Faculty Ethics in Research policy (http://www.commerce.uct.ac.za/Pages/ComFac-Downloads)	☑

I hereby undertake to carry out my research in such a way that

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

Signed by:

	Full name and signature	Date
Principal Researcher/Student:	Mohammed Alhassan Enagi 	5th October, 2015

This application is approved by:

Supervisor	Professor Jean Paul Van Belle	15th October, 2015
HOD (or delegated nominee – for all Honours Projects):		
Chair: Faculty EIR Committee (only for postgraduate research at Master and PhD level)		29 November 2015

U. Rivett, Chair of Ethics Committee; 8 December 2015

Additional permissions and ethics approvals that may be required, and jurisdictional requirements are the sole responsibility of the researcher in accordance with responsible conduct of research. Researchers working in foreign jurisdictions will need to acquaint themselves and abide by local standards, laws, regulations, and best practices

Com Ethics_V4

CHECKLIST	SELECT
A full copy of a research proposal or a literature review with methodology is attached in a separate file	☑
Interview schedules / cover letters / questionnaires / forms and other materials used in the study are attached in separate files	☑
Organisational consent letter / UCT student or staff approval letter	☑
On your cover letter to your questionnaire have you included the following?	NA ☑
1. The following UCT Logo 	☑
2. A sentence explaining the aim of the research	☑
3. Sentences of a similar nature to below must be included in the cover letter or consent form:	
This research has been approved by the Commerce Faculty Ethics in Research Committee.	☑
Your participation in this research is voluntary. You can choose to withdraw from the research at any time.	☑
The questionnaire will take approximately X minutes to complete	☑
You will not be requested to supply any identifiable information, ensuring anonymity of your responses.	☑
Due to the nature of the study you will need to provide the researchers with some form of identifiable information however, all responses will be confidential and used for the purposes of this research only.	OR ☐
Should you have any questions regarding the research please feel free to contact the researcher (insert contact details).	☑
4. Have you scanned in your signature for the last section of the form?	☑

Small & Medium Enterprises Development Agency of Nigeria

SMEDAN/NS/168/VOL.1/2
Western By pass,
Adjacent Police S.S,
Minna,
Niger state
Nigeria.
21/10/2015

TO Mohammed Alhassan Enagi
Department of information system,
Faculty of commerce,
University of cape town,
South Africa.

RE: CONSENT LETTER AND ETHICS CLEARANCE

We write to inform you that we will be happy to provide you with the relevant information and resources to support your research.

Your research, "Enterprise Architecture driven design of an artefact to support strategic IT decision making in Small Nigerian and South African organizations" will be beneficial to our SMES.

We consent to your request to conduct interview, focus group, observation and administration of questionnaire to stakeholders of your research, feel free to contact us for any further support. We wish you best of luck in your endeavor.

Regards.
Folorunsho O.I
22/10/2015
State Management

Tel: 09-7804771
09-7804765

35, Port Harcourt Crescent,
Off Gimbiya Street, Area 11, Garki
Abuja.

Website: www.smedan.gov.ng
E-mail: info@smedan.gov.ng
P. M. B. 5165, Wuse, Abuja, Nigeria.

Appendix A3: Problem Awareness Interview Questions

Problem Awareness Interview Questions

Research Title:

Enterprise Architecture-driven Design of an Artefact to Support Strategic Information Technology Decision-Making in Small Enterprises in Nigeria and South Africa

Questions

a. What are the technologies you use to support your business?
b. How do you support your business with IT?
c. What are the challenges in your organisation that you will think of addressing with IT?
d. What are the steps you follow when choosing IT solution(s) for your business?
e. How do you define your requirement(s) when selecting any IT (software or hardware) for your business?
f. How do you prioritize your requirements when selecting IT for your business?
g. What criteria do you employ in fulfilling your requirement(s) before you choose a particular IT for your business?
h. What are your concerns over the proliferation of IT when choosing the best IT for your business?
i. How do you search for information to support you in making IT decisions?
j. To what extent do you rely on internal or external sources of information during the decision-making process?
k. How do you analyse the relevant information sources before making IT decisions?
l. How do you generate alternatives for your IT choices when making decisions and how do you evaluate the alternatives before choosing a particular IT for your business?
m. What is your perception on the possibility of designing a software that automates the IT decision-making process?

Appendix A4: Summative Evaluation Interview Questions

Summative Evaluation Interview Questions

Research Title:

Enterprise Architecture-driven Design of an Artefact to Support Strategic Information Technology Decision-Making in Small Enterprises in Nigeria and South Africa

Questions

a) How relevant is the artefact to your decision-making process?
b) How would you compare the artefact with your previous approach to information searching – say on Google, asking friends etc. - for making IT decisions?
c) How has the artefact influenced your goal for the choice of IT for your organisation?
d) Do you think the artefact poses any professional or technical risk or challenge to your organisation?
e) What do you think of the artefact in terms of cost savings, resource requirements, and time it take to make IT decisions?
f) Do you think that, after using the artefact, your ability to assess your choices has improved?
g) Do you make/prefer to make a simple/one IT goal-at-a-time to support a specific IT decision?
h) If Yes, how will you describe the simplicity of your IT choice process when you have one IT goal to support a specific business need?
i) How will you describe the complexity of your decision-making process when you have a simple/single IT goal and now that your IT goals have increased?
j) What is the relationship between the time you spend searching for information and your IT goals?
k) How will you describe the user interface and the simplicity of the artefact?
l) Answered in previous interview – How will you compare this artefact and your previous process of searching for information when making IT decisions.
m) How comprehensible were the questions and the recommended feedbacks?
n) Any suggestion to improve this artefact to support IT decisions?
o) Any further comment(s)?

Appendix A5: Content of the Manual IT Decision Making Artefact

1. List of business goals and strategies Strategic Business Goal

	Goal	Recommended Objectives
a	Improve Business Process Performance	Business process improvement can be realised through the following objectives: i. Increased process throughput ii. Consistent output quality iii. Predictable process costs iv. Increased re-use of existing processes v. Reduced time of sending business information between processes
b.	Decrease Costs	Cost improvement can be realised through the following objectives: i. Lower levels of redundancy and duplication in assets throughout the enterprise ii. Decreased reliance on external IT service providers for integration and customization iii. Lower costs of maintenance
c.	Improve Business Operations	Business operation improvement can be realised through the following objectives: i. Increased budget available to new business features ii. Decreased costs of running the business iii. Decreased time-to-market for products or services iv. Increased quality of services to customers v. Improved quality of business information.
d.	Improve Management Efficacy	Management efficacy improvement can be realised through the following objectives: i. Increased flexibility of business ii. Shorter time to make decisions iii. Higher quality decisions
e.	Reduce Risk	Risk improvement can be realised through the following objectives: i. Ease of implementing new processes ii. Decreased the introduction of complex and faulty systems into business processes iii. Decreased real-world safety hazards
f.	Others (Yet to be grouped)	i. Improve customer satisfaction ii. Establish or increase brand awareness iii. Find new markets for products or services iv. Expand product or service lines v. Decrease time to market vi. Improve employee satisfaction vii. Increase management communication

		viii. Reduce operational cost ix. Generate new sources of revenue x. Become more entrepreneurial xi. Increase networking with partner
g.	Improve Effectiveness of IT Organisation	IT organisation effectiveness can be realised through the following objectives: i. Increased rollout of new projects ii. Decreased time to rollout new projects iii. Lower cost in rolling out new projects iv. Decreased loss of service continuity when rolling out new projects. v. Common development: - application that are common to multiple business areas should be developed or acquired once and re-used. vi. Use off-the-shelf products: - to reduce dependence on custom developments and maintenance costs. vii. Development of portable applications that will allow software re-use for those application that must be custom developed viii. Resource (hardware, software, and data) sharing

2. List of processes that the business performs

		None	Under Development	Defined	Measure
		A	B	C	D
Strategic Management	**The organisation has visualised what the business might be like five to ten years from now.**	Have a defined SMART business goal for your business to leverage IT benefits for your business.	The organisational strategic goal should be explicit and should inform the organisational IT needs.	The organisational strategic goal should guide your IT decisions.	A check list to assess the organisational business and IT alignment will provide a strategic roadmap.
	Stakeholders have identified the factors that are critical to the long-term success of the business.	Identify the internal and external factors that influence the growth of your business. Define the organisation's strengths, weaknesses, opportunities, and threats.	The organisation can choose from certain management tools like SWOT, SOAR and market analysis to define business long term success factors. Organisational internal and external influence factors should be considered.	Have an assessment measure like Key Performance Indicator (KPI) to assess the organisational objectives.	Ensure that your strategies align with your organisational mission and vision. Lean management, KPI and dashboards are good tools for assessing your success.
	The organisation assesses how everyday operating decisions affects your long-range plans.	The operational activities inform the long-term goal of the organisation. The organisation can choose from certain management tool like SWOT, SOAR and market analysis to define business long term success factors.	Define the ratio of input (such as cost, people, time) to output gained (e.g. revenue, margin, market differentiation, customer, innovation).	Operational efficiency defines the ration of input to run business operation and the output gained from the business. Note that output could be money, new customers/clients, opportunities & complexity, innovation, product/service quality or agility.	Ensure that your operational decisions and efficiency aligns with your mission statement.
	Our organisation has a clear and defined growth measure, through organisational base business and new business.	Stakeholders should consider having strategies for growth.	The organisation should consider some of the following steps when developing strategies: establish value proposition, identify customers, verify revenue streams, focus	Market expansion, penetration & segmentation, business diversification, product expansion, acquisition, leveraging partnership are possible growth strategies to be considered.	Create a niche for your business through your business growth strategies.

			on strength, consider competitors' strategies, define key indicators.		
	Our business has conducted a careful analysis of competitors' strategies.	Every business has potential or existing competitors. It is always important to seek for competitive advantage.	Look into similar businesses that are growing in unique and new ways to inform your organisational growth strategy.	Organisational vision should inform competitive strategies.	Organisational vision should inform competitive strategies.
	Managers know what differentiates the company from its competitors in the eyes of customers and other stakeholders.	It is paramount to distinguish your business from competitors, create a niche, and brand for your business.	Focus on the organisation's core value and possible innovation to create business differentiation. Differentiation can be achieved through marketing, support, brand, loyalty, etc.	Your business competitive strategy should have the stakeholders perceive your organisation's offering as being superior when compared to similar offerings.	Your business competitive strategy should have the stakeholders perceive your organisation's offering as being superior when compared to similar offerings.
	What are the important opportunities and risks for the organisation?	Forecasting and assessing organisational opportunities and risks with the process of identifying how to take advantage of the opportunities or minimise risk impact is very significant to any kind of business.	Have measures such as: risk avoidance, risk control, risk transfer, loss reduction, self-retention, duplication of resources and spread of risk in place to help define your risk strategies. The organisational opportunities can be informed by growth and differentiation approach.	Have measures such as: risk avoidance, risk control, risk transfer, loss reduction, self-retention, duplication of resources and spread of risk in place to help define your risk strategies. The organisational opportunities can be informed by growth and differentiation approach.	Risk measures and business growth plans need to be well communicated to stakeholders.
HR Management	**How will you rate your staff's strength compared to other similar small and medium businesses?**	Your organisation needs to acknowledge that human resources is a highly valued competitive asset especially in HR-driven businesses.	HR planning is relevant for staffing, skills consideration, organisational knowledge, which reflects in business output.	Employment, training, development, retention are examples of activities to be compared with other similar businesses.	HR should drive organisation's competitive advantage through innovation, productivity and share price by mobilizing the workforce towards excellence.
	How well are the HR records managed by your	The organisation should consider staff management systems such as ERP that will manage the staff records and other	In developing a staff management system, your organisation could consider	Have a checklist to assess your staff management system. Employee self-	Assess your staff record with your strategic goal. The staff record system should inform your operational, tactical and strategic decision.

	organisation ?	human resource activities such as hiring, training, payroll, promotion or scheduling.	online or offline based, open source or proprietary system but should integrate functionalities like: staff management, training, skill management, recruitment, performance evaluation, payroll, etc.	service/ scheduling, performance evaluation, attendance, recruitments, payroll, tax/insurance, confidentiality and privacy of information are example of functionalities significant to a good record management system.	
Production	**Production process is managed in one central production site.**	The stakeholders should structure the production/supply line and have a defined system to coordinate activities.	Similar or dependent processes should be defined, structured, aligned and integrated for easy IT intervention.	Your organisation can start seeking IT solution to automate certain defined-structured processes.	Production planning, location of facilities, supply chain, plant layout, material handling, product design, process design, quality control, material management, maintenance should be well structured and integrated.
	Using IT to leverage product developmen t is a major organisation al concern.	Your organisation can seek for IT solutions that can support and improve efficiency in the production/manufacturi ng process in your organisation. There are free or paid and cloud-based or in-house server-based IT solutions that are designed for production and manufacturing process management.	The organisation should seek for a more integrated solution to avoid redundant applications and infrastructure. There are cloud-based, server-based, open source, and proprietary production management systems depending on your organisation's capability.	Seeking cost-saving and competitive advantage through innovation, market or quality could be the objective for leveraging process with IT. Similar software like Plex Systems, Procurify are examples of cloud-based ERP solution. SAP, Rockwell, Siemens MES/MOM could be a benchmark software to inform your choice of your solution.	The organisation's choice of IT solution should enable new capabilities in production/manufacturi ng process of the business with a clear goal of optimizing efficiency.
Services	**The services in your organisation are centrally managed.**	Organisations that have their services distributed should consider having IT wares that support integration of their services.	Similar, dependent services and processes should be defined, structured, aligned and integrated for easy IT intervention.	Your organisation should look for IT solutions that easily integrate to existing systems. Priority should be on core business values as opposed to	An optimised service may focus on: reducing service cost, obsolescent cost or inventory level, increase revenue, improve customer satisfaction and forecasting, minimize technical visit or depending on the organisational goal.

			Total Service Management tools can assist companies optimize services.	support services, except if they're critical needs.	
	Using IT to leverage service is a major organisational concern.	Your organisation can look for IT solutions that can support and improve efficient service delivery in your organisation. There are free or paid and cloud-based or in-house server-based IT solutions for service management.	Identify area of need before choosing particular IT solution. There are cloud-based, server-based, open source, and proprietary service management systems depending on your organisation's capability.	Have a defined objective for looking for IT solutions in your organisation. Bear in mind your key objective while seeking for IT solution.	Assess your organisation's IT resources with the objectives/goal and mission/vision of the business.
Delivery	**Delivery of goods or service is a paramount process.**		A well-integrated customer information, supply chain and target market should inform the development of a delivery system.	Product, Supply, Service and Customer delivery processes should be properly defined to ascertain your organisation's readiness to seek an IT solution to automate the entire delivery process.	Assess your organisation's delivery process with the business objective and set checklist. Then consider automating relevant delivery process base on priorities.
	Automating delivery process in your organisation is significant.	Create a benchmark for when you need to automate delivery process. Automating process may require IT intervention.	Electronic channels like web portal, electronic payment platforms are possible order and payment tools. Delivery of physical goods can be tracked using unique identifiers like item ID, code etc.		You can look for improvement or maintain niche base on the value your organisation is getting from the automation process of the delivery system.
Account & Finance	**Accounting and finance management are decentralised roles in the organisation.**	Accounting involves the recording and reporting of financial transactions. Finance is the science of planning the distribution of a business' assets. Depending on the organisation's maturity, finance and accounting are grouped because both functions deal with	Evaluation, preparation, analysing, and interpretation of finances should be the primary focus of the account unit. The finance unit defines decision-	Evaluation, preparation, analysing, and interpretation of financial should be the primary focus of the account unit. The finance unit defines decision-making process regarding	The accounting unit should provide an assessment of how the company is performing, monitor day-to-day accounting operations, and for taxing. Meanwhile, the finance unit forecasts the future performance of the business.

		the administration of a business' assets.	making process regarding working capital issues such as level of inventory, cash holding, credit levels, financial strategy, managing and controlling cash flow.	working capital issues such as level of inventory, cash holding, credit levels, financial strategy, managing and controlling cash flow.	
	The Organisation receives large transactional records on a day to day basis.	There is no urgent drive for your organisation to look for technology intervention in the account and finance unit. Priorities can be defined for prospective needs.	Your organisation should consider using accounting and finance tools to manage transactional records. These include: accounting (the balance sheets, profit and loss ledgers, positional declarations, and cash flow statements) and finance (performance reports, ratio analysis, risk analysis, estimating break evens, returns on investment, etc.) tools.	A well-structured accounting and finance management system will provide a clear roadmap for seeking for IT intervention to meet organisational goal.	Transactional records should provide organisations with efficient and productive management of assets and liabilities based on existing information and preparation of account records.
	There is a pressing need for the use of IT to leverage the management of the organisation's accounting records and financial transactions.	No matter what type of business you're running, you should have an accounting or financial tool to support your business activities.	Your accounting and financial software should keep your business on track, manage your revenue and expenses, track and pay your employees, manage taxes, inventory and business assets. Your organisation can consider having an all-in-one package or single function. Integration is paramount but functionalities	Your financial data and business information must be accurate, accessible, timely, and secure. Any IT solution you choose to invest in should easily let you access and analyse data, efficiently manage budget processes, ensure regulatory compliance, and create, access, and distribute financial reports	Your financial data and business information must be accurate, accessible, timely, and secure. Any IT solution you choose to invest in should easily let you access and analyse data, efficiently manage budget processes, ensure regulatory compliance, and create, access, and distribute financial reports.

			like purchasing, payment, invoicing, expense reporting, payroll or inventory management are at stakeholder's discretion.		
Sales and Marketing	**Your organisation uses IT to manage a defined target market.**	Target market strategy is an integral part of business marketing strategy. Without a defined or knowledge of your target market, your business could be losing business to your competitors or missing out on opportunities to increase sales.	Consider collecting demographic and psychographic profile of target customers. The following steps should guide your organization when developing target market: define the market for your organization, create segments, evaluate the segment on a set criterion, construct segment profiles, evaluate the attraction of the segment, select target market, develop position strategy, develop and implement marketing mix, and review performance.	Understand your current customers, identify your business strength and opportunities using SWOT and set strategies and goals to break into new market.	Examine the various aspects and measures of a market segment in comparison to your organisational goals and resources. Typically, your business target market should logically fit with your business's strategic direction, resources and the extent to which your business is able to compete successfully in the segment.
	You have a system that manages Unique Selling Proposition (USP) of your customers.	A unique selling proposition differentiates your product from your competitors, such as the lowest cost, the highest quality or the first-ever product of its kind. In other word, unique selling proposition is: what you have that competitors don't. You can use IT to reach and achieve a USP strategy.	Focus on differentiation, key values, brand attributes, response and perception of your customers. Seek to create differentiation through the IT solution used	Focus on differentiation, key values, brand attributes, response and perception of your customers. Seek to create differentiation through the IT solution used in your organisation.	A successful, unique selling proposition should have a clearly articulated benefit to consumers, offers customers something that competitive products can't or don't offer. Above all, it should be compelling enough to attract new customers. Make note of your requirements while

			in your organisation.		investing on any sales and marketing tools.
	Digital Marketing / Social Media is a niche marketing strategy for the business.	Digital and social media marketing allow firms to market products or services using digital technologies, internet and internet services, mobile phones, display advertising, and any other digital medium.	Content (blogs, podcasts, etc.), Site Structure (page descriptions and tags), Social Media (Facebook, Twitter, YouTube, LinkedIn), Paid Online Advertising, Pay Per Click (PPC), Pay Per Impression (PPM), Cost per Acquisition/Lead (CPA/CPL), Bounce Rate, Click Through Rate (CTR) are examples of digital marketing tools and assessment matrix your organisation can explore.	Your organisations digital/social marketing should manage complex customer relationships across a variety of channels, respond to and initiate dynamic customer interactions, and extract value from big data to make better decisions faster.	The key assessment measure is the alignment of the digital marketing strategies with business goal. SERVAS (Sustainable, Engage, Relationship, Value, Action and Synergy) Digital Analysis is an example of assessment tool.
Customer Support	**Customer support service is a key requirement for the success of our business.**	Customer support assists customers in making cost- effective choices and is a channel for customer satisfaction and retention.	Consider the most appropriate support service required by customers and what your organisation can provide. Proactive, pre-emptive, self and assisted supports are different types of customer support service approach your organisation can adopt.	Your customers' information needs vary. Your support service can be channelled to improved support service (e.g. billing/order/ delivery queries, registration, complaints, etc.), marketing services, technical support, sales or customer analytics (e.g. profitability, complain analysis etc.).	Customer satisfaction & improvement, customer retention, net promoter score, complaint resolution time, issues (active and resolved), brand attributes, complaint escalation rate, cash flow, etc. are examples of assessment metrics for measuring your customer service.
	The current customer support service in our organisation has been leveraged with IT.	You can use different IT channels like phone, social media, internet (web portal, remote access, email) etc. to provide effective customer support service.	Customer Relationship Management (CRM) system will help your business meet its overall goal of interacting with current and potential customers. Your choice of	Your organisation should have a defined appropriate data classification across different channels (verbal communication, internet, email advertisement, telephone etc.)	Your CRM system should enhance target profitable customers, integrate assistance across different channels, individualise marketing strategy, enhance sales force, improve pricing, improve customer service, and allow the

			CRM system or a lightweight CRM system (CRM for small businesses) should help manage customer data, customer interaction, automate sales & marketing, manage employee, vendor and partnership relationship. Assess your current infrastructure and the potential CRM requirements before investing in any CRM system. There are different types of CRM systems based on your industry type, size, price, platforms and deployment method.	and the dissemination of information to various component of the organisation (support centre, sales, marketing and management) should be informed by your organisation's goal of interacting with current and potential customers.	customisation of products and services.

3. List of things important to the business

Information Resources	The organisational growth is driven by the quantum of information they have about their customers, suppliers, competitors or partners.
	The organisation is very pleased with the amount of information they have in running their business and is not too keen to employ other source.
	The information the organisation has is well managed by the current software and hardware the organisation possesses.
	The organisation is leveraging the wealth of information it has to achieve it strategic goal.
	There is no redundancy of information in our organisation as a result of adequate utilisation of the information or we don't collect irrelevant information.
Software	The organisational information resource is well-managed by the software the enterprise acquired.
	The software acquired by the organisation is very useful and all of the software aids one or more function/process in the organisation.
	Some software the organisation currently has performs similar functions with another software.
	The organisation struggles in maintaining most of the software it uses or relies completely on the vendors for support service.
	The organisation does struggle in using some of the software it has acquired because of the complexity of the software.
	The organisation is willing to outsource the services of providing, managing and maintaining IT software to an external body at a lower cost as long as confidentiality, effective, and efficient service will be delivered to them.
Hardware	The organisation has hardware (such as PC, laptop, printers etc.)
	The hardware provides a good platform for running/operating most of the software the organisation has acquired.
	The organisation doesn't have any redundant hardware because all the hardware is been utilised to the fullest.
	The organisation has spent a reasonable budget on acquiring hardware but there is still need for more or future expenditure on hardware.
	The organisation is in need of more hardware for the organisation to achieve its strategic goal.
	Sophisticated hardware is required to integrate all the hardware the organisation has possessed within or across other branches of the organisation.
	The organisation is willing to dispose/discard of the existing hardware for a cheaper hardware even if the hardware is not physically located in the organisation but organisation has access to the infrastructure.
Communication & Network	The organisation relies keenly on information sharing among stakeholder (e.g. staff, manager, business partners, and customers)
	Hardware and Software are well integrated allowing timely information sharing.
	The communication/network infrastructure has not incurred the organisation too much expense.
	There is efficient use of the communication/network infrastructure in the organisation.
	The organisation is considering the alternative of having an outsource service that will take out the cost of communication/network infrastructures and integrates most of the organisational hardware requirements.

			None	Low	Medium	High
Human Resources	Staff IT Skills	**The in-house IT staff are proficient in providing IT support service.**	Outsourcing IT needs is a good strategy to cut-costs and transfer IT skill requirements .	Choosing cloud-based applications and infrastructures such as: Software as a Service (SaaS), Infrastructure as a Service (IaaS), etc. will relieve your organisation of the cost and skills required to manage and maintain IT.	Choosing cloud-based applications and infrastructures such as; Software as a Service (SaaS), Infrastructure as a Service (IaaS), etc. will relieve your organisation of the cost and skills required to manage and maintain IT.	Your organisation has the option of seeking to develop in-house solutions or choose cloud based solutions.
		There are non- IT professional in your organisation that can provide IT support.		The non-IT staff who are keen on IT should be involved in the IT project development process and decision-making process.	The non-IT professionals in our organisation can be trained by your vendors during implementation and to provide first level support services.	The non-IT professional should be involved in IT decision-making process, implementation and maintenance. Use of cloud services can reduce the technical skills requirement.

		External support/ vendors are the major source of IT support we have.	Look for internal or external skills to manage your organisational IT resources.	Seek for cloud-based IT solutions that provide integration, implementation and maintenance support to minimise the need for IT skills and support from vendors.	Define your Service Level Agreement (SLA) with your vendors on products and services. Deploy customised IT solutions only when unavoidable. Otherwise look for cloud-based IT solutions.	Define your Service Level Agreement (SLA) with your vendors on products and services. Integrated IT solutions will reduce the skills and resource requirements.
		Outsourcing the IT skills requirement will affect the organisation's long-term goals.	Your organisation can consider outsourcing any IT needs to reputable vendors that meets the organisational needs.	Outsourcing should be considered with caution and should align to organisational principles and goals.	Opportunities and risks of outsourcing should be well thought out, defined and assessed before considering outsourcing.	Requirements Definition, Vendor Selection and Due Diligence, Contract Negotiation and Implementation, and Ongoing Monitoring are strategies to manage high outsourcing risks.
Financial Resources	Organisational IT Financial Resources	**The level of our income is stable and our cash flow is fluent and under control.**	Try to understand your organisational financial stability especially the income, expenditure, cash flow, revenue to allow you plan appropriately for every expense (inclusive of IT expenditure)	If organisational income and cash flow is not stable, your best IT solution should be open source and pay-as-you-use technologies.	You might want to consider open source solutions or in-house solutions but ensure that the applications/infrastructures are scalable.	Your organisational income has made it convenient for you to choose from different options of IT solutions, ranging from open source, paid, proprietary etc. but you need to plan for IT investment.
		There is a formal process of financial planning and implementing IT in your organisation ?	Avoid random and unplanned approach of adopting or investing on IT solutions. Ensure that your IT investment has a clearly defined purpose to your business.	IT is more suited for supporting role in your organisation. Preferably, do not make IT investment a capital expenditure. Look for open source applications, cloud based platforms/infra-structures and common readily available devices.	Your organisation can seek to achieve innovative solutions and competitive advantage for your business through IT. Although, solutions should be adopted in phases, based on success and consideration to open sources and value-driven solution as opposed to uniqueness.	Your organisation should have clear assessment measures to evaluate IT expenditures and value. Your organisation has several options of solution space (open source, common infrastructures, uniqueness, proprietary etc.).
		The organisation has a limited budget for ICT (hardware, software, skills	Your organisation should have clear assessment measures to evaluate IT expenditures	Your organisation can achieve innovative solutions and competitive advantage for your business	IT is more suited for a supporting role in your organisation. Preferably, do not make IT investment a capital expenditure. Seek for open source applications, cloud-based	Avoid random and unplanned approach of adopting or investing on IT solutions. Ensure that your IT

		training) expenses.	and value. Your organisation has several options of solution space (open source, common infrastructure, uniqueness, proprietary etc.).	through IT. Solutions should be adopted in phases, based on success and consideration to open sources and value-driven solution as opposed to uniqueness.	platforms/infra-structures and common readily available devices.	investment has a clearly defined purpose to your business.
		The organisation is willing to increase ICT expenses budget if the investment aligns with its strategic goal.		Leverage the benefit of the existing IT in your organisation to support and sustain your business. Otherwise, invest in IT for the purpose of sustaining your business growth as opposed to innovative purpose. Integratable and scalable solutions should be key focus for your IT investment.	Your organisation is financially ready to explore different IT opportunities but it is paramount you consider the business need for IT, such as: better business performance, competition, new product or service development, innovative service delivery.	Define your organisation need for IT; you can invest in IT for better business performance, competition, new product or service development, innovative service delivery.
		At all-times, cost is our key concern when investing in IT and the organisation can comprise other criteria for low cost.		A guiding principle for IT investment can help your organisation in making IT decisions that will align with organisational goals and objectives especially if you are looking for industry-specific- owned IT solutions.	Open source software, Infrastructure as a Service, Platform as Service etc. are good options for your IT choice considering your concern for cost.	Open source software, Infrastructure as a Service, Platform as Service etc. are good options for your IT choice considering your concern for cost. You can also consider in-house development of your IT software applications and get customised hardware if it is necessary to meet your business goals.
Customers/Clients	Population of Customers	**The organisation considers itself to have a large customer base.**	If customer growth is significant to your business, you should consider the marketing tools and social media platforms to improve your	You can use social media platforms such as Twitter, Facebook, etc. for zero or low cost to improve your customer base and promotion.	Develop strategies for collecting your customer's records to improve your customer relationship management.	Develop strategies for collecting your customer's records to improve your customer relationship management.

			customer base.			
		The organisation customer base is large and is difficult to manage.	It is not necessary for you to invest in complex customer management solutions considering your customer base.	Use standalone or integrated spreadsheets like Microsoft Office Excel, Google Docs, Open Office, iWork Number etc. to manage your customer information.	Evaluate your organisation's resource capabilities before considering and choosing any Customer Relationship Management (CRM) tools. There are light-weight and open source CRM solutions that you can select with minimal skills and resources requirements.	It is paramount for you to have a Customer Relationship Management (CRM) tool to manage your customer information.
		Analysing our customers' data to retain, ensure a growing customer base, and improve sales is important to us.	Customer sourcing, retention and management are important for businesses that rely on customers for their finished products or services.	Develop a roadmap for sourcing, retaining and growing your customer base through the use of IT tools (e-marketing, e-payment system etc.) to target existing and potential customers.	Business Intelligent analytic tools can analyse your organisation's data, conduct data mining, process online data, query and provide intelligent report on your data. Consider having ordering, payment and delivery systems that will cater for customers need and convenience.	Develop, choose a proprietary or open source analytic tool to manage your customer records. Deploy platforms and infrastructures that will improve sales through convenient ordering system.
	Customer Types	**Our customers are spread across different locations.**		Identify key areas of business improvement or need to satisfy and reach out to customers, such as convenience in ordering, payment and delivery.	Identify key areas of business improvement or need of your customers and develop strategies which serve your customers across different location through choice of open source or low-cost technologies.	It is necessary you develop a well-structured ordering system, e-payment options, delivery systems or support services.
		Our customers are spread across different channels such as: electronic platforms (emails, social media), fax, stores etc.	For convenience, your organisation can reach out to customers/ clients via emails, social media and e-payment platforms.	Set-up online/electronic presence such as shared-website, Facebook, twitter, Instagram etc. for your organisation to reach out to customers.	Your organisation should have a web-presence and social media presence which will provide customers with service/product information, ordering system etc.	The organisation should have a dedicated unit to be responsible in providing electronic presence to manage different customer types.

4. List of locations important to the business

		Irrelevant	Uncertain	Distinct
Business Location	The organisation has more than one branch (business outlet) that engages in common tasks to achieve organisational goal.		The organisation may consider the use of certain collaborative technologies if it has staff that need to collaborate across different locations and times. Electronic scheduling, project management systems, online proofing, workflow systems, knowledge management systems, social software, client portal are some collaborative software solution that your organisation can consider.	Measure the success of the current collaborative technologies against your organisation's defined objective checklist. Plan for future need and possible integration.
	The staff engage in more group activities (schedule events, brainstorming, information/knowledge sharing etc.) regularly, irrespective of their physical location.		Groupware are technologies that support synchronous and asynchronous collaborative activities. To deploy a groupware you need to have a network system (which could be a server-based, local area network or internet) to support the implementation of your choice of groupware.	Ensure you align your choice of groupware technology with your organisational principles for investing on technology. Your organisation should set some criteria when deciding on the kind of groupware (e.g. Lotus Note, Microsoft Exchange, Google Doc etc.) to adopt.
	The organisation has a sufficient IT tools that support staff collaboration.		Open source applications and cloud service like PaaS, IaaS and SaaS are good options for organisations that are constrained by certain organisational resources like staff skills, funding, etc.	Your organisation should define principles and have a checklist to assess the tools your organisation uses to support collaborative activities to help in making your decision.
	The software the organisation uses is the same in all the business locations.		It is paramount you consider the use of common applications across all your business for easy integration, scalability and maintenance. Define your clear principle(s) for choosing any software for your business.	
	The hardware and software used for collaborative activities are integrated across different business location.		Integrating hardware and software makes it more convenient to secure systems, allow solution consistency, common data format and system compatibility.	Ensure you maintain consistency in your IT decision to integrate your hardware and software investment.
Market location	The organisation has a defined market for product/services.		Your organisation should have an established/steady market for products/services through sales analysis tool and use of Business Analytic and Intelligent tools and Customer Management Systems.	Define your organisation target for market domination or creating of niche using Business Analytic and Intelligent tools and Customer Management Systems.
	Market are spread on different geographical location and its paramount for the organisation to reach out to the market		Your organisation need to identify its customers' need, preferences and location to achieve competitive advantage or business growth, depending on the organisation's goal.	Your organisation should make plans to provide convenient ordering, payment and delivery systems for her customers. Non-physical/tangible/soft goods items can be delivered online.
	Online market has been a good market space for the organisational growth.		Your organisation need to identify its customers' needs, preferences and location to achieve competitive advantage or business growth, depending on the organisation's goal.	Your organisation should prioritise strategies to leverage online customers, if customer growth or market distinction is your organisational goal.
Suppliers' location	The suppliers are located in different geographic locations than your organisation.		Identify the location of your supplier, which will allow you to make an informed choice of source for raw materials for your product or services.	You should have an approach for choosing a supplier or vendor, identify the requirements (IT in specific) for doing business and how your organisation can align with your supply requirements.
	A good communication channel will improve the effectiveness of the supply chain.		Enquire with your suppliers regarding possible hardware or applications they use with other customers to ease ordering, tracking of order, supply process etc.	Invest in communication platforms like mobile phone, internet connectivity, use of emails, supply chain management systems (e.g. CRM or stand-alone applications) and e-payment platforms to improve the supply process.

5. List of organisations important to the business

		None	Low	Medium	High
Business Partner	Your organisation relies solely on business partners (suppliers, vendors etc.) to achieve organisational goals.		Identify the key areas your partners influence your business and define terms of operation with your partners.	Your organisation should have a defined partner relationship management strategy. Partner relationship management (PRM) is a business strategy for improving communication between companies and their channel partners.	Your partner relationship management strategies should be well defined and should align to your business goals.
	Your business partner has defined software or hardware requirements for your organisation. The business relies on the successful supply of raw materials or service from third party company or business partner.		Web-based applications for partner relationship management enables companies to customize and streamline administrative tasks by making shipping schedules and other real-time information available to all the partners over the Internet.	Depending on the level of your organisation's reliance on your partner, avoid choosing your IT solution based on your business partner's criteria or preference, only if it aligns with your organisational IT need. Always have your readiness and principles stated up-front.	Your partner's IT requirements for partnership should fits into your organisational maturity, readiness and principles for investing in IT. Always have your readiness and principles stated up-front.
	Your business relies on the successful supply of raw materials or services from third party company or business partner.		Introducing basic technology like e-payment, e-communication channel (emails, mobile phones, chats), spreadsheets or web portal in managing your business partner will fast track the supply chain process with you.	Depending on your business partner's IT readiness, several technologies like e-payment platforms, automated delivery systems, Customer Relationship Management system (CRM providers have incorporated Partner Relationship Management - CRM features, such as web-enabled spreadsheets shared through an extranet, in their software applications) can help improve business and partner relationship to foster supply chain process.	Ensure that your business partners are willing to integrate solutions that will improve the supply chain process through IT solutions like e-payment platforms, automated delivery systems, Customer Relationship Management systems.

6. Enterprise Architectural Principles

	Principle	Statement (Description)	Define Implications of Principle
General	Non-proliferation of Technology	Technical diversity will be controlled in order to reduce complexity.	
	Compliance with Law	Compliance with all relevant laws and regulations.	
	Business Continuity	The enterprise will be resilient to internal and external threats.	
	Business Alignment	Every IT project must be aligned with business goals and strategy.	
	Common Use Solutions	Cross-silo solutions are preferred over duplicative silo specific applications, systems and tools.	
	Simple Solutions	IT will be as simple as possible. Where complexity is required it will be encapsulated and hidden behind an interface that is as simple as possible.	
	Quality	A minimum standard of quality will be maintained despite time to market concerns.	
	Think Globally, Act Locally	Solutions will consider the enterprise impact of architectural decisions.	
	Shared Resources	Solutions will seek to maximum sharing of resources such as network, computing, storage and data.	
	Protection of Intellectual Property (IP)	Patents, copyrights, trade secrets and other IP will be preserved and protected.	
Business	Business Goals	Business units will publish business goals and strategy.	
	SMART Business Goals	Business goals will be Specific, Measurable, Attainable, Relevant, Timely.	
	Costumer Focus	Business decisions will seek to maximize value to the customer.	
	Simplified Operations	Business decisions will seek to simplify operations.	
	Response to Customers	Customer requests will be addressed in a timely manner.	
	Long Term Focus	Decisions will be based on long term strategy — even at the expense of short term profitability.	
	Time to Market	Business units will respond to opportunities in a timely manner.	
	Response to Threat	Business units will respond to external threats in a timely manner.	
	Empowerment of Employees	Employees will be empowered to do their jobs.	
	Diligent Requirements	Business will provide rigorous functional and non-functional requirements for projects.	
Data	Information Openness	Information must be open and available to support productivity and innovation.	
	Shared Asset	Data is a shared enterprise asset and cannot be owned by a department, team, or individual.	
	Information Relevance	Data must be business-relevant and have value.	
	Data Currency	Data must be timely.	
	Protection of Data	Data is an asset that must be protected.	
	Data Confidentiality	Confidential data must be protected.	
	Data Stewardship	Data elements must have a designated trustee who is responsible for data quality.	
	Data Interpretation	Data definitions and vocabularies will be consistent throughout the organization.	
	Globally Unique Identifier	Business critical data objects will have a globally unique identifier.	
	Data Backup	All data will be backed up.	
	Data Validation	Data will be validated at the point of collection.	
	Data Retention Policy	Master data repositories will maintain a data retention policy that is in line with enterprise and regulatory requirements.	

	Decoupled Data	Data should be maintained in a separate data layer decoupled from applications.	
	Re-keying	Users will never be asked twice for the same data.	
Data Integration	Real-time Integration	Real-time integration is preferred over batch integration.	
Technology (General)	Bleeding Edge	Experimental or early release technologies will not be used unless they are critical to competitive advantage.	
Infrastructure	Horizontally Scalable	Infrastructure should be capable of scaling up by adding devices.	
	Logical Partitioning	It should be possible to logically partition infrastructure capacity.	
	Enterprise-wide Security	Infrastructure should enable enterprise-wide security.	
Applications	Mobility	Applications should be built to maximize the locations from which they can be used.	
	Extensibility	Applications will provide hooks that allow functionality to be extended in future	
	Flexibility	Applications will be architected to minimize the costs of future changes.	
	Monitoring and Measurement	Applications will be designed to support monitoring and measurement.	
	Platform Independent, Open Standards	Applications that support open standards are preferred.	
	Interoperability	Applications will be interoperable.	
	Application SLA	All applications will publish a SLA that has been agreed upon with the business.	
	High Availability	All applications will publish availability targets that have been agreed upon with the business.	
	Application Documentation	Applications must have architecture, design and run book documentation.	
	Capacity Management	IT capacity will meet current and future business requirements.	
	Reuse of Components	Where possible applications will re-use existing components.	
	Standards Compliance	Applications will comply with established standards, conventions, agreements, processes, practices and methods.	
	Scalable	Applications will be designed to handle higher loads when allocated more resources.	
	Error Robustness	Applications will handle errors in a controlled fashion and continue to operate normally (graceful degradation).	
	Modernization	Applications have a limited life span — end of life should be anticipated and plans for replacement developed.	
	Collaborative	Applications should consider incorporating tools to facilitate collaborative processes.	
Service Oriented Architecture (SOA)	Separation of Concerns	It will be possible to change a component with minimal impact to other components.	
	Loosely Coupled Services	Services will be loosely coupled (producers loosely coupled from consumers).	
	Self-describing Services	Services will be self-describing.	
	Reusable Services	Services will be designed to maximize enterprise wide reuse.	
	Discoverable Services	Services will be discoverable.	
	Service Abstraction	Services will hide their underlying implementation details.	
	Service Statelessness	Services should avoid saving state where possible.	
	Service Autonomy	Services should have significant control over the functionality they provide.	

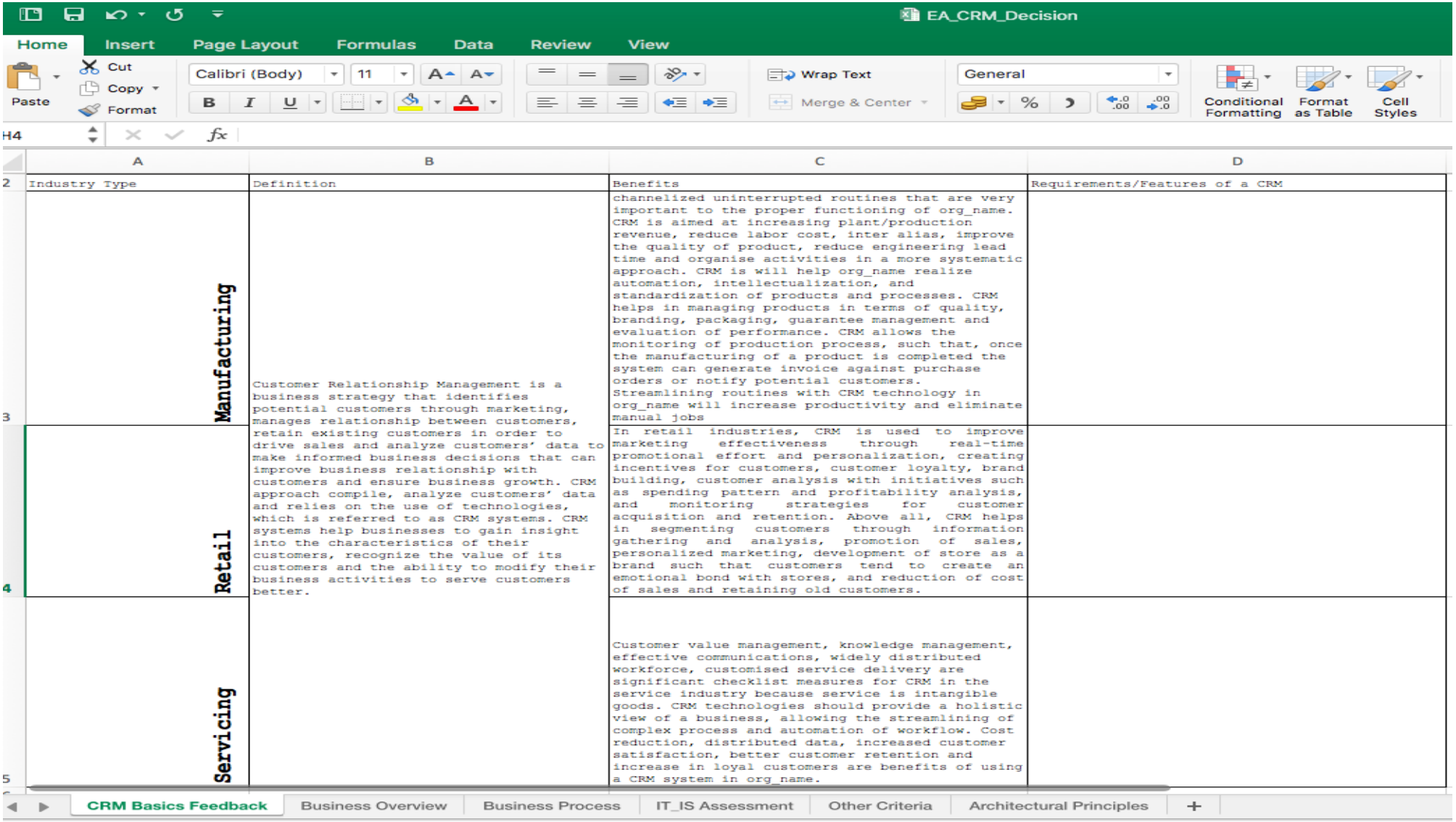
	Policy Driven Security	Services will have a defined security policy.	
Usability	Equitable Use	User interfaces will be designed to maximize accessibility (to as wide an audience as possible).	
	Ease of Use	User interfaces will be as simple and intuitive as possible	
	Learnability	An application should be easy to learn.	
	Technology Transparency	Underlying technical implementations should be hidden from users.	
	Fail-safe	User interfaces will provide fail-safe features to protect users from unintended consequences of actions.	
	Consistent Navigation	Content and navigation will be consistent.	
	Predictable Interface	User actions should have predicable results.	
Processes	Zero Touch	Manual tasks should be managed as a workflow.	
	Straight Through Processing	Enterprise level processes will be automated end-to-end including integrations with customers and partners.	
	Productivity	Processes will seek to maximize productivity.	
	Process Reinvention	When a new system is implemented — impacted processes will be investigated for simplification.	
	Continuous Improvement	Processes will be designed from the ground up to support continuous improvement.	
	Process Realism	Processes will reflect the real world.	
	Problem Identification	Processes should be designed to bring problems to the surface as soon as they occur.	
Security	Separation of Duties	The builder and operator of an application will be independent roles.	
	Security by Design	Security is embedded into business, application, data and technology architecture.	
	Security is a Management Discipline	Security is more than a technical problem. Security needs to be managed at every level of the business.	
	Confidentiality	The confidentiality of sensitive data will be maintained.	
	Security Transparency	Security supports business goals and should be as transparent as possible.	
	Defence in Depth	Security will be layered.	
	Least Permissions	Security privileges will be just enough to perform requisite activities.	
	Balanced Controls	Security controls will be balanced and proportional to risk.	
	Cost-effective Security	Security costs need to be balanced with security benefits.	
	External Security Responsibilities	The organization has security responsibilities to customers, partners and regulators.	
	Security Ownership	Security accountabilities and responsibilities should be made explicitly clear.	
	Security Reassessment	Security is not a one-time activity — it must be periodically reassessed.	
	Enterprise Security	Security must be considered at the Enterprise level (not only at the system or departmental level).	
	Consistent Policy	Security policies will be applied consistently across the enterprise.	
	Security Requirements	System requirements must specify security features, controls, and operational practices.	
	User Management	All systems must have defined processes for requesting, issuing, and closing user accounts.	
	Direction of Threat	Both internal and external threats will be considered in security architectures.	
	Audit Trail	All significant user and system actions should leave an audit trail.	

7. IT Governance Strategy Check list

Corporate governance			None	Initial	Intermediate	Advance
		How strong is your governance structure?				
		Involvement/support from your stakeholders in the management of your business?				
		The extent of monitoring and control measures in your organisations?				
		Defined structure of accountability in your organisation?				
		Application of legal regulatory policy guiding your business?				
		Adherence to the relevant legal and regulatory policies?				
		Use of a particular integration framework to guide your IT investment?				
		How well do you stick to roadmaps to achieve your set business goals/objectives using IT?				
IT Change Management	Planning Change	Are you introducing a new system into your organisation				
		Have you built a solid business case for the IT change?				
		Do you have a road-map for the IT change?				
		Have you communicated why the change is happening in a convincing manner to people?				
		Do you have a clear understanding of possible barriers and implications to a successful implementation of the change?				
		Does the proposed change align with your organizational strategy plan?				
		Do you have a view of what success will be like for the organisation?				
		Do you have a clear understanding of what is actually going to change?				
		Do people have the skills needed to implement and adopt the new system?				
		Have you involved some of the people that will be affected by the new system?				
		How can we leverage employees' knowledge and empowerment?				
		Have you arranged for people to be coached and supported during the change?				
		What training will people need?				
	Implementing Change	Do you have defined metrics to keep track of the change progress?				
		Is the organisation learning anything new as the new system is been implemented?				
	Evaluating Change	How well has the new system addressed the problem that it set out to solve?				
		Have you compared the achievement of the new system with your set metrics?				
		Is there anything remaining to be done or is there a gap between your planned and implemented system?				
		Have you defined your next steps?				
Quality management		Have customer quality standards been defined and documented?				
		Have regulatory quality standards been defined and documented, if applicable?				
		Have organisation quality standards been utilized?				
		Have other relevant quality standards been identified?				
		Have measures/thresholds for quality metrics been defined?				
		Have quality policies and standards been communicated to the project team?				
		Does the Quality Management Plan align with organisational quality standards?				
		Has the project's current level of quality been assessed?				
		Have the acceptance criteria for project deliverables and product performance been developed and agreed upon by the stakeholders?				

Appendix A6: Content of Semi-Automated IT Decision Artefact (SITDA)

Overview of the Content of CRM Demonstrated with SITDA



	A	B	C	D
2	Industry Type	Definition	Benefits	Requirements/Features of a CRM
3	Manufacturing	Customer Relationship Management is a business strategy that identifies potential customers through marketing, manages relationship between customers, retain existing customers in order to drive sales and analyze customers' data to make informed business decisions that can improve business relationship with customers and ensure business growth. CRM approach compile, analyze customers' data and relies on the use of technologies, which is referred to as CRM systems. CRM systems help businesses to gain insight into the characteristics of their customers, recognize the value of its customers and the ability to modify their business activities to serve customers better.	channelized uninterrupted routines that are very important to the proper functioning of org_name. CRM is aimed at increasing plant/production revenue, reduce labor cost, inter alias, improve the quality of product, reduce engineering lead time and organise activities in a more systematic approach. CRM is will help org_name realize automation, intellectualization, and standardization of products and processes. CRM helps in managing products in terms of quality, branding, packaging, guarantee management and evaluation of performance. CRM allows the monitoring of production process, such that, once the manufacturing of a product is completed the system can generate invoice against purchase orders or notify potential customers. Streamlining routines with CRM technology in org_name will increase productivity and eliminate manual jobs	
4	Retail		In retail industries, CRM is used to improve marketing effectiveness through real-time promotional effort and personalization, creating incentives for customers, customer loyalty, brand building, customer analysis with initiatives such as spending pattern and profitability analysis, and monitoring strategies for customer acquisition and retention. Above all, CRM helps in segmenting customers through information gathering and analysis, promotion of sales, personalized marketing, development of store as a brand such that customers tend to create an emotional bond with stores, and reduction of cost of sales and retaining old customers.	
5	Servicing		Customer value management, knowledge management, effective communications, widely distributed workforce, customised service delivery are significant checklist measures for CRM in the service industry because service is intangible goods. CRM technologies should provide a holistic view of a business, allowing the streamlining of complex process and automation of workflow. Cost reduction, distributed data, increased customer satisfaction, better customer retention and increase in loyal customers are benefits of using a CRM system in org_name.	

Kindly respond to the questions in this section using the following Likert scale: "None" represent No, or if you totally disagree or don't consider the question relevant; "Under Development" means your organisation is considering or working towards the question; "Defined" means Certainly, Yes, or your organisation has resolved the question; "Measured" mean you strongly agree, Yes, or your organisation has formalised and develop measures to assess the question.					
	Questions	None	Under Development	Defined	Measured
Manufacturing	**1**	7	8	9	9
	2	10	11	12	12
	18	19	20	21	22
	19	23	24	18	25
	12	34	35	31	36
	13	37	38	38	39
	14	40	41	42	43
	23	44	45	46	46
	24	47	48	49	49
	25		51	51	51
	26		51	51	51
	27	53	53		
	28	52	52		
	29	51	51		
	30	50	50	50	50
	31	50	50	50	50
	18	19	20	21	22
	19	23	24	18	25
	12	34	35	31	36
	13	37	38	38	39
	14	40	41	42	43
	23	44	45	46	46
	24	47	48	49	49
	25		51	51	51
	26		51	51	51
	27	53	53		
	28	52	52		
	29	51	51		
	30	50	50	50	50
	31	50	50	50	50
Service	**5**	13	14	15	16
	6	17	15	18	18
	18	19	20	21	22
	19	23	24	18	25
	12	34	35	31	36
	13	37	38	38	39
	14	40	41	42	43
	23	44	45	46	46
	24	47	48	49	49
	25		51	51	51
	26		51	51	51
	27	53	53		
	28	52	52		
	29	51	51		
	30	50	50	50	50
	31	50	50	50	50

IS Assessment for CRM Decision

Instructions: Kindly complete the following tasks before you respond to questions in this section!
1. Make an inventory list of all the hardware (computers, printers etc.), software (MS office, OS, HR/Account management etc.), Communication (Routers, Modems etc.) in Org_name.
2. Associate/link each of the resources you have identified to a particular process or function in Org_name.
3. Evaluate each of the resources based on the value it provides Org_name.

Question	Not at all	Rarely	Occasional	Always
1		10	10	11
6	10	10	10	11
9	9	9	10	10
10	9	9	10	10
13			10	10
20	10	10		9
17			10	10
18	10	10	11	9
19	9	9	11	10
21	10	10	11	9
24	1	1	2	2
25	1	1	3	3
27			10	10
26	4	4	4	
28	9	9	11	10
30	10	10	11	9
31	5	5	5	6
32	6	6	7	7
33	*6*	*6*	*5*	*5*
34	8	8	6	6
35	6	6	5	5

Enterprise Architecture Principles for CRM Decision

Principles		Business Overview Feedback	Business Process Feedback	IS Assessment Feedback	Other Criteria Feedback
3	Business-IT alignment		50,51,52,53,64	9,10,11	
4	Common use of IT solutions		50,51,52,53	9,10,11	
5	Compliance with Law		50	9,10,11	
6	Consistency of IT			9,11	
7	Enterprise process automation		50		
8	Equitable use interface			9,11	
11	Learnability			9,10,11	
12	Non-proliferation of Technology		50,51,52,53,64		
14	Productivity is a priority		50,51,52,53		
15	Quality is a priority		50,51,52,53		
16	Realistic Solutions		50	9,11	
18	Simple IT solutions			9,11	
20	Simplify re-invented processes		50,51,52		
24	Costumer Focus		50,51,52,53		
26	Opportunity to market		50,51,52,53		
27	Publish Business Goals		50,51,52,53,64		
28	Quick response to customers		52		
29	Response to Threat		50		
34	Information Openness		50,51,52,53		
36	Data Backup			9,11	
37	Data protection			9,10,11	
38	Information Confidentiality			9,10,11	
41	Real-time Integration			9,11	
47	Compliance to Standards		50,51,52,53	9,10,11	
48	Documentation			9,10,11	
49	Open source preference			10	
50	Scalable application			9,11	
51	Service Level Agreement is mandatory			9,10,11	
60	Centrally secured infrastructure			9	
61	Control of infrastructure			9,11	
62	Reusable infrastructure			9,11	
63	Scalable infrastructure			9,10,11	
69	Cost-effective security			9,11	
70	Enterprise security ownership			9,11	
73	Security is organisational responsibility			9,11	
74	Security re-assessment			9,10,11	

Business Process Question Code Description

Index	Business Process Category	Question Description
1	Production	To what extent will you rate the structuring of the production process of Org_name?
2	Production	To what extent has your Org_name integrated IT to its production processes?
3	Services	How satisfactory will you rate the level of integration of services in Org_name?
4	Services	To what extent does Org_name consider the use of IT to leverage services?
5	Services	Does Org_name have plans to offer customers 24/7 access to the business?
6	Services	What is Org_name's strategy on reaching out to its customers about products and services?
7	Services	Is Org_name keen to integrate all online applications into one centrally accessible system?
8	Sales & Marketing	How will you rate Org_name's readiness towards the management of defined target market for your products and services?
9	Sales & Marketing	How will you rate the management of Org_name's unique selling preposition?
10	Sales & Marketing	What is the scale of Org_name's Digital Marketing and Social Media as a niche marketing strategy?
11	Sales & Marketing	How will you rate Org_name's plan to automate the ordering process of goods and services?
12	Delivery	How defined and integrated will you rate Org_name's delivery process?
13	Delivery	How will you rate Org_name's strategy to use IT to improve the delivery process?
14	Delivery	Are customers of Org_name looking for software that will allow them to track their orders?
15	Customer Support	To what extent does customer support contribute to the success of your business?
16	Customer Support	How well is Org_name's current customer support leveraged with IT?
17	Customer Support	Do your customers require consistent support services?
18	Customer Support	Do you think offering loyalty programs will encourage long time patronage from your customers?
19	Customer Support	To what extent has Org_name achieved better marketing strategies with the use of a tool to manage customers' records?
20	Customer Support	How well does Org_name's approach of managing customers' records result in better sales?
21	Customer Support	To what extent has Org_name optimised it business and improved it customer experience using any tool to manage customers' record?
22	Customer Support	To what degree does the analysis of Org_name's customers' data inform key and critical business decisions?
23	Customer Support	How well has Org_name analysed customers' records such that revenues and strategies are informed by customer experiences?
24	Customer Support	Has Org_name always had a large customer base?
25	Customer Support	Is Org_name's customer base often too large to manage?
26	Account and Finance	Is Org_name keen to have a convenient payment platform that allows customers to make a payment anytime and anywhere?
27	Account and Finance	How distinct are the activities of the accounting and the finance department in Org_name?
28	Account and Finance	How will you rate Org_name's approach in managing the day-to-day transactional records?
29	Account and Finance	How will you rate the efficiency of the tool (s) Org_name use in managing financial transactions?
30	Account and Finance	How aligned is the activities of the accounting and the finance department in Org_name?
31	Account and Finance	How will you rate Org_name's approach in managing the day-to-day transactional records?
32	Account and Finance	How will you rate the efficiency of the tool (s) Org_name use in managing financial transactions?
33	Human Resource	How will you rate Org_name approach to staff management?
34	Human Resource	To what extent does Org_name's staffing reflect on the business success?

Business Process Feedback Code Description

Index	Business Process Feedback Code Description
1	Staff management should be important to Org_name and management should ensure that the right employees are assigned the right responsibilities. Lack of or poor staffing can result in a chaotic, disorganized work environment, which can make Org_name lose valuable business.
2	Staff management requires a combination of reasonable and relevant tools which Org_name can use. Employment, training, skills development, knowledge management, staff involvement and organisational defined goals should be considered when managing staff.
3	A well-managed staff structure should drive Org_name's competitive advantage through innovation, productivity, and share price by mobilizing the workforce towards excellence.
4	Your HR management strategy should inform your operational, tactical and strategic decision. Hence, it is important you assess your HR management strategy with your business goals.
5	Depending on your organisational needs, an HR system should have functionalities like recruitment, staff training, skill management, performance evaluation, promotion, and payroll. HR management system can be online, offline or cloud-based and could be an open source or proprietary system.
6	Have a checklist to assess your staff management system. Employee self-service/scheduling, performance evaluation, attendance, recruitments, payroll, tax/insurance, confidentiality and privacy of information are examples of functionalities significant to a good record management system.
7	Develop strategies for a structured production process and have a defined system to coordinate activities.
8	Production process and dependent processes should be clearly defined and integrated for easy IT intervention.
9	Production planning, location of facilities, supply chain, plant layout, material handling, product design, process design, quality control, material management are examples of generic checklist for a well-structured production process. Org_name can look for IT solutions to automate certain production processes.
10	IT can support and improve the efficiency of production/manufacturing process. There are free and paid IT tools for managing production and manufacturing processes.
11	Seek for integrated IT solutions to avoid redundant applications and infrastructure. Depending on Org_name's capabilities and needs, you can consider cloud-based, server-based, open source, and proprietary production management systems.
12	The adoption of a production management system should enable new business capabilities with a clear goal of optimising efficiency in production/manufacturing process. Applications like Plex Systems or Procurify are examples of cloud-based Enterprise Resource Planning solutions. SAP, Rockwell, Siemens MES/MOM are benchmark applications that can inform your choice of production management systems.
13	Service integration is an approach to managing multiple business services and incorporating interdependent services from internal and external providers to provide a single business to achieve business goals.
14	To successfully perform service integration, certain IT capabilities are required and services need to be well structured. Total Service Management tools can help in integrating and optimizing services.
15	Emphasize supporting core business values when investing in IT. Invest in applications, infrastructures, or technologies that can easily be integrated with existing systems.
16	Integrated and well-managed services are characterized by reduced service cost, comprehensive view into overall service performance, increase revenue, improve customer satisfaction, faster service delivery, and forecasting, minimising technical visits.
17	IT is integral to business success and can leverage your business through efficient and effective service delivery. There are free and paid IT applications to support service delivery and management.
18	It is important that Org_name has clearly defined objectives for investing in IT and strictly adheres to certain principles.
19	It is paramount to have a structured delivery process in order to control the link between the business and your customers through a coordinated market analysis, which makes it easier to use IT to improve the delivery process.
20	A well-structured delivery process should integrate customers' information, supply chain, and market for products or services.
21	The objective of a defined delivery process is to ensure that products or services get to the right customer as timely and accurate.
22	Org_name should seek IT opportunities that will leverage the delivery process.
23	There are quite a lot of IT solutions that can improve your business and ensure growth at less cost with limited IT skill requirements. Org_name can consider open-source (free), cloud-based, or light-weight systems to support your business.
24	While developing a delivery system, you can consider having electronic channels like web portal and electronic payment systems to support online customers. Delivery of physical goods can be tracked using RFID (radio frequency identifiers).
25	Org_name can create a niche for its business by exploring the opportunities offered through improved delivery management systems and should attempt to integrate dependent processes.
26	It is important to distinguish the roles of accounting and finance units no matter how the units are structured in Org_name. Accounting involves the recording and reporting of financial transactions, while finance is the science of planning and distribution of a business' assets.
27	It is worth noting that the accounting unit is responsible for preparing, evaluating, analysing, and interpreting Org_name's finances. On the contrary, the finance unit defines decision-making process regarding working capital issues such as level of inventory, cash holding, credit levels, financial strategy, managing and controlling cash flow.

28	Ensure that the accounting unit provides an assessment of how the company is performing, monitors the day-to-day accounting operations, and handles taxation. Meanwhile, the finance unit forecasts the future financial performance of your business.
29	There are tools Org_name can use to manage daily transactional records. Accounting tools to manage balance sheets, profit and loss ledgers, positional declarations, and cash flow statements; and finance tools for performance reports, ratio analysis, risk analysis, estimating break even, returns on investment, can be considered for the management of transactional records.
30	Efficient transactional management should lead to a successful management of company's assets and liabilities, and in turn, translates into business growth.
31	It is paramount that Org_name identifies its business strength and opportunities using tools like SWOT, PESTLE, and further develop strategies towards a successful business growth.
32	Monitoring business performance, managing revenue, and expenses, tax management, payroll, inventory and assets management are functionalities that should be considered when developing a tool for managing financial transactions.
33	Accurate business information, accessibility to financial records, efficient data analysis, budget management, ensuring regulatory compliance, and easy access to financial record are requirements for financial management tools.
34	Target market strategy is an integral part of business marketing strategy, without a defined or knowledge of your target market, your business could be losing business to competitors and missing out on opportunities to increase sales.
35	The following factors should guide Org_name when developing target market strategy: define your market, create segments, evaluate the segment on a set criterion, construct segment profiles, evaluate the attraction of the segment, select a target market, develop position strategy, develop and implement marketing mix, then review performance.
36	Ensure that Org_name's target market logically fits with its strategic direction and resources to compete in the segment market.
37	A unique selling proposition (USP) will differentiate Org_name's product from competitors, in terms of cost, quality and innovativeness. In other words, unique selling proposition refers to what Org_name has that competitor doesn't. You can use IT to achieve a USP strategy.
38	Org_name can create market differentiation, unique brand and customers' satisfaction by using IT tools.
39	A unique selling proposition should articulate consumers' benefit, offer customers something that competitive products can't or don't offer; above all, it should be compelling enough to attract new customers.
40	Digital and social media marketing allow firms to market products or services using electronic media, internet services, mobile phones and electronic advertising. Digital marketing is very pervasive such that access to information is not limited by time or place.
41	Blogs, podcasts, and social media platforms are typical digital marketing tools. There are different subscription plans and assessment metrics for digital marketing, such as Paid Online Advertising, Pay Per Click (PPC), Pay Per Impression (PPM), Cost per Acquisition(CPA), Bounce Rate and Click Through Rate (CTR).
42	Org_name's digital marketing strategy should manage complex customer relationships across different marketing channels and initiate dynamic customer interactions by extract value from customers' information to support a more informed business decisions.
43	SERVAS (Sustainable, Engage, Relationship, Value, Action and Synergy) is an assessment tool for evaluating digital marketing tools and strategy Org_name can consider for measuring the success of its digital strategies.
44	Customer support informs customers in making cost effective choice and it is intended to ensure that customers derive maximum satisfaction from your business, which could lead to customer retention and business growth.
45	Proactive, pre-emptive, self and assisted supports are examples of approaches to customer support service Org_name can adopt.
46	The following metrics are efficient in assessing Org_name's customer support service: customer satisfaction & improvement, customer retention, net promoter score, complaint resolution time, assessment of issues (active and resolved), brand attributes, complaint escalation rate, cash flow etc.
47	Social media support, online chat support, remote support, email support, phone support, are strategies Org_name can adopt to provide customer support.
48	There are different types of CRM system that suit different industries which differ by price and vary across platforms and deployment methods. A good CRM system should manage customer data, customer interaction, automate sales & marketing, manage employee, vendor, and partnership relationship.
49	A checklist for a successfully implemented Customer Relationship Management (CRM) system includes: enhanced target customers, individualize marketing strategy, enhance sales force, improve pricing, improve customer service and allow the customization of products and services.
50	Maturity_Business Analytics and Decisions
51	Maturity_Improve Customers Experience and Support
52	Maturity_Integrate and Drive Sales
53	Maturity_Marketing of Products and Services
54	Org_name should consider creating an online presence. Online presence is the process of presenting and attracting customers to a brand, person, product or service online.
55	Creating online presence might not be relevant to Org_name because of the nature of the business, customers, and/or market. Skills constraint should not hinder Org_name creating online presence because there are several free and user-friendly tools available to create a basic website. Social media can also be used to advertise and market products/services.
56	Online presence should create 24/7 accessibility to businesses, increase customer base, ease the way businesses market and sell products/services, and improve customers experiences through interactions and feedback.

57	Your response to the need for a strategy to reach out to customers about your services indicated that Org_name should create online visibility by having a basic website or creating a social media presence solely to display information about the company, brochures, catalogues, advertisement, and contact information.
58	Your response to the need for a strategy to reach out to customers about your services indicated that Org_name should have an interactive online presence. An online platform that supports online enquiry, chat, forums, request for information, response to request or survey, FAQs and a website displaying information about business.
59	There is an expectation of full automation and unification of different business processes when Org_name requires the integration of other online applications. The integrated phase of online presence requires technology that is more sophisticated. Customers get personalised online service delivery and users can access different services from a central system at any given time.
60	Transactional online presence allows business to create online platforms that allows customers to make orders, pay for purchases, and track the delivery of their orders. Electronic payment systems allow customers to pay for goods and services anytime and anywhere.
61	Org_name can consider having an integrated online presence if it has sufficient resources, skills, and need for a fully automated online processing system. This is the stage where the business has vertically and horizontally integrated its services online across all departments. Provision of end-to-end electronic transactions, integration of business applications like CRM, ERP, HR Management Systems, sharing of information across all business units, collaboration, automated advice and problem resolution are requirements for an integrated online presence.
62	Online presence is recommended for Org_name. It is the process of presenting and attracting customers to a brand, product or service using the internet. Online presence is a marketing, sales and messaging strategy, and the representation of business on the World Wide Web to allow wide reach of customers. Org_name can run some of its business operations like marketing, ordering, payment and customer support using online platforms.
63	Org_name can incorporate features like chats, social media, forum and online enquiries into business website and any online platforms.

IT_IS Assessment Question Code Description

Index	EA Domain	IT_IS Assessment Question Code Description
1	Business Information	Is Org_name's growth driven by the amount of information it has about her customers, suppliers, competitors and partners?
2	Business Information	Org_name is pleased with the amount of information it possessed about customers?
3	Business Information	Is the information Org_name possessed well managed by the current software and hardware it uses?
4	Business Information	Is Org_name leveraging the information it has to achieve it strategic goal?
5	Business Information	Is there redundant information in Org_name that can be leverage for business growth?
6	Business Information	Org_name is very keen about the security of customers data and willing to spend more to secure customers' data when investing in a CRM technology?
7	Business Information	Is Org_name keen in having every business information and applications accessible online?
8	Business Information	Org_name is considering having an online presence solely to interact with customers and not to conduct transactions online?
9	Organisational Software	The ability of a CRM system to expand very frequently and rapidly to meet business needs is a key consideration for Org_name?
10	Organisational Software	Org_name is keen to have a CRM technology that is accessible from remotely (anywhere and anytime)
11	Organisational Software	Some software in Org_name perform similar functions?
12	Organisational Software	Org_name is efficiently managing her business information resource with existing software?
13	Organisational Software	Your staff struggle to use some of the software because the software are too complex?
14	Organisational Software	Org_name will run some specific business applications with its business online systems.
15	Organisational Software	Control of the business online systems is Org_name's priority even when the security and performance of the system are guaranteed?
16	Organisational Infrastructure	Org_name have redundant hardware that are not been utilised?
17	Organisational Infrastructure	Do you think Org_name spend too much of its resources on IT hardware?
18	Organisational Infrastructure	Do you feel the need to integrate all the hardware used in Org_name?
19	Organisational Infrastructure	Is Org_name willing to replace existing hardware with remote infrastructures at a cheaper cost?
20	Organisational Infrastructure	Org_name restricts third party from having access to its computers, servers and database?
21	Organisational Infrastructure	Integrating a CRM tool to the existing hardware is very paramount to Org_name's choice of CRM system?
24	IT Skills	There is non- IT professional in Org_name that can provide IT support?
25	IT Skills	Org_name rely on vendors and external persons for IT support service?
26	IT Skills	Outsourcing your IT skill-requirement will affect Org_name's long-term goals?
27	IT Skills	Do you think Org_name rely completely on the vendors' support in maintaining software?
28	IT Skills	Is Org_name willing to outsource some software solution to a third party?
30	IT Budget	Org_name is willing to set aside a significant amount of budget for the initial setup cost for implementing CRM technology?
31	IT Budget	Your business's income is stable and cash flow is fluent and under control?
32	IT Budget	Org_name has a formal process of financial planning for IT investment?
33	IT Budget	Org_name has a limited budget for ICT expenses?
34	IT Budget	Org_name is willing to increase it ICT expenses budget if the investment aligns with the business goal?
35	IT Budget	Cost is always a key concern to Org_name when investing on IT?
36	IT Budget	Org_name does not have money to spend on having an online presence for it business but will prefer to have online presence?
37	Customer types	Your customers are spread across different locations?
38	Customer types	Org_name have customers that prefer to use electronic platforms for transactions?
39	Business Information	Securing customer and business information for online transactions is a major concern for Org_name
40	Business Information	Org_name is seeking to conduct online transactions like buying and selling with its customers?
41	Business Information	Org_name is interested in owning or being in control of the information its making available to the public via the internet?

IS Assessment Feedback Code Description

Index	IT_IS Assessment Feedback Code Description
1	Cloud computing is the delivery of internet-based computing services like application, storage, database, data analysis, software service, networking, security systems, servers and scalable infrastructures. Cloud computing services benefits organisations with insufficient resources such as money, skills and infrastructures to purchase, deploy and maintain servers, software and storage systems. Org_name can access IT resources (such as hardware, software, storage and network) and scale (expand or shrink) services as business needs change at affordable cost and less skills requirement. There are different types of cloud services Org_name can consider. Software as a Service (SaaS) is a type of service that provides applications and programs over the internet. Platform as a Service (PaaS) is a cloud-based environment that allow business to create customised applications without the complexity and cost of purchasing and managing supporting infrastructures. Infrastructure as a Service (IaaS) is another service that Org_name can use to access resources like networking, servers, storage and data centers.
2	Org_name can employ the service of in-house, non-IT staff to provide basic support and maintenance services by engaging them in project development, training, implementation, and decision-making process.
3	Service Level Agreement (SLA) is a contractual document between service provider or vendor and client that explicitly defines the level of service that a client/customer should expect from the vendor or service provider. The responsibility, performance, standard, quality, availability of service expectations are defined in SLA which the service provider is obliged to meet.
4	Outsourcing Org_name's IT needs to a third party or a vendor will reduce cost of IT, increase efficiency, allow Org_name to focus on core business, have access to skilled IT professionals, enjoy faster IT service delivery, better support service, and save on infrastructures and technologies. Outsourcing exposes business to risk of exposing confidential business information, loss of managerial control and quality problem, which can be curbed if Org_name has defined business principles guiding their outsourcing. Requirements definition, vendor selection, contract negotiation and implementation, and ongoing monitoring are strategies to manage outsourcing risks.
5	Org_name can adopt an open source application, pay-as-you-go (PAYG) and fee-for-service (FFS) cloud-based applications. Open source applications are software applications available free to users. Users can often modify the software to suit their needs and software documentation is available to the public. Organizations seeking affordable, transparent, flexible and interoperable applications may consider the use of open source application. The pay-as-you-go service allows users to access resources like software, storage, networks, operating systems, memory, infrastructures, and platforms and compute charges based on what is used. Similarly, fee-for-service is an approach where the user pays for services separately and allow users subscribe to the specific and relevant resources they need.
6	A guiding principle for IT investment can help your organization in making IT decisions that will align with Org_name's goals and objectives.
7	Org_name can achieve innovative business solutions and competitive advantage through IT, and stakeholders should develop assessment measures to evaluate Org_name's IT expenditures and return on investments.
8	It is important that Org_name has clear and defined objectives for investing in IT and strictly adheres to certain principles.
9	On-Premises Deployment: The on-premises deployment of CRM system often takes into account that the customer will install, configure and maintain the software on internal infrastructure. The purchasing of the necessary hardware, supporting software and licenses would be the initial capital outlay. Ongoing support of the environment will also increase the operating costs as the servers will need to be maintained by internal support staff ensuring the latest updates and patches are applied. Any requirement for disaster recovery would need to be considered when selecting this option, as the recovery architecture, implementation, and process would be the responsibility of the customer.
10	Cloud Deployment: The Cloud deployment model moves the application and data off the internal infrastructure and operates as services over the internet making use of existing infrastructure of a service provider. The application, data, customisation and code all reside with the chosen service provider. Users access and interact with the application through the internet. The service provider handles infrastructure, security, as well as any patching and upgrades, with the customer making use of the expertise and services offered. On the surface, this is often seen as an attractive option, as the up-front cost is reduced, specifically around infrastructure and supporting software required. However, consideration needs to be made with regards to data security, and integration requirements before jumping at this option.
11	Hybrid Deployment: The hybrid deployment model of CRM system gives the customer the option to make use of elements of the on-premises and cloud deployments to suit their specific requirements. This gives businesses the flexibility to make use of the benefits around the subscription pricing model of a cloud deployment, yet have complete control over their data internally, and behind secured infrastructure. The customer will then have the option going forward to keep their setup or move into an on-premises or cloud deployment model.
12	*Social Media Platform:* This is the most common and cheapest option of online presence. It easy to setup and often does not require technical skills. Users create an account and can advertise and communicate with customers. The popular platforms include Facebook, Twitter, LinkedIn, Instagram, Pinterest, and YouTube. Certain features require users to make some subscription payment. The confidentiality in social media platform is very limited and businesses have less control of the system.
13	*Shared Server Platform:* All resources are shared with other users on the same server space at lesser cost. It is economical and very affordable, suitable for a start-up or business that need a simple online presence like websites and blogs. This type of online presence deployment is like renting a room in an apartment with every other common space or facilities like playground, parking shared with neighbours. The performance is relatively slow because the CPU, memory and storage space are shared with other clients. This is not an ideal option for transaction online presence because security is minimal and traffic is likely to be high.

14	*Virtual Private Server (VPS):* Resources are shared with other users but on a dedicated server space. Client can be on the same server, CPU, or hardware. The VPS allows clients to occupy their space on the server, so security is high. Relating this to renting a unit in a complex where you have some space to yourself but the client is responsible for maintaining the rented property.
15	*Dedicated Server Platform:* The client can choose the kind of operating system they want to use, the software that needs to be install on servers, preferred hardware, and deciding on the required storage space. With a dedicated server, users have full access to the resources they pay for with full control of the entire system.

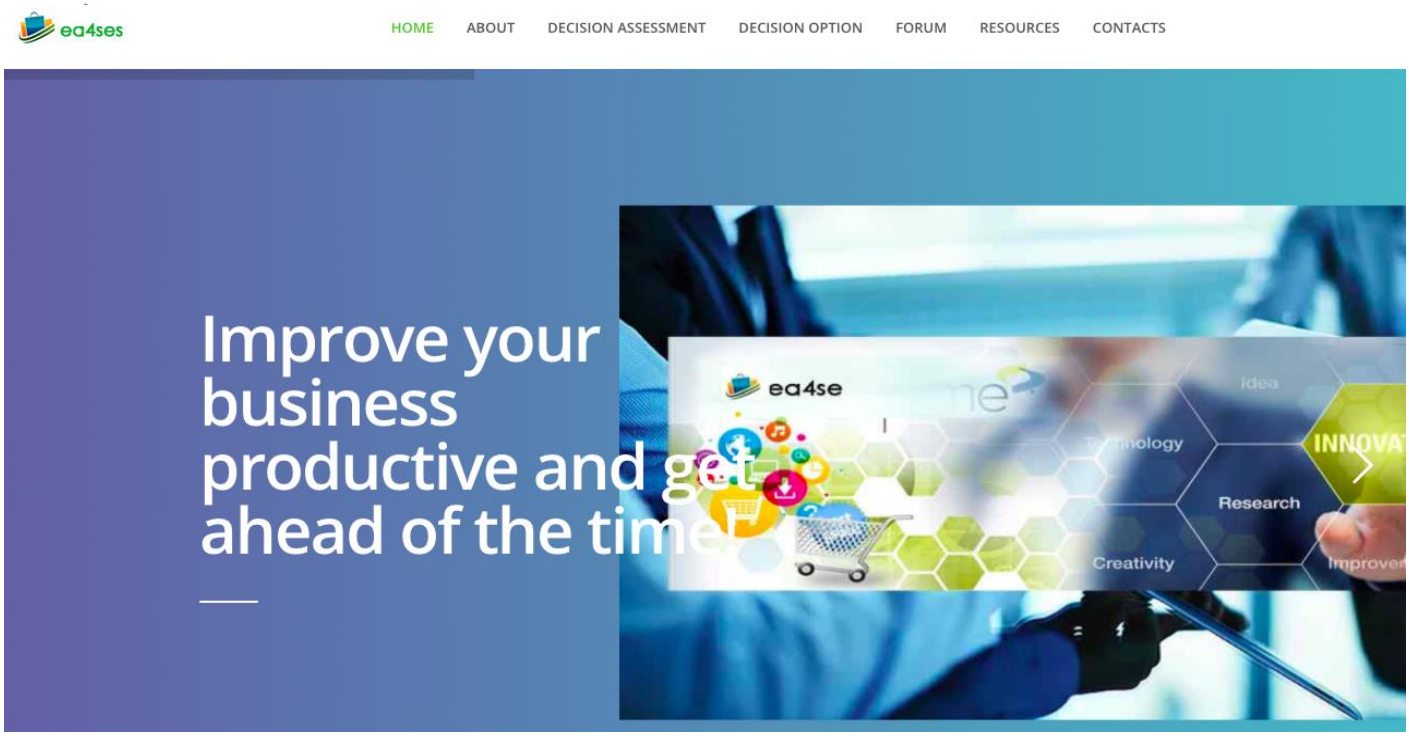
Enterprise Architecture Principles Code Description

Index	Principle Category	Principle Name	Principle Statement
1	General	Bleeding Edge	Experimental or new release technologies will not be used unless the technology is critical to business growth.
2	General	Business Continuity	Enterprise will be resilient to external and internal threats and will continue to serve customers.
3	General	Business-IT alignment	Every IT investment must be aligned with business strategies and goals.
4	General	Common use of IT solutions	IT solutions that can be used for different processes, activities and task will be preferred over specific applications or tools.
5	General	Compliance with Law	Business will comply with all relevant laws and regulations.
6	General	Consistency of IT	Vendors and service providers must maintain consistency when designing or developing any technology.
7	General	Enterprise process automation	Business processes will be automated end-to-end to include integrations with partners and customers.
8	General	Equitable use interface	User interfaces will be designed to maximise accessibility to wide audience.
9	General	Innovative Solutions	Business will seek for innovative solutions and localise the solution.
10	General	Intellectual Property (IP) protection	Copyrights, patents, and trade secrets will be strictly preserved and protected.
11	General	Learnability	All technologies in enterprise should be easy to learn.
12	General	Non-proliferation of Technology	Acquisition of non-trivial technologies will be controlled to avoid redundancy.
13	General	Problem Identification	IT interventions should identify and notify stakeholder of problems.
14	General	Productivity is a priority	IT investments will seek to maximize productivity.
15	General	Quality is a priority	Business will maintain a minimum standard of quality at all cost.
16	General	Realistic Solutions	IT solutions will not be over-ambitious and unrealistic.
17	General	Shared IT Resources	IT solutions will seek to maximum sharing of resources such as computing, data, network and storage.
18	General	Simple IT solutions	IT will be as simple as possible to avoid complexity.
19	General	Simple user interface	User interfaces will be intuitive and easy to use.
20	General	Simplify re-invented processes	When a new system is implemented, affected processes will be simplified.
24	Business	Costumer Focus	Business decisions will seek to maximise value to customers.
25	Business	Long-term focus goal	Business decisions will focus on long-term strategy at the expense of short-term profitability.
26	Business	Opportunity to market	Business will respond to opportunities in a timely manner.
27	Business	Publish Business Goals	Organisation will publish business strategies and goals.
28	Business	Quick response to customers	Customer complaints and requests will be timely addressed.
29	Business	Response to Threat	Business will make decisions to respond to external threats in a timely manner.
30	Business	SMART Business Goals	Business goals will be Specific, Measurable, Achievable, Relevant, Time-bound.
34	Information	Information Openness	Business information will be open and available to support productivity.
35	Information	Currency of information	Business information must be timely and recent.
36	Information	Data Backup	Data must be backed up at a designated time.
37	Information	Data protection	Business information/data must be well protected.
38	Information	Information Confidentiality	Information will be treated with secrecy.

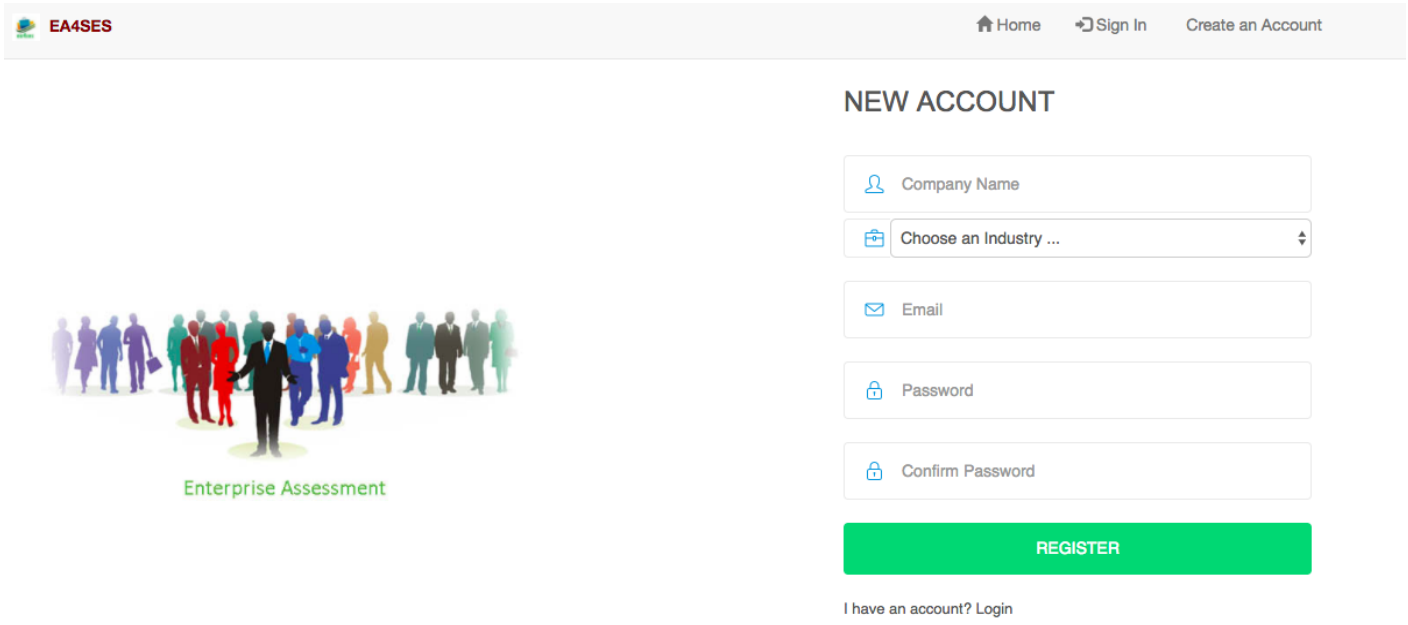
39	Information	Information Relevance	Data collected by the organisation must be relevant and useful to business.
40	Information	Information Stewardship	A designated trustee must be responsible for data quality and protection.
41	Information	Real-time Integration	Real-time integration of data is preferred over batch integration.
42	Information	Shared Information	Business information will be made available to all department, units and team.
43	Information	Validation of Information	All business information will be validated at the point of collection.
47	Application	Compliance to Standards	All application software must comply with established agreements, conventions, practices and standards.
48	Application	Documentation	Vendors and service providers must publish a documentation for every application software.
49	Application	Open source preference	Enterprise will always seek for a free and open standard application software.
50	Application	Scalable application	Application should scalable to handle more tasks when required.
51	Application	Service Level Agreement is mandatory	SLA will be publish for every application software deployed.
52	Application	Shared functionality	Application software should be built to support collaborative processes.
53	Application	Software extensibility	Application software should allow functionality to be extended in future.
54	Application	Software flexibility	Application software should be built to minimize the costs of future changes.
55	Application	Software interoperability	Application software should be able to exchange and share resources.
56	Application	Software mobility	Application software should be built to allow easy and free access to the system from any location.
57	Application	Software stewardship	A designated staff will always be responsible for every application software.
60	Infrastructure	Centrally secured infrastructure	Enterprise will invest in infrastructure that can be secured centrally.
61	Infrastructure	Control of infrastructure	Enterprise should have control over the functionalities and management of infrastructure.
62	Infrastructure	Reusable infrastructure	Functionalities of infrastructure will be well maximise for several purposes.
63	Infrastructure	Scalable infrastructure	Infrastructure that will be purchase should support addition of similar devices.
66	Security	Audit Trail	All significant users must leave an audit trail.
67	Security	Confidentiality	The confidentiality of sensitive systems will be maintained.
68	Security	Consistent security policy	Security policies will be consistent across the enterprise.
69	Security	Cost-effective security	Enterprise will always balance the costs of providing security with security benefits.
70	Security	Enterprise security ownership	Enterprise will be fully accountable and responsible for securing systems.
71	Security	External security concerns	Enterprise has security responsibilities to customers and partners.
72	Security	Response to Threat	All threats (internal and external) will be urgently considered.
73	Security	Security is organisational responsibility	Security must be considered as enterprise responsibility and not a technical problem.
74	Security	Security re-assessment	Security will not be a one-time activity and must be periodically reassessed.

Appendix A7: Online IT Decision-Assistive Tool

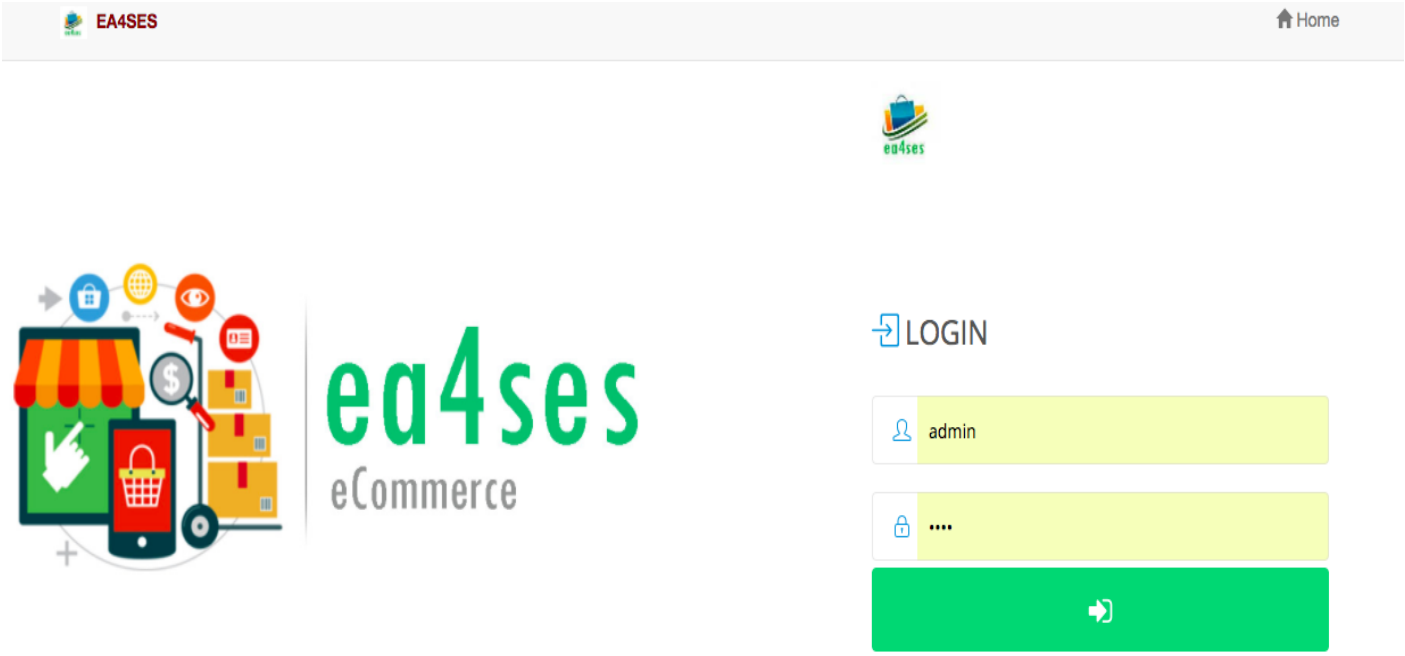
1. Home Page



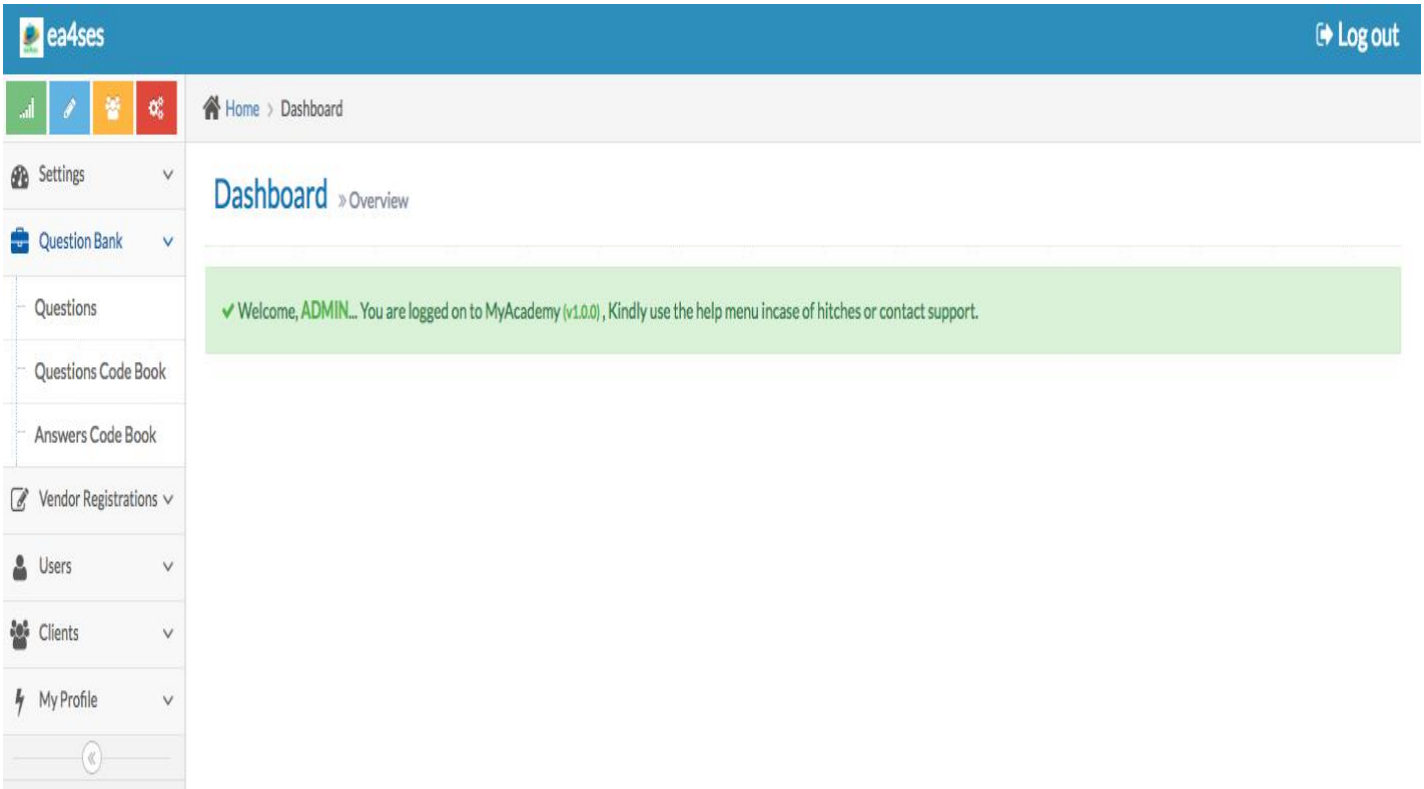
2. SE's Registration Page



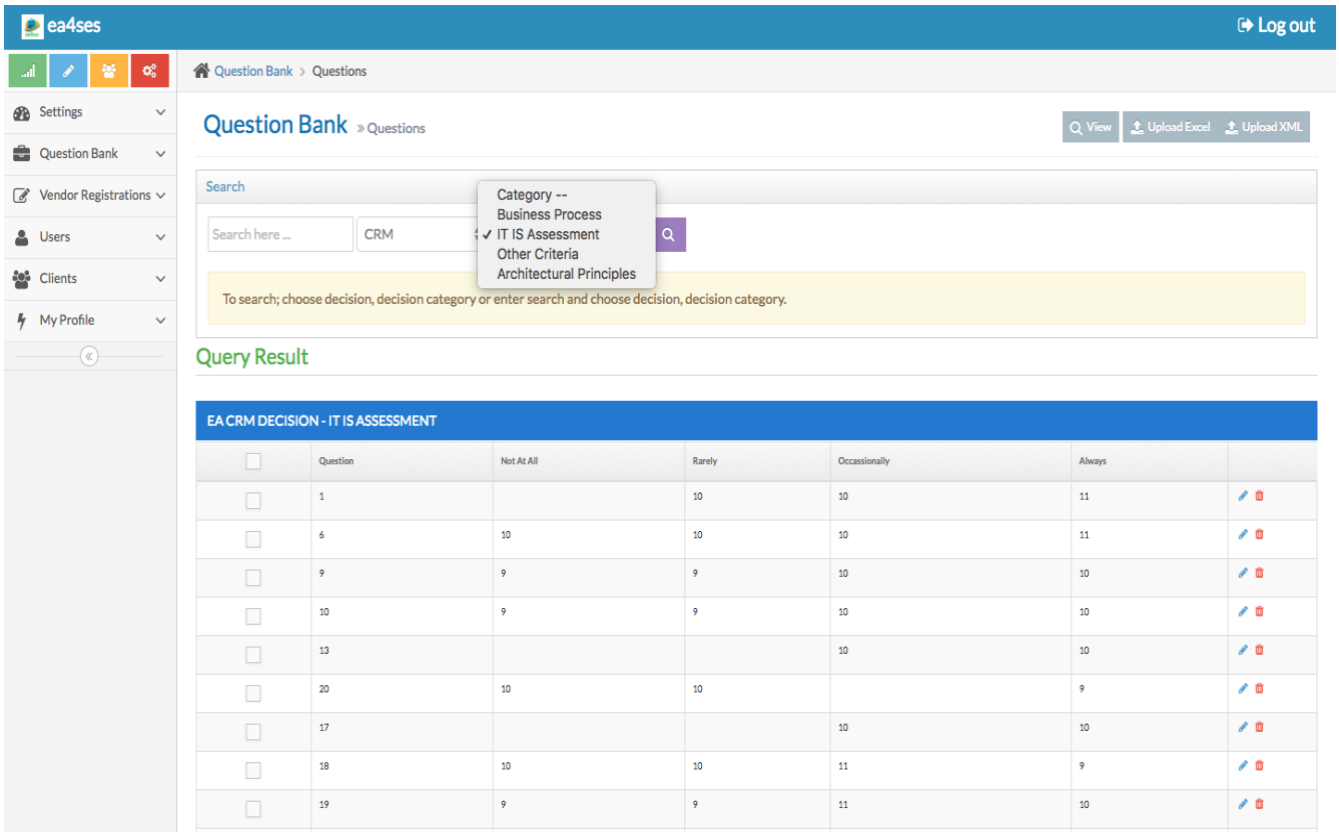
3. Admin Login Page



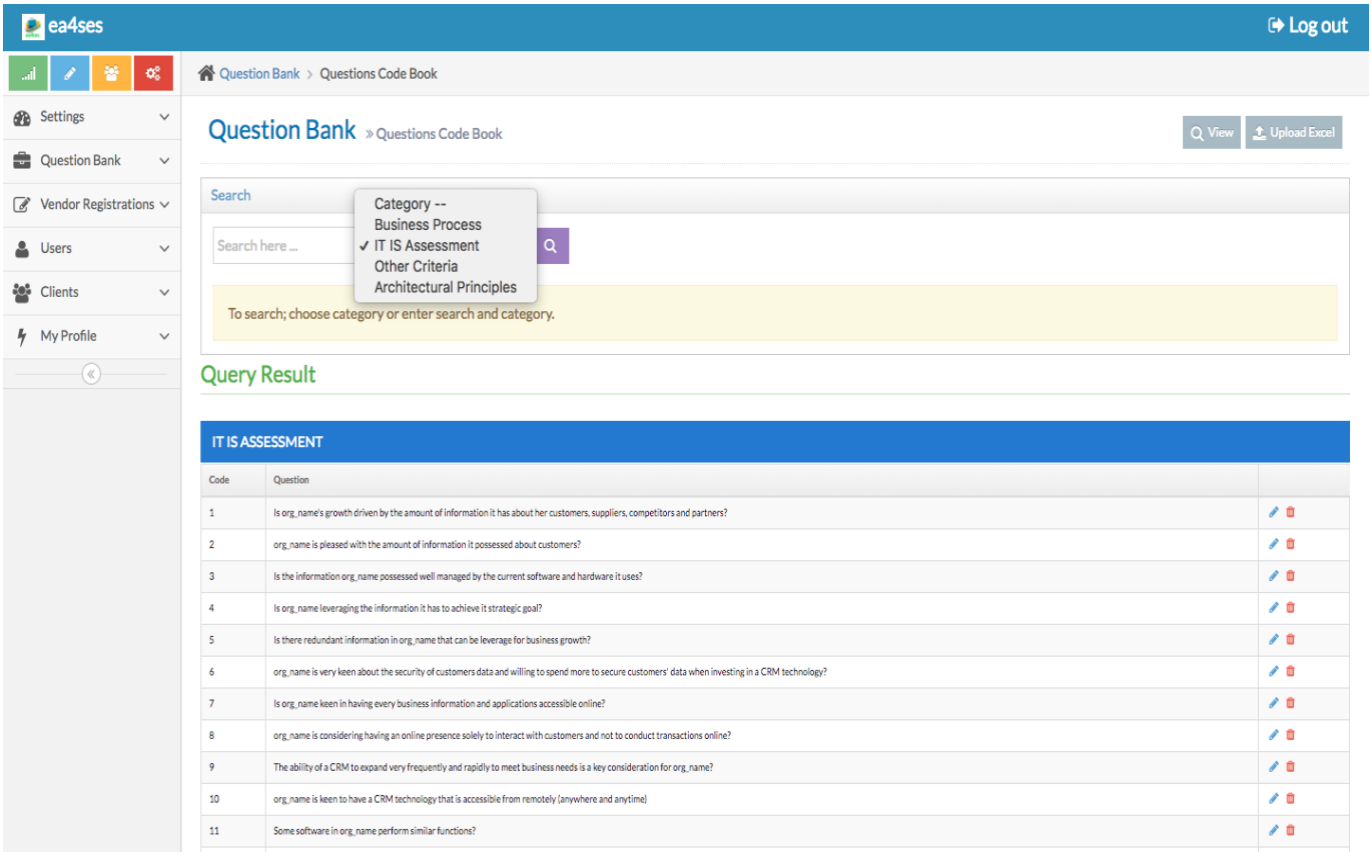
4. Admin Dashboard



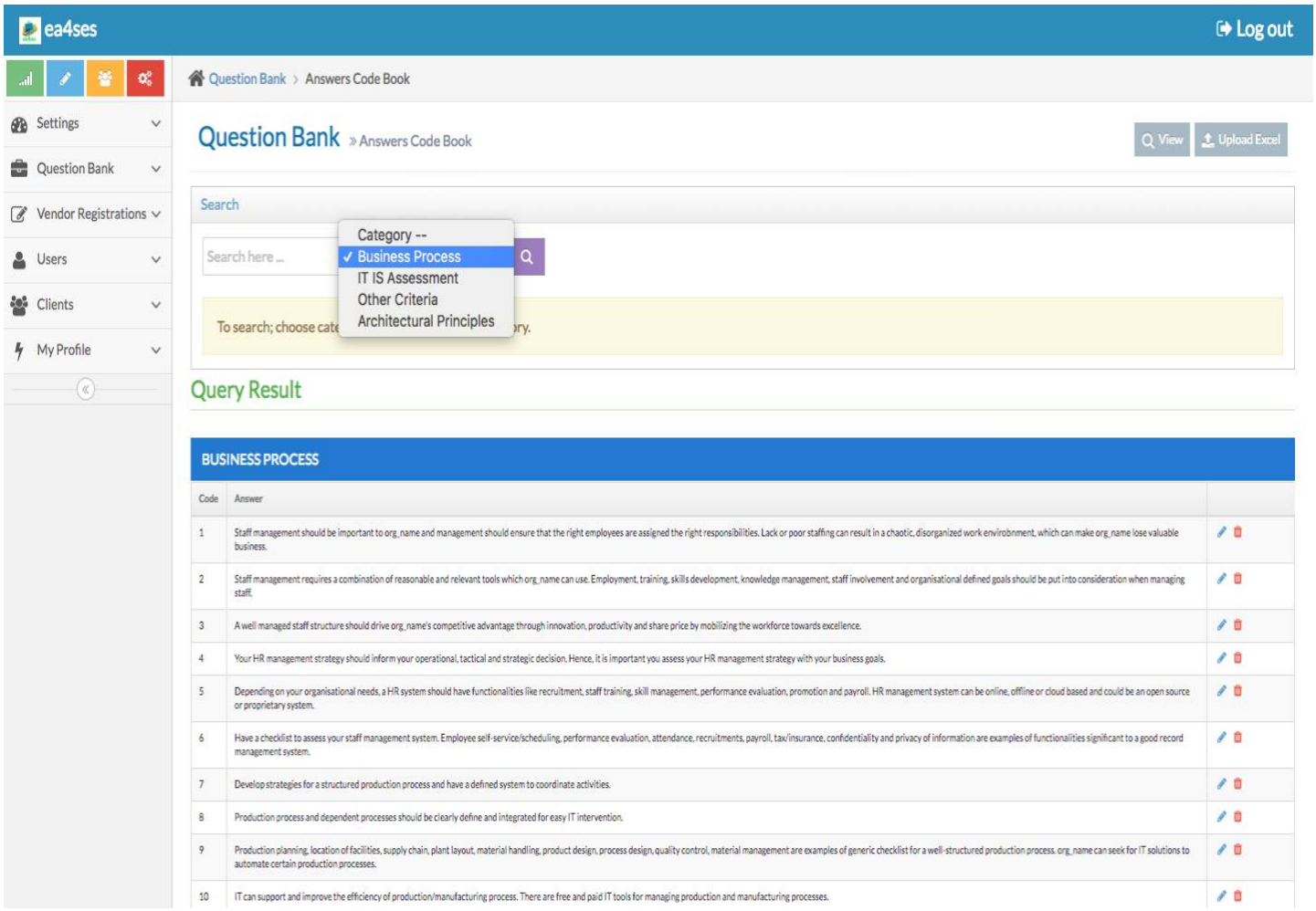
5. Interface for Populating Questions



6. Interface for Populating Question Codes

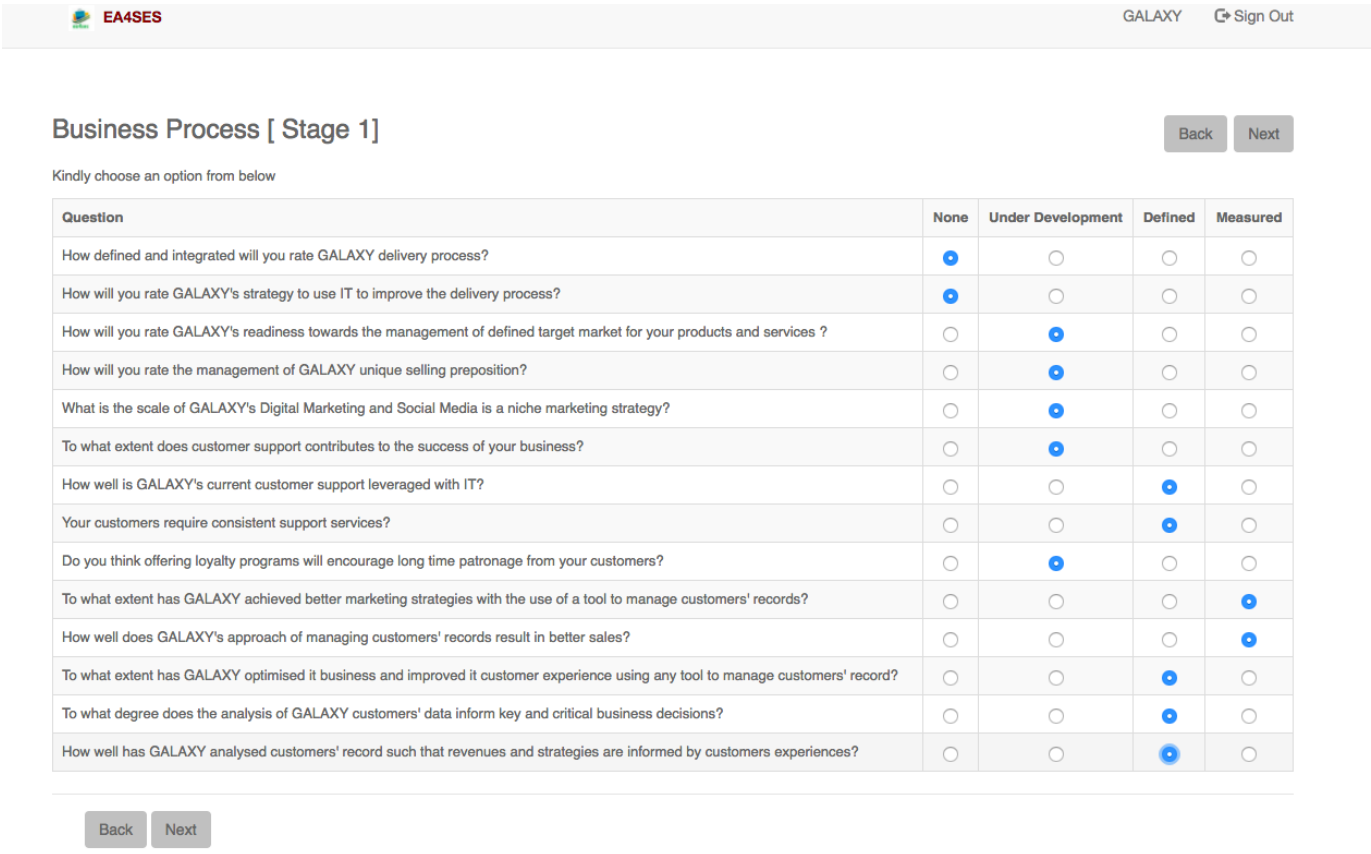


7. Interface for Populating Answer Codes

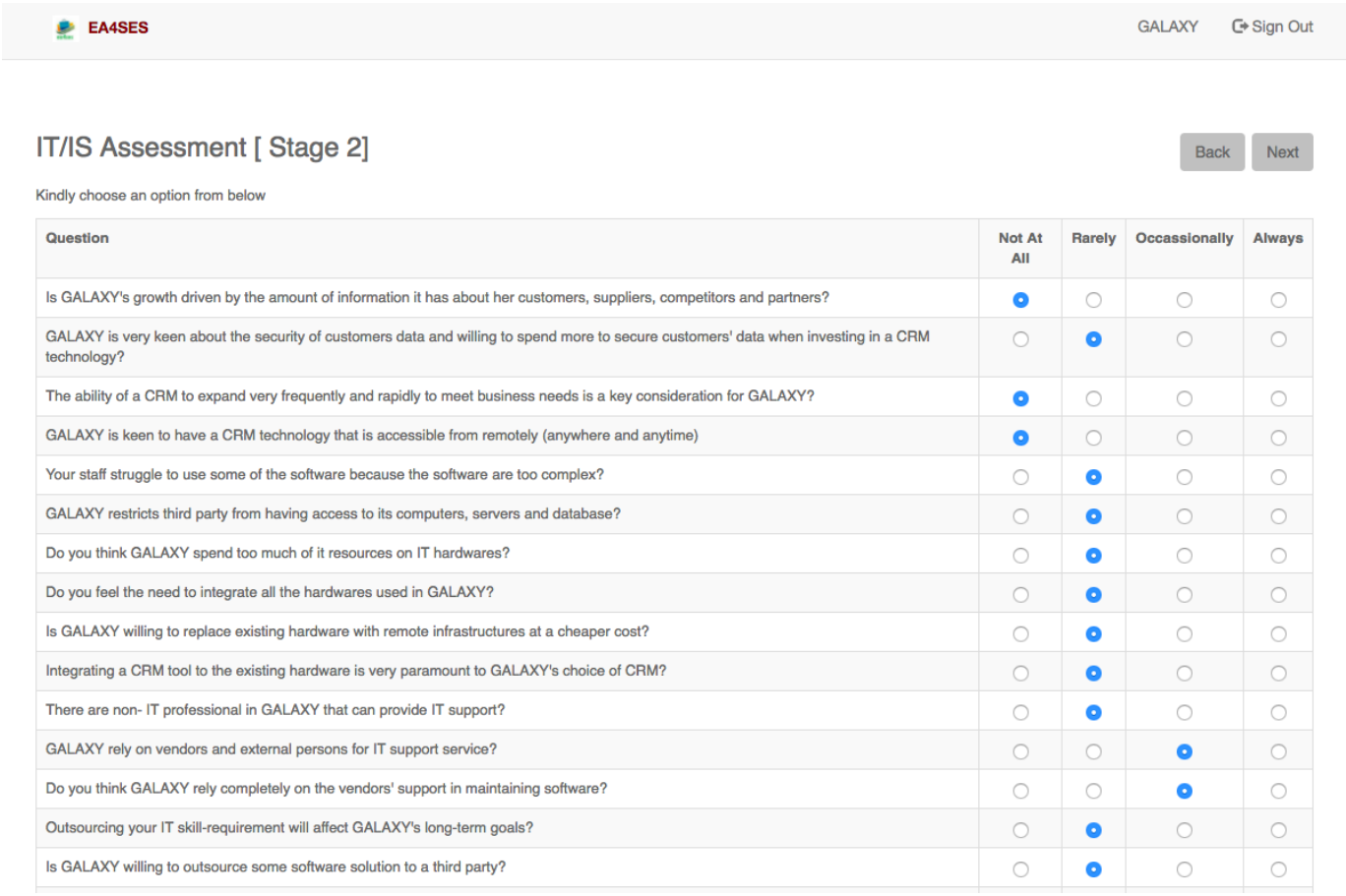


8. SE's Decision Assessment Option Page

9. Decision Assessment Stage 1

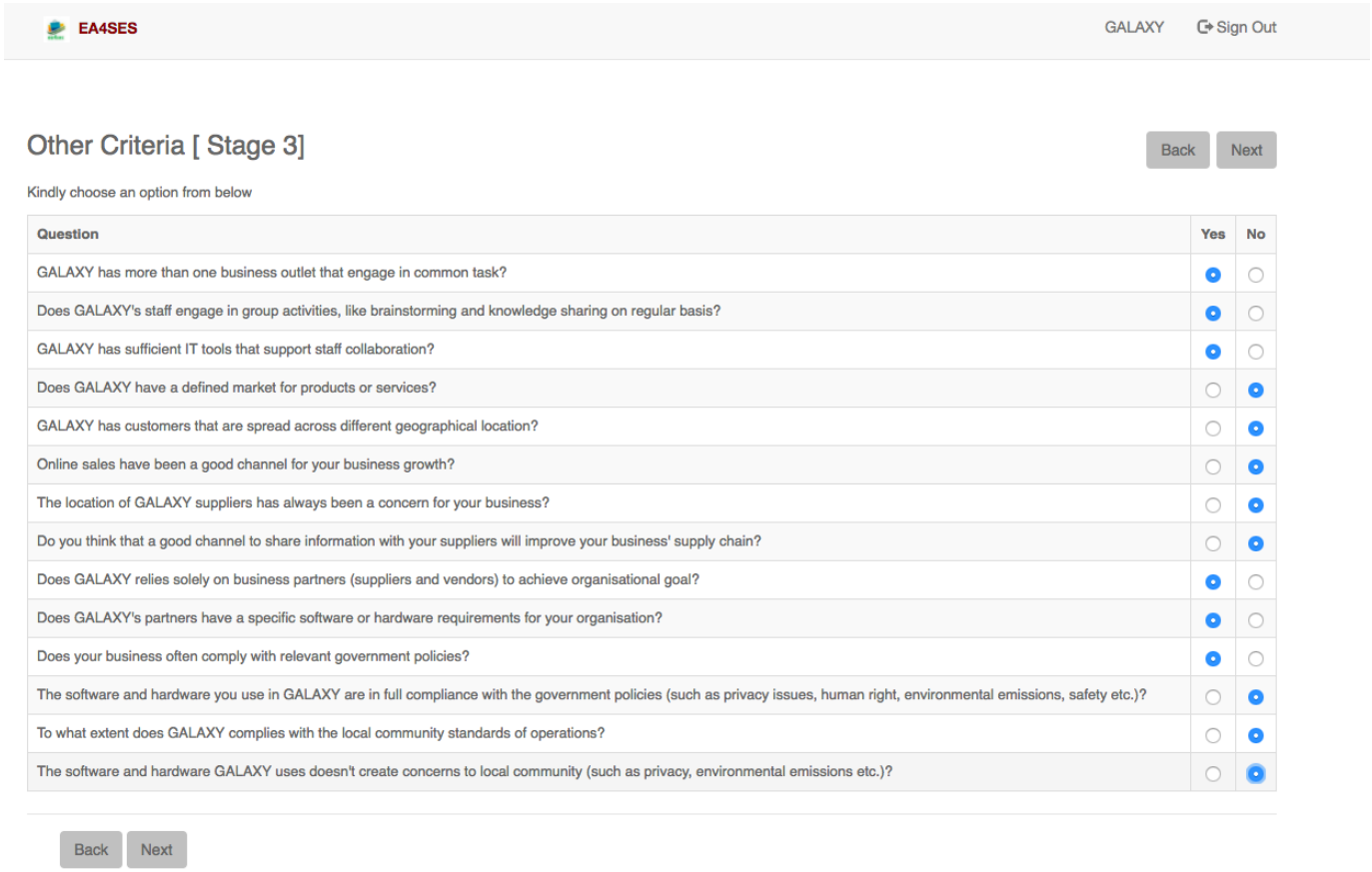


10. Decision Assessment Stage 2

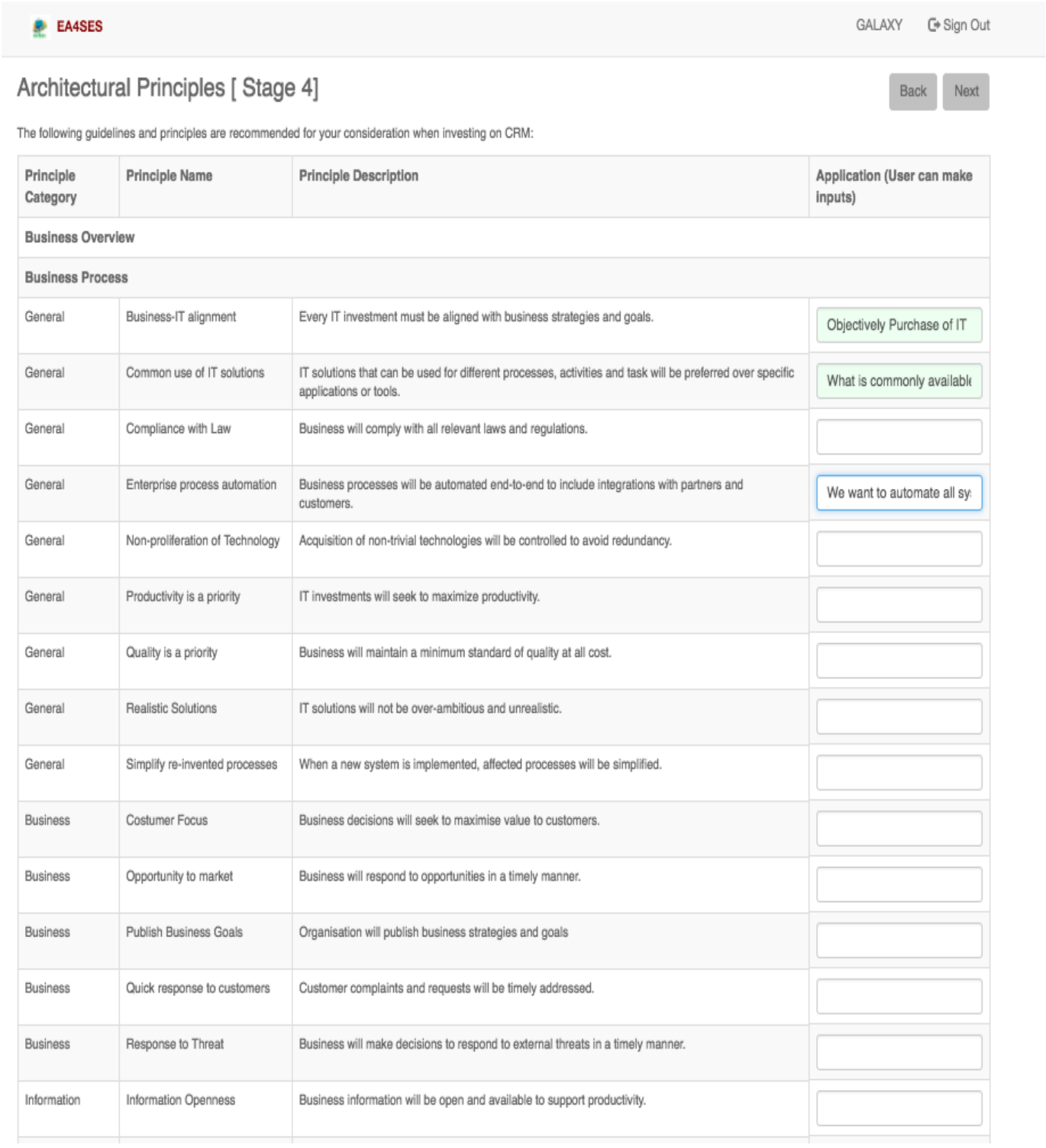


Question	Not At All	Rarely	Occassionally	Always
Is GALAXY's growth driven by the amount of information it has about her customers, suppliers, competitors and partners?	●	○	○	○
GALAXY is very keen about the security of customers data and willing to spend more to secure customers' data when investing in a CRM technology?	○	●	○	○
The ability of a CRM to expand very frequently and rapidly to meet business needs is a key consideration for GALAXY?	●	○	○	○
GALAXY is keen to have a CRM technology that is accessible from remotely (anywhere and anytime)	●	○	○	○
Your staff struggle to use some of the software because the software are too complex?	○	●	○	○
GALAXY restricts third party from having access to its computers, servers and database?	○	●	○	○
Do you think GALAXY spend too much of it resources on IT hardwares?	○	●	○	○
Do you feel the need to integrate all the hardwares used in GALAXY?	○	●	○	○
Is GALAXY willing to replace existing hardware with remote infrastructures at a cheaper cost?	○	●	○	○
Integrating a CRM tool to the existing hardware is very paramount to GALAXY's choice of CRM?	○	●	○	○
There are non- IT professional in GALAXY that can provide IT support?	○	●	○	○
GALAXY rely on vendors and external persons for IT support service?	○	○	●	○
Do you think GALAXY rely completely on the vendors' support in maintaining software?	○	○	●	○
Outsourcing your IT skill-requirement will affect GALAXY's long-term goals?	○	●	○	○
Is GALAXY willing to outsource some software solution to a third party?	○	●	○	○

11. Decision Assessment Stage 3



12. Architectural Principles Recommendation



13. Report for SE

EA4SES GALAXY Sign Out

Back Print PDF

Enterprise Assessment Result for GALAXY

BUSINESS PROCESS

It is paramount to have a structured delivery process in order to control the link between the business and your customers through a coordinated market analysis, which makes it easier to use IT to improve the delivery process.

There are quite a lot of IT solutions that can improve your business and ensure growth at less cost with limited IT skill requirements. Org_nmae can consider open-source (free), cloud-based or light-weight systems to support your business.

The following factors should guide GALAXY when developing target market strategy: define your market, create segments, evaluate the segment on a set criterion, construct segment profiles, evaluate the attraction of the segment, select a target market, develop position strategy, develop and implement marketing mix, then review performance.

GALAXY can create market differentiation, unique brand and customers' satisfaction by using IT tools.

Blogs, podcasts and social media platforms are typical digital marketing tools. There are different subscription plans and assessment metrics for digital marketing, such as Paid Online Advertising, Pay Per Click (PPC), Pay Per Impression (PPM), Cost per Acquisition(CPA), Bounce Rate and Click Through Rate (CTR).

Proactive, pre-emptive, self and assisted supports are examples of approaches to customer support service GALAXY can adopt.

A checklist for a successfully implemented Customer Relationship Management (CRM) system includes: enhanced target customers, individualize marketing strategy, enhance sales force, improve pricing, improve customer service and allow the customization of products and services.

Maturity_Improve Customers Experience and Support

Maturity_Business Analytics and Decisions

IT/IS ASSESSMENT

On-Premises Deployment: The on-premise deployment of CRM often takes into account that the customer will install, configure and maintain the software on internal infrastructure. The purchasing of the necessary hardware, supporting software and licenses would be the initial capital outlay. Ongoing support of the environment will also increase the operating costs, as the servers will need to maintained by internal support staff ensuring the latest updates and patches are applied. Any requirement for disaster recovery would need to be considered when selecting this option, as the recovery architecture, implementation and process would be the responsibility of the customer.

OTHER CRITERIA

Collaborative technologies are computer-based systems that facilitate information sharing and coordination among individuals or group of people engaged in a common task across different place and time. Collaborative technology is also referred to as groupware' and collaborative activity could be synchronous or asynchronous. Collaborative technologies minimize the travel cost and time, ease communication across different location and facilitate group work. Electronic scheduling, project management systems, online proofing, workflow systems, knowledge management systems, social software, client portal are some collaborative software GALAXY can consider.

ARCHITECTURAL PRINCIPLES

The following guidelines and principles are recommended for your consideration when investing on CRM:

Principle Category	Principle Name	Principle Description	Application (User inputs)
Business Overview			
Business Process			
General	Business-IT alignment	Every IT investment must be aligned with business strategies and goals.	Objectively Purchase of IT
General	Common use of IT solutions	IT solutions that can be used for different processes, activities and task will be preferred over specific applications or tools.	What is commonly available in market
General	Compliance with Law	Business will comply with all relevant laws and regulations.	
General	Enterprise process automation	Business processes will be automated end-to-end to include integrations with partners and customers.	We want to automate all system by 2014

Appendix A8: Comparison of Quantitative and Qualitative Research Method

S/N	Qualitative	Quantitative
1	Researcher becomes an insider because of the level of involvement with the social world to understand the social actor's culture and view.	Limited access or contact with participants. The option of faxing, mailing questionnaire, or assistive administering of questionnaire limits the face-to-face interaction between the researcher and participants.
2	The procedure for a qualitative research is flexible and open.	Highly structured in nature.
3	It is difficult to anticipate the outcome of the research process, with the limited idea on where to start, how to proceed and the potential outcome.	It involves a predetermined process because the instrument, data gathering, and test are often predetermined.
4	Soft: The researcher accepts opportunities when they open up during data collection and follow leads as the research progresses.	Hard: The researcher focuses on maximum control of data collection and attainment of uniformity of the applied techniques.
5	Research is perceived as a learning process, and researchers desist from imposing ideas.	Objectivity and replicability are the core of the research techniques to allow the researcher to achieve objectivism, an epistemological stance explicitly or implicitly assumed.
6	The researcher should be able to tolerate complex, uncertainty, ambiguity and lack of control because it is a messy and unpredictable technique.	The quantitative researchers have slight tolerance for ambiguity and uncertainty. Thus they prefer predictability and order.
7	The scope of research is often context –based.	The scope of the research is often context-free.
8	Concepts and theory development, understanding social actors, and social process are key focus of the researcher.	Concepts measurement, generalisation, establishing casualties and replication are the major concerns of the researcher.
9	The peculiarity of each participant in a qualitative research method makes corroboration and replication difficult, leaving the researcher to interpret what he/she has learnt from people sampled.	Rigor is assessed by validity and reliability which is achieved through corroboration and replication.
10	Data collection method includes: participant observation, semi/unstructured observation, in-depth interview, oral/life histories, group/focus group interview, and content analysis (document).	Data collection method includes: questionnaire, structured interview, structured observation, and content analysis (document).
11	Data reduction method: open/axial coding, developing themes, and constructing typology.	Data reduction method: factor analysis, cluster analysis, pre/post coding, index construction etc.
12	Data analysis method: descriptive and theory generation.	Data analysis method: explanatory, descriptive and inferential.

Table 1: A9 - Adapted from Blaikie, 2010; Fox & Bayat, 2000

Appendix A9: Tentative Extended EADF

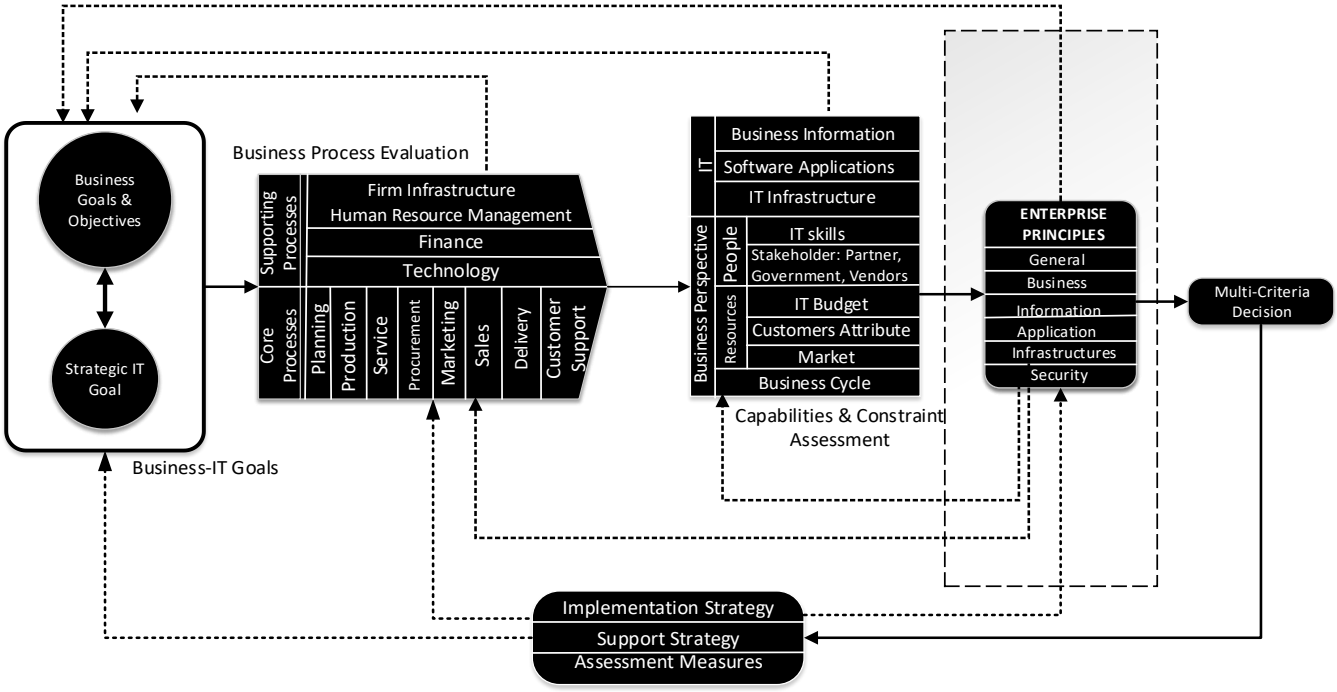


Figure 1: A10- Extended EADF for IT Decision in SEs

Multi-Criteria Choice (MCC)

This section describes the extended Multi-Criteria Decision Phase included in the EADF. Decision makers often have more than one criterion when making IT decisions but will always have to prioritise their preferences. Pomerol & Adam (2006) state that decision making requires compromise because decision makers are not posed carefully with problems wrapped in bundles with the value elements and the factual elements neatly sorted; hence decision making is a matter of compromise. This implies that decision makers often have to deal with contradictory objectives. SEs decision makers often add to the complexity of their decision process by seeking for multiple goals (Comes, Wijngaards, & Schultman, 2013). These goals are sometimes conflicting and contradictory. The multi-criteria decision analysis (MCDA) is a technique that analyse decisions with multiple goals. MCDA is a decision analysis technique that explicitly models the multi-facet nature and attributes of decision makers' preferences (Belton, 1999; Comes et al., 2013; Triantaphyllou, 2000). MCDA evaluate options or create a better understanding of preferences (Belton, 1999). MCDA is used widely in psychology, engineering, mathematics and management science to negotiate among groups, decide on individual aspects, address organisational issues, decide on public policy and ranking of options (Belton, 1999). There are different methods of solving a multi-criteria decision problem (Triantaphyllou, 2000). The weighted sum model (WSM), the weighted product model (WPM), the analytic hierarchy process (AHP), revised AHP model and the elimination, choice translating reality (ELECTRE) and the techniques for order preference by similarity to ideal

solution (TOPSIS) are different approaches for MCDA (Triantaphyllou, 2000). The Weighted Sum Model (WSM) approach is well suited for decisions with single goal and is the most commonly used approach for MCDA (Belton, 1999; Triantaphyllou, 2000). The WSM was adopted for the development of the EADF.

The EADF describes MCC as the process of analysing several IT criteria and choosing from different alternatives. This study adopted the WSM model of analysis and recommended the following steps as MCC techniques:

1. List all the criteria and factors that need to be considered by the decision maker as the rows labelled c_1, c_2, c_3...c_n in table 1-A9.
2. Beneath the Criteria row, add another 'weight' or 'scoring' row and assigned a value to each of the corresponding criteria based on how important is the criteria to the decision maker, as row labelled w_1, w_2, w_3....w_n in table 1-A9.
3. Calculate the relative importance of each alternative base on the decision makers predefined criteria. This step requires the knowledge of the alternatives (that is the products) available to the decision maker.
4. Multiply each of the weight of the criteria with the corresponding (relative importance) value as in step iii, as labelled $x_1.w_1$
5. Sum the multiplied value for each alternative (product) as labelled $\sum xw$
6. Convert the summed value into a percentage value to identify the product with the highest percentage as the best-matched alternatives.

Criteria	C_1	C_2	C_3	C_n		
Weight	w_1	w_2	w_3	w_n	$\sum xw$	100
Product 1	$x_1.w_1$					
Product 2	$x_2.w_1$					
Product n						

Table 1:A9: Illustration of Multi- Criteria Choice