

**A FRAMEWORK FOR THE EVALUATION OF THE INFORMATION SYSTEM AT ESKOM**

by

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## **DEDICATION**

Glory to the Lord the almighty, for giving the wisdom and strength to accomplish this work.

To my parents Freddy and Elizabeth Ramafalo for their love, support and tireless sacrifices.

To my partner Dinah and son Theresho who have been with me every step of the way.

## ACKNOWLEDGEMENT

A dissertation is not a product of work of one person; it is usually completed with contributions of various people. Some people make their contribution by encouraging you to carry on; some give you advice and constructive criticism; while other others provide you with comments, suggestions and insights. In recognition of this, I would like to dedicate a few lines to those individuals who have contributed to the completion of this research project:

- What would I be without a supervisor? I would first like to express my sincerest gratitude and appreciation to, Dr Pieter Conradie, for his tireless efforts in guiding and directing this research in his capacity as a supervisor. Without his support, guidance and academic integrity, I would have never gone this far.
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## **ABSTRACT**

A reliable and efficient information system (IS) is critical for Eskom so that it is able to manage and meet its energy demands. A reliable power supply provides stakeholders with the confidence that supply of power is managed sustainably, effectively and efficiently. Thus, an information system is integral in the effective and efficient generation, distribution and transmission of electricity.

The purpose of the study was to investigate IS evaluation criteria and to develop a comprehensive framework that will serve as basis for IS evaluation across Eskom. The research study additionally investigated IS evaluation methods and instruments that are currently used in Eskom. This study produced an information systems success evaluation framework. The proposed model was built by reviewing well-established information systems success models and information systems theories found in the literature.

This research study followed the interpretive research paradigm combining it with qualitative case study. The research findings linked information systems success to top management support, change management process and information quality. The findings of the study also revealed that quality of IS department's service as perceived by users can greatly influence IS success. The results of this study provided enlightening reference benefit for Eskom, which was in line with Eskom's goal of improving business processes, efficiencies and eliminating waste.

### **Key words:**

Information systems success model; IS success evaluation; D&M model; DeLone and Mclean.

## DECLARATION

I declare that, "A framework for the evaluation of the information system at Eskom", is my own work and all sources have been acknowledged by means of complete references.

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SIGNATURE

Mr ME Ramafalo

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DATE

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## LIST OF ACRONYMS

CIO	Chief Information Officer
ICT	Information and Communication Technologies
IT	Information Technology
IS	Information Systems
ISA	Information System Acceptance
SA	South Africa
SOC	State Owned Company
UTAUT	Unified Theory of Acceptance and Use of Technology
NGP	National Growth Path
NDP	National Development Plan

# CHAPTER 1: INTRODUCTION

## 1.1 RESEARCH BACKGROUND

Since companies and institutions spend large sums of money to acquire or develop Information Systems (IS) (also referred to as business information systems), the need to evaluate IS, and examine their costs and benefits are critical (Vasilecas, Saulis & Derekevicious 2006). Furthermore, the importance of evaluating the success of IS has been singled out as the most critical issue in businesses, mainly since this increases the rate of success for costly IS initiatives (Al-adaileh 2009).

According to the Standish Report (1995), a staggering 52.7% of IS projects are completed but are either over the allocated budget, over the allocated timeframe or did not meet business requirements that were specified originally. In addition, 31.1% of projects are either abandoned or cancelled before completion. On the success side, only 16.2% of the projects are completed within budgets and within the allocated time frame, while meeting the business requirements that were originally specified. Failure in IS projects is costly. In targeting this financial damaging failure, IS evaluation is seen as a catalyst to increase the rate of success in future IS projects (Al-adaileh 2009).

The biggest challenge for organisations is to develop a sufficient holistic company-wide IS evaluation framework that applies to a range of applications and provides enough guidance for managers (Stockdale & Standing 2006). Managers have the responsibility to implement robust and responsive IS, and yet they still find it hard to evaluate and quantify these investments, since there is no suitable framework to guide them (Gunasegaran, Ngai & McGaughey 2006). Without proper guidelines, managers will struggle to develop and implement IS initiatives which are critical for the long-term competitiveness of the organization. The importance of using IS to streamline business processes is vital for organizations and it is therefore important to do proper IS evaluation (Irani 2001).

The evaluation framework that will be developed in this study for Eskom will enable managers to follow a structured, standard and consistent approach to assess the merit and worth of business information systems at Eskom, thereby ensuring that managers are equipped with relevant information for decision making. This will enable managers to conduct proper evaluation processes and validate the requirements using scientifically proven methods. The proposed framework will be modelled mainly on DeLone and McLean's (1992, 2003) IS success models, Wixom and Todd (2005) IS model and other relevant scientific evaluation models (Ballantine, Bonner, Levy, Martin, Munro & Powell 1996; Seddon 1997; Hwang, Windsor & Pry 2000). This study will also consider empirical evidence on the use of these success models. In conclusion, the foci of this study are to develop an evaluation framework to assist managers at Eskom to effectively and efficiently evaluate business information systems.

## **1.2 PURPOSE OF STUDY**

The purpose of this study is to investigate IS evaluation criteria in Eskom across all divisions, and to develop a comprehensive framework that will serve as a basis for IS evaluation across the enterprise. This will assist Eskom in its quest to standardize business processes, improve efficiencies and eliminate waste (Eskom 2012). This study will additionally investigate IS evaluation methods and instruments that are used currently in Eskom. The results of this study will provide Eskom with a standard IS evaluation framework that is usable throughout the enterprise.

## **1.3 SIGNIFICANCE OF STUDY**

The research artefact, namely an IS evaluation framework, will enable managers to follow a structured, standard and consistent approach to assess the merit and worth of business information systems at Eskom. Information systems managers and decision makers have the responsibility to implement robust and responsive IS, and yet they still find it hard to evaluate and quantify these investments. This is mainly due to the unavailability of suitable IS evaluation frameworks to guide them. Furthermore, the development of a homogenized IS evaluation framework is in line

with Eskom's objective to standardize, optimize and simplify business processes and in turn improve efficiencies (Eskom 2012), critical in reducing cost. With Eskom facing limitations in funding, saving and cost cutting has become a critical organizational objective.

## **1.4 PROBLEM STATEMENT AND RESEARCH QUESTIONS**

The greatest challenge facing enterprises in South Africa is the lack of comprehensive evaluation frameworks for IS. An evaluation framework generally serves as a model for software standards, best practices and benchmarks for IS development and acquisition. According to Irani (2002), organizations have difficulty assessing the quality of IS products and this is attributed to a lack of adoption of scientific based evaluation frameworks. Critical factors or variables identified in an evaluation framework will ensure increased IS use, improved reporting, user satisfaction and organizational performance. Hence creating a scientifically proven framework for measuring IS worthiness is highly desirable for industry.

Obviously, without a framework, Eskom will continue to have difficulty assessing the quality of IS procured externally or developed within the organization. This can lead to hesitancy by managers to implement IS solutions, imperative to Eskom's journey towards being a world class utility company (Eskom 2012). This *status quo* coupled with recent publications about the low level of IS success, oriented the researcher to propose an evaluation framework for strategic decision making in the area of IS evaluation.

Based on the research problem as discussed above, the following primary research question was formulated:

What is needed to construct an effective framework for IS evaluation at Eskom?

In order to answer the above primary research question, the following secondary questions were formulated:

- What types of IS success models and theories exist?
- Which constructs are needed to develop a framework for IS evaluation at Eskom?

- What are the effects of the proposed framework at Eskom?

## **1.5 RESEARCH AIM AND OBJECTIVES**

The aim of this research is to conduct an exploratory study to identify IS evaluation criteria and determinants of IS success.

The objectives identified for this study are:

1. To evaluate the importance of IS evaluation and its impact on organizational performance.
2. To identify major constructs that can be utilized in the development of an evaluation framework for IS.
3. To identify the organizational determinants of IS success.
4. To develop an evaluation framework, specifically for Eskom, that will guide management in the evaluation of IS.
5. To appraise the value and effectiveness of the developed evaluation framework for IS.

## **1.6 RESEARCH METHODOLOGY**

Research is defined as a systematic process of collecting and analysing information in order to increase understanding of the phenomenon under investigation (Ertmer 1997). Research usually follows a research methodology or method to attain its goals. Research methodology consists of identifiable components that need to be considered including the research paradigm, research method, research technique, research participants, research procedure and data analysis (Marelli 2005).

### **1.6.1 RESEARCH PARADIGM**

Myers (1997) states that all research, whether based on quantitative or qualitative approach, is based on underlying assumptions of what comprises good research. In order to validate research it is imperative to know those assumptions. There are

basically three underlying research paradigms, based on three research epistemologies, defined as positivist, interpretive and critical.

This study is interpretive in nature, utilizing a case study research method. According to Myers (1997), in interpretive research, social constructed reality is only convened through social interaction. Thus, interpretive studies try to understand a phenomenon through the meaning that people attach to it. The interpretive method in IS attempts to understand the relationship between the context of IS and the influence of IS on context (Walsham 1993).

### **1.6.2 RESEARCH METHOD**

This study will employ an exploratory case study to investigate constructs required for the construction of the proposed IS evaluation framework. A case study can be defined as an empirical inquiry that studies a phenomenon in real life (Myers 1997). Classified as a qualitative approach, employing a case study will assist the researcher to understand the cultural and social context in which IS are utilized at Eskom, and thus which constructs are relevant (Myers 1997). According to Heath (1997), qualitative researchers attempt to describe and interpret human behaviour, often in the words of selected individuals, generally referred to as participants.

### **1.6.3 RESEARCH TECHNIQUE**

The main research technique employed, also referred to as the data collection method in research literature, will be interviews (Myers 1997). Utilizing an interview guide, it is envisaged that the researcher will conduct personal interviews with various stakeholders including end users, middle managers, senior managers and executive managers. This strategy will ensure that a broad spectrum of IS users and decision makers' views are considered when developing the evaluation framework. In addition, relevant literature on evaluation frameworks will be utilized to construct the interview guide, thereby assisting in identifying the relevant evaluation constructs.

## **1.6.4 RESEARCH PARTICIPANTS**

The participants in this study will consist of employees from various IS departments in the following nine Eskom divisions: Generation, Transmission, Distribution, Group Customer Services, Human Resources, Technology and Commercial, Finance and Group Capital, Enterprise Development and Sustainability.

## **1.6.5 RESEARCH PROCEDURE**

The research will be conducted in phases starting with literature reviewing and ending with the proposed evaluation framework. A continuing literature review will be conducted to gather additional information on evaluation constructs. This will be followed by establishing the appropriate research methodology, performing data collection, data analysis and review, and developing conclusions and recommendation, resulting in the final research artefact, namely the envisaged evaluation framework for IS at Eskom.

## **1.7 DATA ANALYSIS**

Data obtained from interviews will be analysed by employing thematic data analysis. Thematic data analysis is the process of identifying codes and themes from data that are normally transcripts, obtained during interviews. Employing the strategy proposed by Braun and Clarke (2006), initial codes will be identified as features of the data by hand, after which subthemes and themes will be identified. Data extracts that best exemplified the main theme(s) will then be ascertained, with the researcher's reflections on each interview also included. ATLAS.ti will be employed in managing the data analysis process as far as possible. Strategies that will be employed to ensure trustworthiness include:

- Triangulation: Data was obtained from more than one source as suggested by Leedy and Ormrod (2001), which included end users, middle managers, senior managers and executive managers. The use of multiple sources enabled the researcher to gather different points of view regarding IS success.

- **Validity:** Validity refers to the degree to which the research findings can be trusted (Runeson & Host 2009) and the correct research instruments were used (Golafshani 2003).
- **Reliability:** Reliability refers to the degree to which data analysis is dependent on the specific researcher(s). If another researcher conducted the same study, the findings should be similar.

## **1.8 ETHICAL CONSIDERATIONS**

Due to the fact that this study is based on interaction with people, the principles of respect for persons should apply (Fernandez, Kodish & Weijer 2003). Respect for persons requires participants in a research study to sign a consent form, referred to in Addendum C, which will explain the purpose and nature of the study. The consent form will also ensure participants' privacy, confidentiality, and that participation is totally voluntary. Approval of Eskom Group IT has also been obtained referred to in Addendum B, before the commencement of the study.

## **1.9 OUTLINE OF THE STUDY**

### **Chapter 1: Introduction, problem statement and objectives of the study**

Chapter 1 will provide a brief introduction orientation of the study.

### **Chapter 2: Literature review**

Chapter 2 will take a detailed look at existing literature on IS evaluation studies.

### **Chapter 3: Research methodology**

Chapter 3 will detail the selected research methods for the study following interpretive paradigm. Detailed description of the data collection and analysis methods will be presented and discussed.

### **Chapter 4: Data analysis**

Chapter 4 will present research findings and interpretation.

### **Chapter 5: Conclusions and recommendations**

Summary, reflection and conclusions regarding the study and its findings will be drawn in this chapter.

# **CHAPTER 2: LITERATURE REVIEW**

## **2.1 INTRODUCTION**

Chapter 1 introduced the research study by clearly stating the purpose of the study, the significance of the study, the research problem and the objectives of the study. The purpose of this chapter is to present the literature review on established IS success models and constructs. The main aim of conducting literature review on IS success models is to determine constructs to be included in the envisaged IS evaluation framework. The proposed model presented in this chapter was developed based on existing IS models found in the literature.

Document analysis will also be conducted in order to try to understand the context in which the proposed IS success model will be applied. The understanding of the “Eskom context” is important in order to develop a suitable model that is relevant to Eskom. Therefore, this chapter also presents the findings of document analysis on Eskom business and operations. Documents that were analysed include integrated annual reports, newsletters, media correspondence, business plans and strategies.

The next section discusses the importance of literature review.

## **2.2 IMPORTANCE OF LITERATURE REVIEW**

Literature review is the collection of both published and unpublished documents on a specific subject of interest, which contain ideas and information written from a certain perspective in order to meet certain objectives or make a particular point on a specific topic (Hart 2009). These documents need to be effectively synthesised in line with the topic being investigated. Sometimes the review of literature may include unpublished materials such as dissertations, manuals and personal correspondence.

Why do researchers conduct literature reviews? Literature reviews help the researcher to define and clarify the problem, summarise previous research in order to inform the reader of the state of current research, and to identify the relations,

contradictions, gaps and inconsistencies in the current literature (Urbach, Smolnik & Riempp 2009). Knowing the current status of knowledge and gaps helps the researcher to conduct an effective literature review. Effective literature review enables the researcher to demonstrate the knowledge of subject area and understanding of the problems and gaps that exist in a particular area, and to justify the researchability of the research topic, the choice of research design, method and methodology (Hart 2009). According to Levy & Ellis (2006), an effective literature review accomplishes the following objectives:

- Helps the researcher understand areas where there is enough research coverage (i.e. what is already known?) and where there are research gaps i.e. what is needed to be known?).
- Building credibility for the proposed study in relation to what is already known about a specific area.
- Justifying the existence of research gaps in relation to what is needed to be known.
- Justifying the proposed research study as one that contributes something new to the body of knowledge.
- Develops appropriate research methods, techniques, methodologies, design, approach and goals for the proposed research study.

As a data collection method, literature reviews have many advantages. Literature reviews have the following strengths (Marelli 2005):

- Literature reviews are flexible and can be applied to any topic information either at high level or in-depth level.
- Literature reviews are relative effortless, and efficient to conduct. Large quantities of data can be collected quickly at minimum cost.
- No appointments or arrangements are required. Cooperation of people or personal interaction is not required. The only resources required are a very good library or access to online facilities.
- Literature reviews enable the researcher to build a conceptual framework in order to develop a road map of the study.

The next section discusses the purpose of the literature review.

## **2.3 PURPOSE OF A LITERATURE REVIEW**

The research proposal touched on a small part on the background of evaluation of information systems (IS). However, it is the purpose of the literature review to provide a deeper and more thorough insight into the phenomena of interest, i.e. evaluation of information systems. Literature review provides the researcher with a conceptual framework for relating new findings to previous findings in the discussion section of a dissertation (Randolph 2009). Without prior understanding of previous research, it will be virtually impossible to establish how the new research expands the previous researches. According to Levy and Ellis (2006), effective literature reviews should incorporate the following characteristics:

- Methodologically review, evaluate and synthesise previous research.
- Justify the current research topic.
- Justify the choice of research methods, design, approach, technique and methodology.
- Demonstrate that the proposed research contributes new knowledge in the field's knowledge base.

The main purpose of any research is to address certain questions which the researcher needs to answer. When these questions are answered, the researcher will be in a position to gain more insight into the subject of focus. Figure 2.1 presents some of the questions that may be answered when undertaking a literature review.

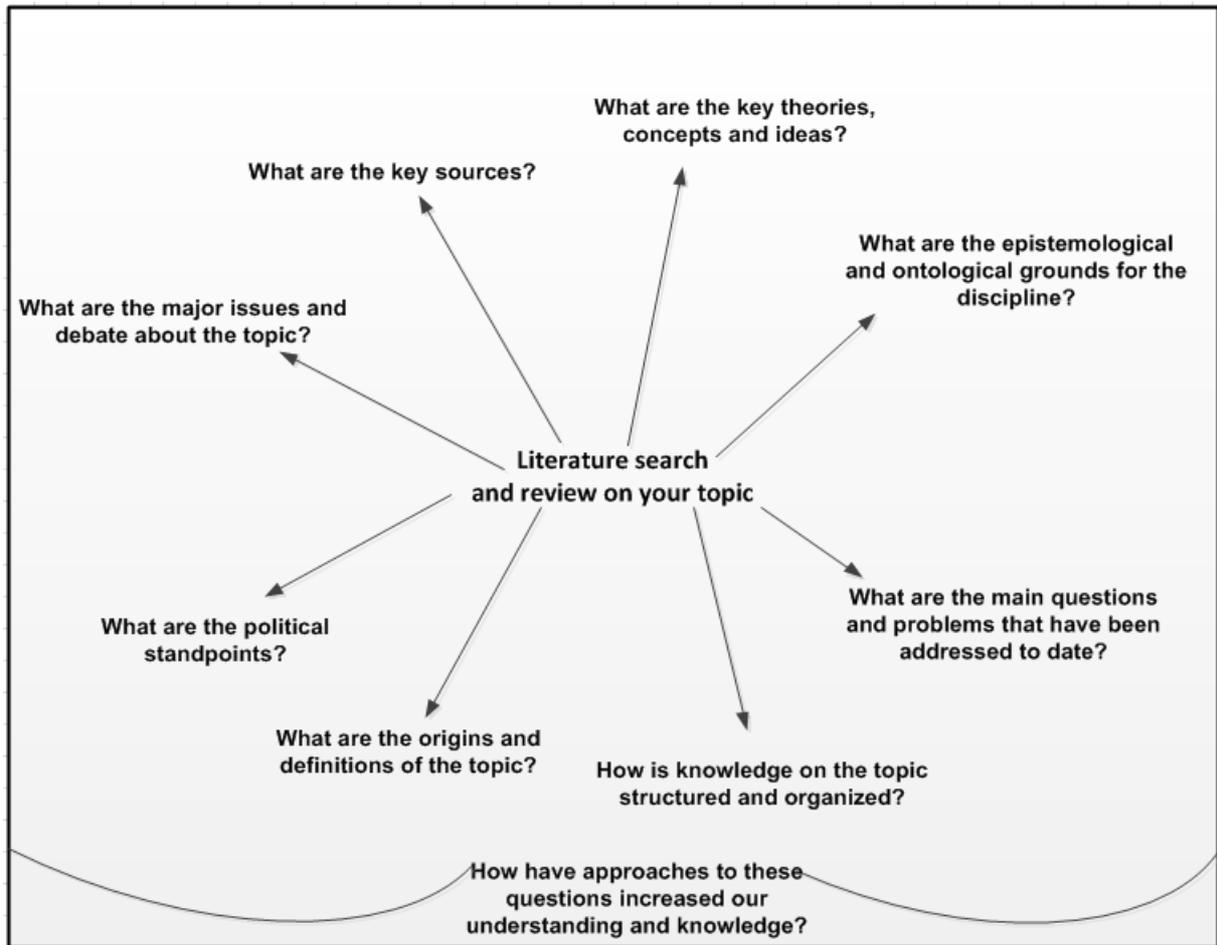


Figure 2.1: Literature review questions (adapted from Hart (2009:14))

Answering these questions will result in a literature review accomplishing several objectives (Hart 2009). The following are some objectives that can be achieved by carrying out an effective literature review (Hart 2009):

- Demonstrating that the researcher understands the state of current research on the proposed research and also helps the researcher gain deeper understanding of the research problem and question.
- Justifying the need for further research and uncovering gaps in the literature before the actual research is undertaken.
- Presenting what has been done on a specific topic (i.e. what is already known) in relation to what needs to be done (i.e. what is needed to be known).
- Analysing and synthesising previous research and gaining a new understanding and perspective.
- Building credibility for the research topic or problem.

- Enhancing the significance of the research problem.
- Linking theory and ideas to practice.

An in-depth discussion of the literature review develops a framework for the research to be put in the right context in relation to the related study (Marshall & Rossman 2010). According to Marshall and Rossman (2010), literature review serves several purposes:

- Provides evidence that the researcher understands the research area and context of related research.
- Demonstrate that the researcher has identified what is already known and the proposed study will present what is needed to be known.
- Literature review enhances the understanding of the research questions and problem by checking if the research problem has been addressed in previous researches.

This literature review is guided by guidelines that direct the researcher into how the proposed model should be developed. Some of these guidelines include the following (Marrelli 2005):

- Plan the review: clearly list key words to be used for searching indexes, libraries and other sources. Identify the type of sources to be used whether primary or secondary.
- Identify and locate sources: sources may include large university libraries or access to online databases.
- Read and summarize the sources: look out for sources that closely related to your topic. Once the source is identified read through the introduction and conclusion to see if it contains the information related to the topic.

The guidelines for conducting literature review as outlined above, guided this research study to identify the topics on IS evaluation as presented in Figure 2.2 below. Figure 2.2 presents the structure of this literature review to guide the reader on key concepts that are going to be reviewed.

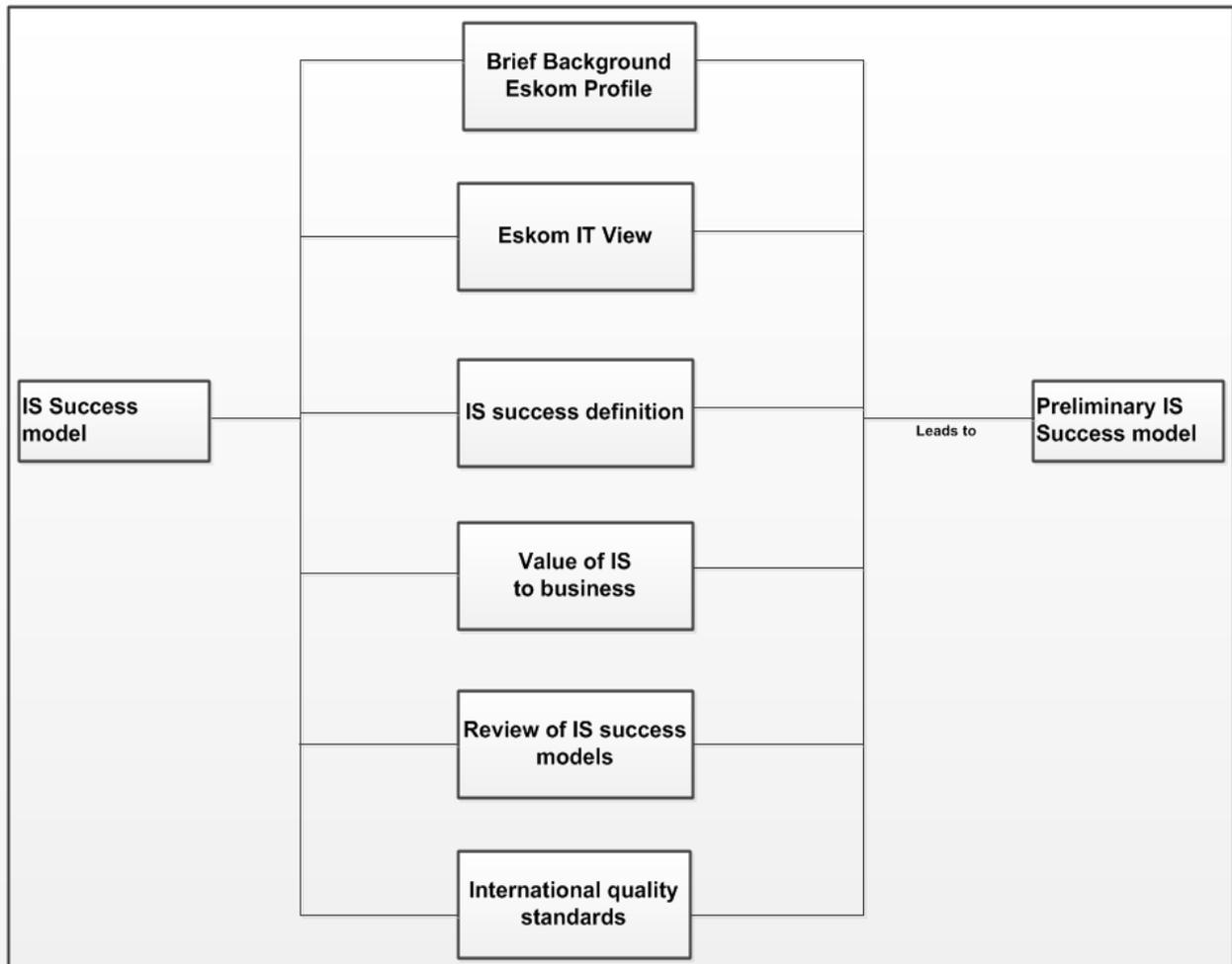


Figure 2.2: Organisation of this literature review

## 2.4 BRIEF BACKGROUND (ESKOM PROFILE)

Eskom, as a state-owned enterprise, has a greater role to play in addition to supplying electricity. Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers and redistributors (Eskom Integrated Annual Report 2013). Eskom supports South Africa’s growth and development aspirations and contributes to the vision of “providing a sustainable electricity solution to grow the economy and improve the quality of the life of the people in South Africa (SA) and in the region” (Eskom Integrated Annual Report 2013). According to Eskom Integrated Annual Report (2013), Eskom also supports the objectives of the government’s National Growth Path (NGP) and the National Development Plan (NDP). Eskom supports the NGD and NDP through keeping the lights on, providing a secure power supply and through

development of infrastructure and procurement spent. Supporting this vision, Eskom Holdings SOC Limited (presented in Figure 2.3 below) comprises of itself and subsidiaries. When referring to Eskom Group in this study, it would mean in the context of the structure as indicated in Figure 2.3 below.



Figure 2.3: Eskom Holdings SOC structure (adapted from Eskom Integrated Annual Report (2013))

Eskom structured its divisions as follows:

- Line functions: Generation, Transmission, Distribution, and Group Customer Services. Line functions operate business and focus on creating value.
- Services functions: Human Resources, Technology and Commercial and Finance and Group Capital. Service functions safeguard Eskom’s assets, provide expertise on day-to-day standardised services and optimise functions that cut across all aspects of the business.
- Strategic functions: Enterprise Development and Sustainability. Strategic functions develop the enterprise, bring about step changes in performance and provide broader strategic support to the group.

Eskom subsidiaries are structured as follows:

- Eskom Enterprise SOC Limited. The Eskom Enterprises group provides lifecycle support and plant maintenance, network protection and support for the capital expansion programme for all Eskom Holdings SOC Limited division.
- Escap SOC Limited. Eskom’s wholly owned captive insurance company manages and insures Eskom’s business risk.
- Eskom Finance Company SOC Limited. Eskom’s wholly owned company that grants home loans to Eskom employees.
- Eskom Development Foundation NPC. Eskom’s wholly owned non-profit company that manages Eskom’s corporate social investment.

To achieve its medium and long term goals, Eskom developed its purpose, strategic objectives and values (detailed in Figure 2.4 below). Eskom’s values, strategic objectives and building blocks assist the organisation to accomplish its strategic purpose and contribute to its visions of providing a sustainable electricity solution to grow the economy and improve the quality of the lives of the people in SA and in the region.

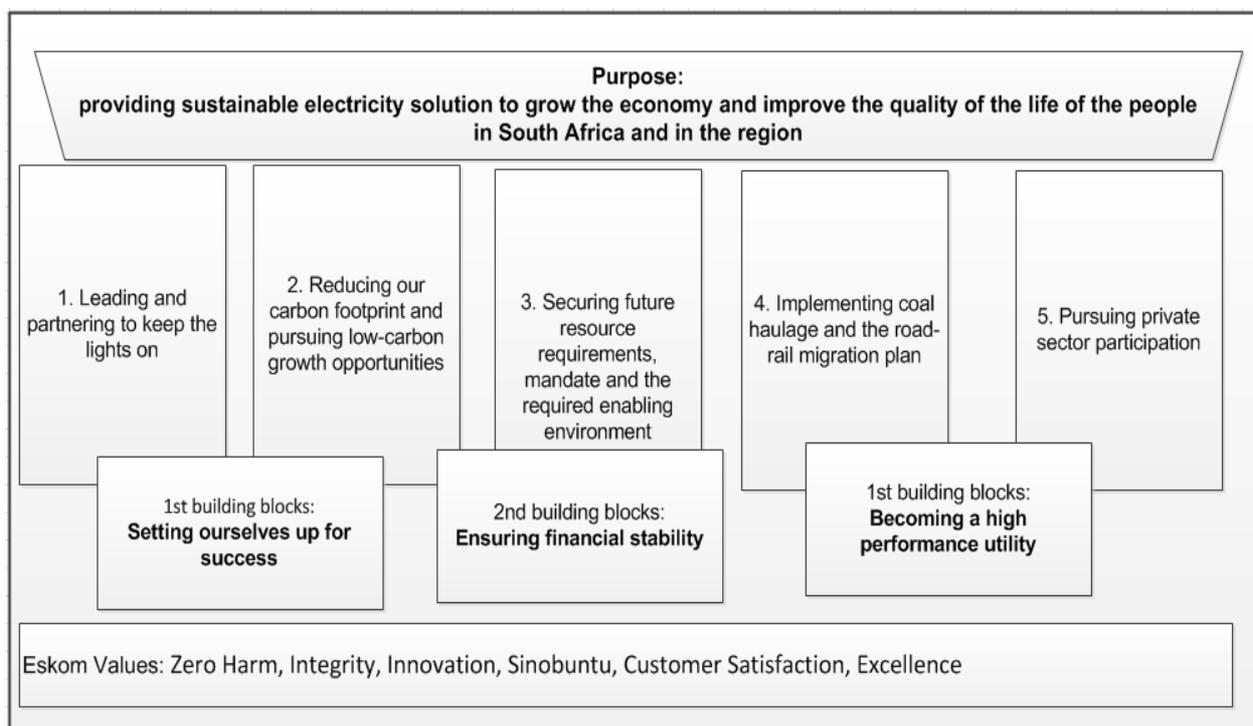


Figure 2.4: Eskom’s purpose, strategic objectives and values (adapted from Eskom Integrated Annual Report (2013))

Eskom is seen as a national asset by the South African government in that it is tasked with the delivery of secure power supply. Secure power supply is critical for SA's economic growth aspirations. The delivery of public services like electricity depends on the effectiveness and efficiency of IS. Eskom Group IT is a business unit in the enterprise development division, which helps to ensure that Eskom meets electricity demand by providing reliable information systems (IS) and information technology (IT) infrastructure (Eskom Integrated Annual Report 2012).

The next section discusses the inside view of Eskom IT. This detailed elaboration ensures that readers understand the Eskom IT environment, therefore laying a good foundation for understanding the subject of focus and its context.

### **2.4.1 ESKOM IT VIEW**

Technology plays a critical role in Eskom operations and includes telecommunication, IT, IS, research and innovation (Eskom Integrated Annual Report 2013). Eskom Group IT is a business unit under the Enterprise Development division whose mandate is to support Eskom operations in terms of improving employee efficiency with effective user computing, automate business processes to reduce costs and improve accuracy. Eskom Group IT also helps ensure that Eskom meets energy demand by providing reliable IT infrastructure (Eskom 2012). Although Eskom Group IT sits within the Enterprise Development division, it is a company-wide business unit that provides services to all Eskom departments including subsidiary companies. When referring to Eskom Group IT in this study, it would mean in the context as explained.

Eskom Group IT developed initiatives that are aligned with Eskom Group's strategic objectives. Each strategic objective of Eskom group as shown in Figure 2.5 in the previous section is aligned with relevant Group IT initiative. Eskom Group IT strategic objectives and building blocks assist to accomplish and contribute to its visions. To effectively and efficiently achieve its mandate of providing reliable power supply, Eskom relies on state of the art IT and robust IS.

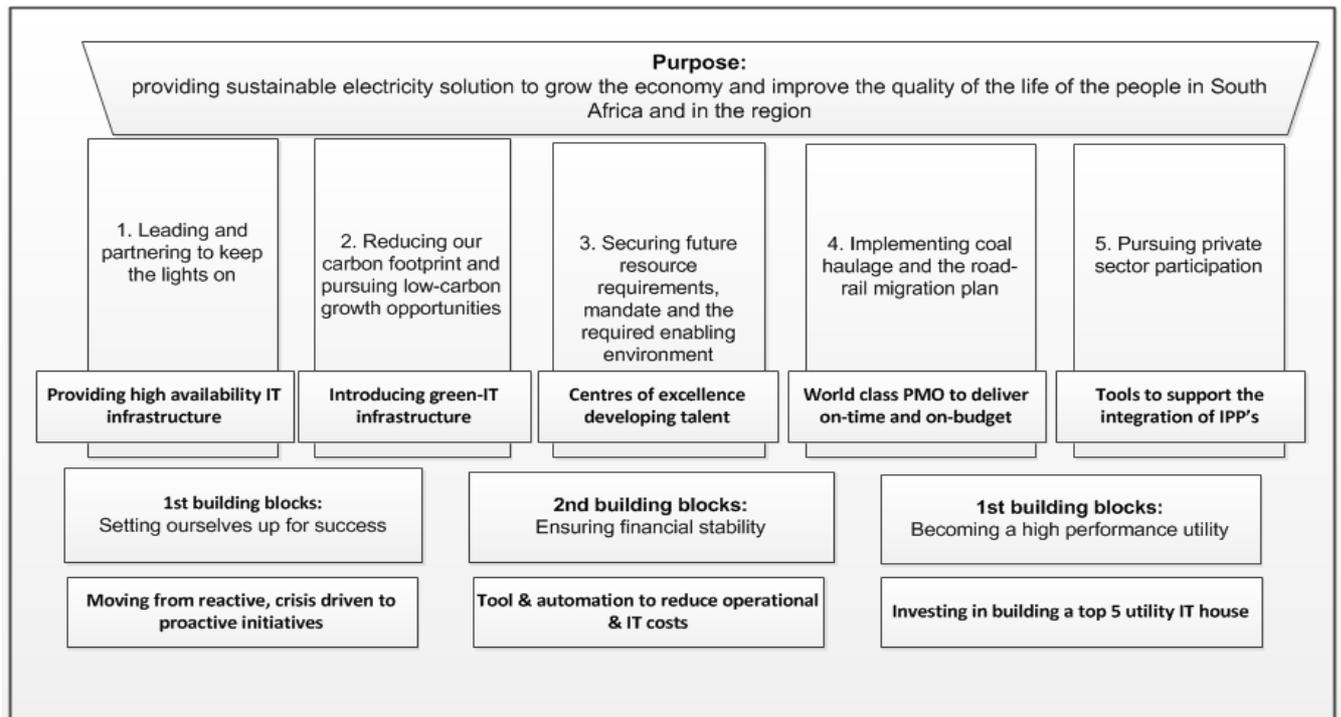


Figure 2.5: Eskom Group’s strategic objectives aligned with Group IT objectives (adapted from Eskom (2012))

Eskom IT is among the largest IT houses in Africa (as detailed in Table 2.1 below) with more than 2000 IT professionals employed in the enterprise. Eskom IT infrastructure is spread over 505 locations in all nine provinces in SA. As presented in Table 2.1 below, there are currently over 43000 users on the Eskom network, 6 million inbound and outbound emails per week and more than 200 million transactions per month and over 2.5 petabytes of data storage (Eskom 2012).

Table 2.1: Eskom IT in statistics (adapted from Eskom Integrated Annual Report (2013))

Category	Value
IT Professional	2000
Opex	R4,8 bn
Carpex	R6 bn
Users	43 000
Storage	2.5 – 3.0 PB
Transactions	+200m
Locations	505
Email/Week	6 mn

The public sector is heavily reliant on IS to provide efficient and effective delivery of services, therefore it is a major investor in IS (Elpez & Fink 2006). Eskom is one of the biggest investors in IS due to the fact that it relies heavily on robust IS to render efficient and effective service to its customers. Eskom spending on IT/IS has surpassed major IT power houses in SA. According to the list of top 20 IT spending companies in SA (as detailed in Table 2.2 below), Eskom is ranked in the top 20 IT spending companies in SA. The huge financial resources put into IT are evidence that Eskom is a major investor in IT.

Table 2.2: Top 20 IT spending companies in South Africa (adapted from Motloutsi (2010:50))

No	Company	Sector
1.	Old Mutual Group	Financial
2.	Nedbank Group Limited	Financial
3.	First National Bank	Financial
4.	Investec Limited	Financial
5.	South African Revenue Services	Government
6.	State Information Technology Agency	Government
7.	Eskom SOC Limited	Utility
8.	Sasol Limited	Oil and Petroleum
9.	SAB Miller	Beverages
10.	South Social Security Agency	Government
11.	Vodacom Group	Telecommunication
12.	MTN Group	Telecommunication
13.	Cell C	Telecommunication
14.	Telkom	Telecommunication
15.	Department of Home Affairs	Government
16.	South African Airways	Aviation
17.	Absa	Financial
18.	Erkhuruleni Municipality	Government
19.	Pick 'n Pay	Retail
20.	Trasnet	Government

With such a huge investment, Eskom has the responsibility to ensure that IS improves business operation and that users utilize IT applications. Eskom IT spendings represent 2% of total Eskom spendings, although the majority is for services (Eskom 2012). This is in line with a report by Gartner (2013) which noted that 55% of all Eskom IT budgets are spent on operations and infrastructure. The next section discusses the definition of IS success.

## 2.5 DEFINITION OF IS SUCCESS

Information systems success is difficult to define because there is no ultimate measure of IS success. The definition of IS success depends on the context of the system being studied (Seddon, Stapples, Patnayakuni & Bowtell 1999) and the perspective of the stakeholders on whose behalf the system is evaluated (Schaupp, Fan & Belanger 2006). According to Grover, Jeong and Segars (1996), in most cases, determination of IS success has been done through evaluation of user satisfaction by way of using surveys. Table 2.3 below presents different definitions of IS success that reflect different points of view.

Table 2.3: Different definitions of IS success

Authors	Definition
Byrd, Thrasher, Lang and Davidson (2006:448)	"... the effects of IS along a path can lead to a better organizational performance, in this case, lower overall costs."
Gatian(1994:119)	"If an effective system is defined as one that adds value to the firm, any measure of system effectiveness should reflect some positive change in user behaviour, i.e., improved productivity, fewer errors or better decision making."
Land (1994:275)	"The new system is accepted in the work place as the way of doing the tasks that the system has been designed to carry out... or is invoked as a support tool on a regular basis."
Rainer and Watson (1995:84)	"An EIS should be developed in response to a specific business need, such as a need to be more responsive to changing customer desires, to improve product quality, or to improve organizational communications. Systems that do not support business objectives are unlikely to succeed."

Different stakeholders have different experience of using the same system. In the IS domain, relevant stakeholders are people that will use the system (end-users), those that are charged with delivering the systems (IS professionals) (Elpez & Fink 2006). Yet, IS have mainly been evaluated from one perspective (Gable, Sedera & Chan 2008). To perform comprehensive IS evaluation; these conflicting perspectives need to be taken into account. Grover, Jeong and Segars (1996) state that to evaluate the system effectively, perspectives of all stakeholders need to be taking into account i.e. users, top management, IS professionals and external parties.

Information system professionals are involved in developing and delivering the IS. Information system professionals are normally a link between end-users and

business. From the perspectives of IS professionals, information systems project is considered successful if it is completed on-time and within budget with functions and features as originally specified (Urbach, Smolnik & Riempp 2009). Information systems professionals, therefore, focus more on delivering a system within budget and on time than on delivering systems users are happy with.

From the end-user's perspective, high usability of the system is associated with success (Elpez & Fink 2006). According to Adelakum and Jennex (2002), end-users will readily use a system that requires little effort to operate and that facilitate their job performance. Users normally evaluate the system based on usability issues and the link between the system purpose and the tasks they perform on the system.

According to a study by Adelum and Jennex (2002), top management evaluate IS by focusing on cost, savings, value to the organisation, user satisfaction and compatibility of the IS to the IT infrastructure of the organisation. Information systems use is often associated with IS success (Delone & Mclean 1992). When end-users continue to use IS, top management may perceive the system as successful. Information system use is measured by frequency of use, length of time used and number of accesses.

In this research study, we remain focused on IS success as defined by D&M (1992), who reviewed over 180 articles with definitions of IS success and corresponding determinants of success. Through conducting a comprehensive review of IS articles, D&M (1992) proposed six interrelated variables that measure IS success, namely: system quality, information quality, system's use, user satisfaction, individual impact and organisational impact. In this research study, IS success is defined in the context of D&M to cover different points of view and IS success measures.

The next section discusses IS success models found in the literature.

## 2.6 A REVIEW OF IS SUCCESS MODELS

Several models of IS success have been proposed along with those factors that influence IS success. The purpose of this section is to review IS models that contributed to our understanding of IS.

One of the most popular models for evaluating IS success is the DeLone and McLean (D&M) success model (DeLone & McLean 1992). D&M synthesized IS success and created taxonomy of factors that influence IS success. D&M identified the following six distinct dimensions of IS success (see Figure 2.6 below): system quality, information quality, use, user satisfaction, individual impact and organisational impact.

According to D&M (1992), these six dimensions of IS success should be incorporated into any model of IS success. The D&M model can be interpreted as follows: system quality and Information quality singularly and jointly influence both use and user satisfaction; the frequency of use can influence the extent of user satisfaction (positively and negatively). Furthermore, use and user satisfaction are direct antecedents of individual impact; lastly, this impact on individual performance will eventually have an impact at organisational level.

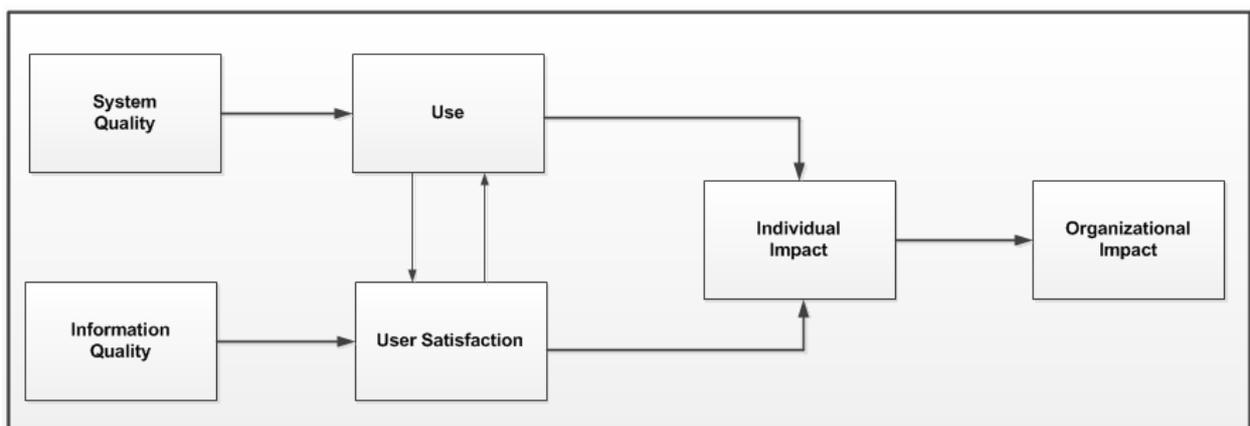


Figure 2.6: DeLone & McLean's IS Success Model (adapted from DeLone and McLean (1992:87))

D&M IS success model made a significant impact in laying a foundation for furthering research in IS success in a number of ways (Ballantine, Bonner, Levy, Martin, Munro

& Powell 1996). The D&M model combines previous research and comes out with six variables of IS success, it categorizes various information systems success measures into various groupings and it takes into account different stakeholder perspectives (Ballantine, Bonner, Levy, Martin, Munro & Powell 1996). The D&M model has also been praised for being simple and easy to understand (Urbach, Smolnik & Riempp 2009).

Seddon (1997) is one of the first researchers to critique D&M IS success model and propose an alternative model. A related model, as shown in Figure 2.7 below, proposed by Seddon (1997) consists of the following categories of measures of IS success: system quality, information quality, perceived usefulness, user satisfaction and IS use. Seddon (1997) views IS use to be a behaviour and not a measure of IS success. This definition of IS use means it is seen as an outcome of IS success rather than part of success.

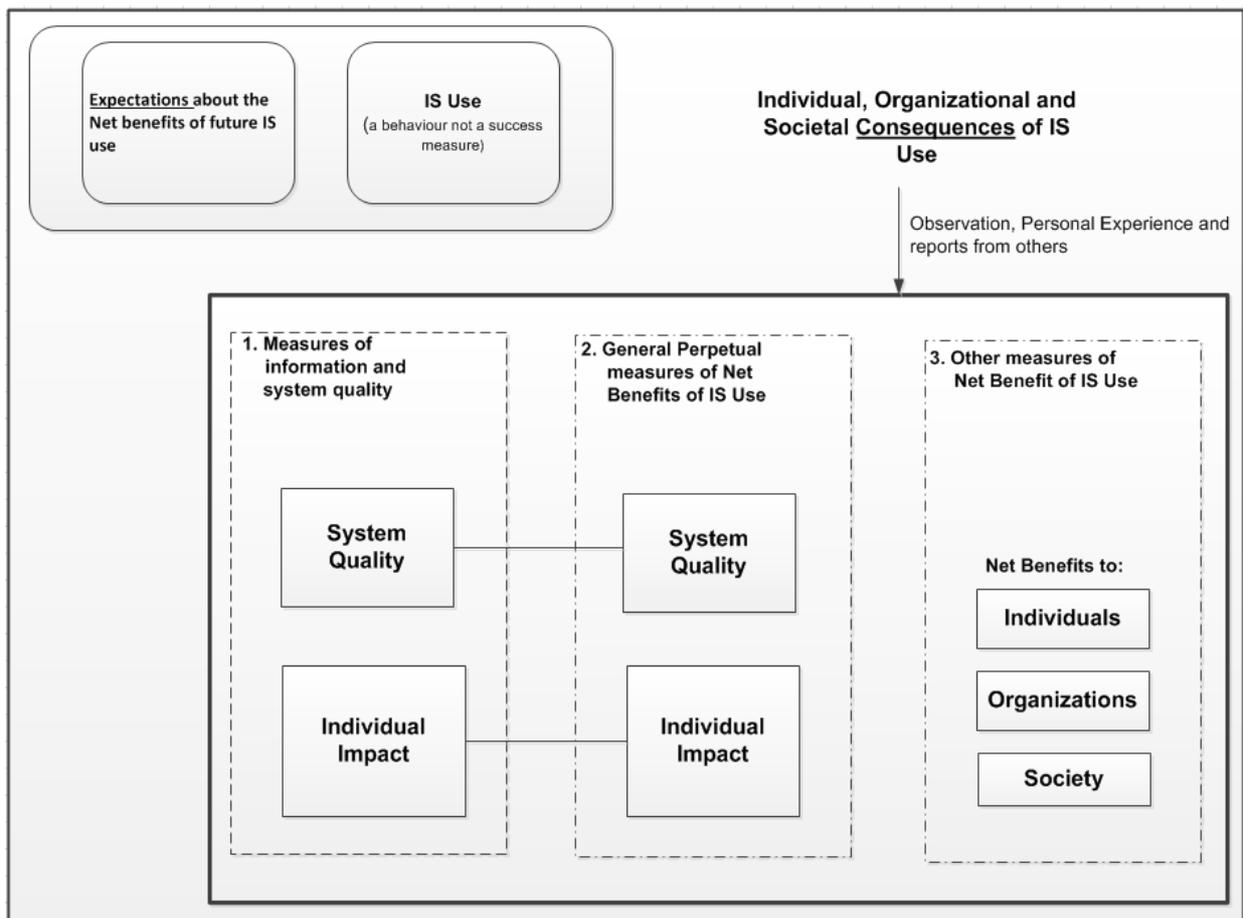


Figure 2.7: Re-specified model of IS success (adapted from Seddon (1997:245))

Rai, Lang and Welker (2002) conducted a study to theoretically and empirically assess Delone and McLean's (1992) and Seddon's (1997) models of IS success. Their study validated the importance of using integrated and multiple construct for measuring IS success. Rai *et al.* (2002) concluded that both models are valid and have merit for evaluating IS Success.

Another alternative IS success model is the 3-D model proposed by Ballantine, Bonner, Levy, Martin, Munro & Powel (1996) as presented in Figure 2.8 below. The 3-D model attempts to enhance our understanding of IS success by breaking down success into three basic levels; the technical Development level, the Deployment to the user and the Delivery of business benefits (Ballantine, Bonner, Levy, Martin, Munro & Powell 1996).

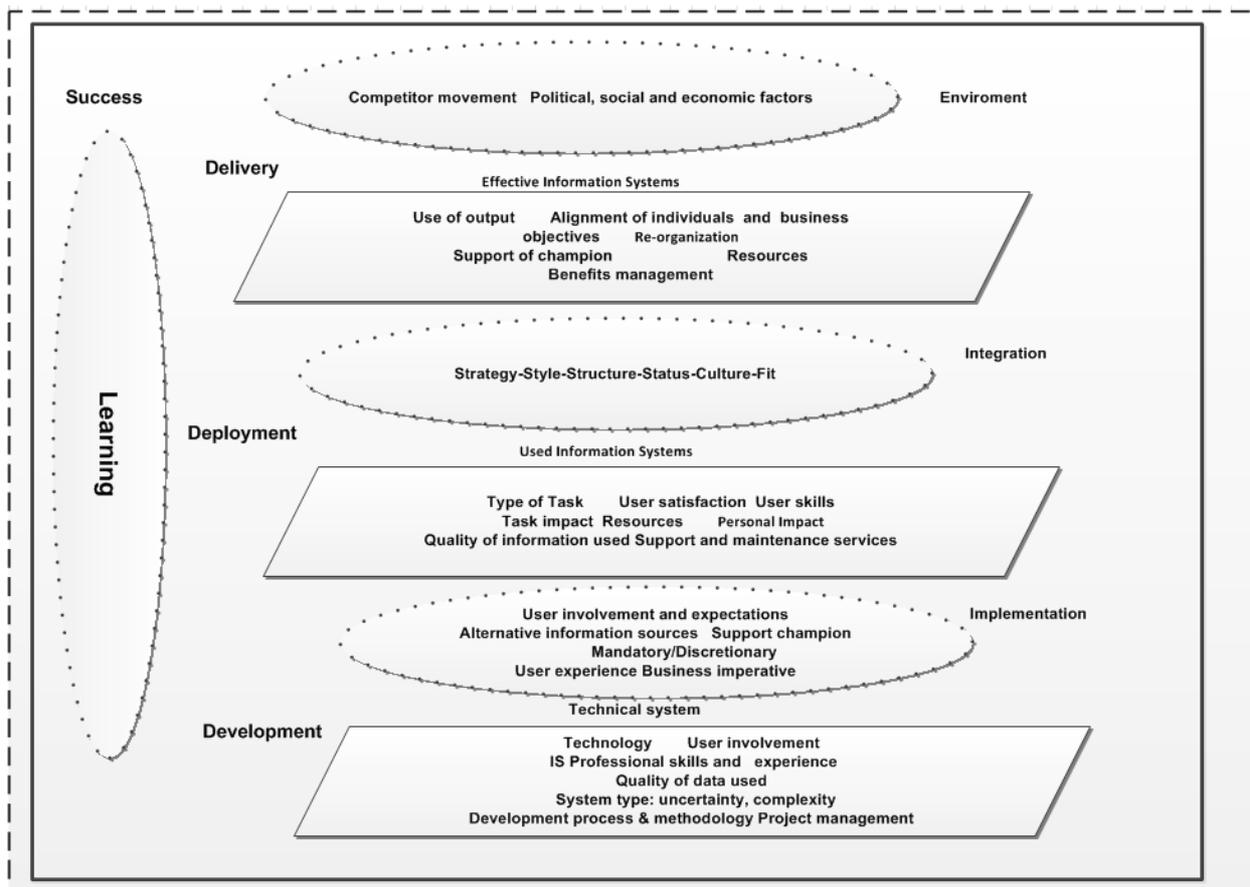


Figure 2.8: 3-D model of IS success (adapted from Ballantine, Bonner Levy, Martin, Munro & Powell (1996:11))

Another model is the system success model (depicted in Figure 2.9 below) proposed by Hwang, Windsor and Pryor (2000). This model has been built on established IS success models including the well-known D&M IS success (1992) model. The model consists of environmental variables related to the organisation, users, IS operation, IS development, IS and external environment. These variables have a direct influence on the use, satisfaction of the individual and the organisational impact of IS. The 3-D model of IS success consists of five environmental variables that interact with IS. Environmental variables and the D&M success model variables are combined to form System Success Model.

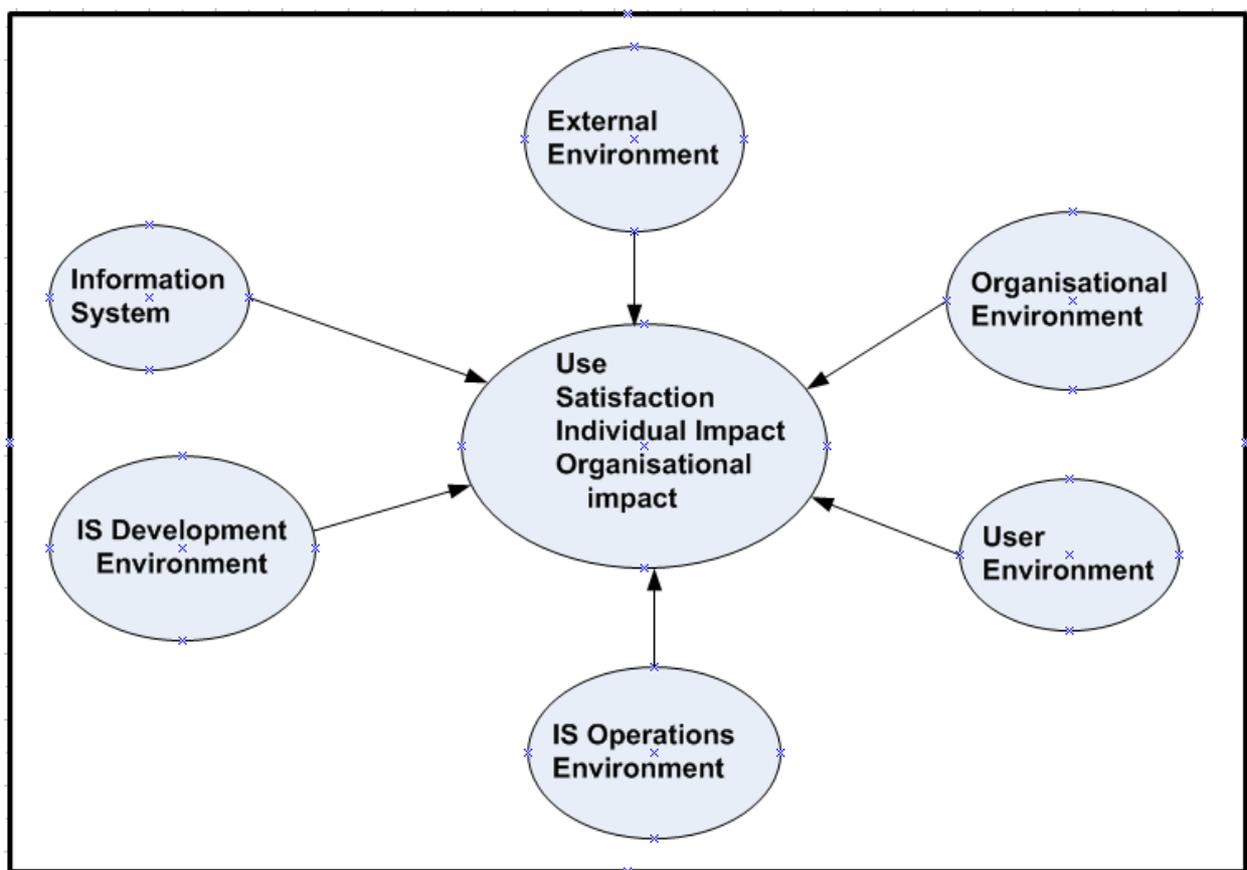


Figure 2.9: System success model (adapted from Hwang, Windsor and Pryor (2000:27))

A decade later after developing the original model of IS success, D&M (2003) proposed an updated model to extend, validate and strengthen the original one. The only new additions on the updated model are “service quality” and “intention to use” as an alternate measure of “use.” The consolidation of individual impact and organisational benefit into “net benefits” reflects various impacts such as customer impact, societal impact and organizational impact. The updated model consists of six

interrelated measurement variables of IS success namely: information quality, system quality, and service quality, intention to use/use, user satisfaction and net benefits. The addition of “service quality” to the model was due to the uptake of e-commerce which identified service quality as an important factor of IS success. The updated model is presented in Figure 2.10 below.

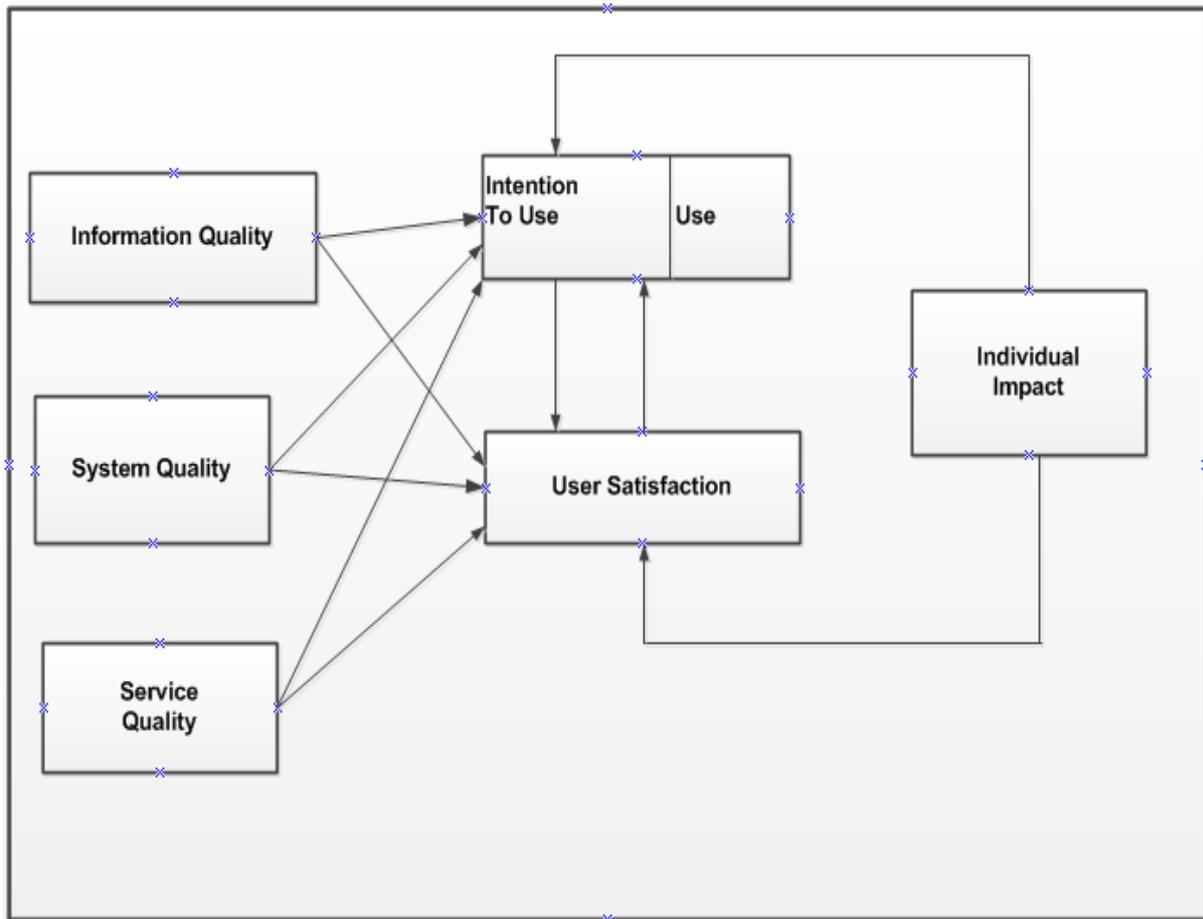


Figure 2.10: Delone & Mclean’s updated IS success model (adapted from Delone and Mclean (2003:24))

The updated model can be interpreted as follows: a system can be evaluated in terms of information, systems and service quality; these factors have an impact on use or intention to use and user satisfaction. By using the model certain benefits which maybe positive or negative may be achieved. The net benefits will influence user satisfaction which in turn will influence further use of the system (Urbach, Smolnik & Riempp 2009).

Wixom and Todd (2005) proposed another model to evaluate IS success. The model is an integration of two streams of research that measure IS success: user

satisfaction literature and user acceptance literature. The model distinguished beliefs and attitudes about the system from those beliefs and attitudes of using the system. The proposed model bridged a gap between user satisfaction and technology acceptance, by integrating these two parallel streams of research. The model as presented in Figure 2.11 below shows the integration of user satisfaction and technology acceptance literature. By combining these two streams of research, Wixom and Todd's model results in the following categories of IS success: information quality, system quality, information satisfaction, system satisfaction, usefulness, ease of use, attitude and intention.

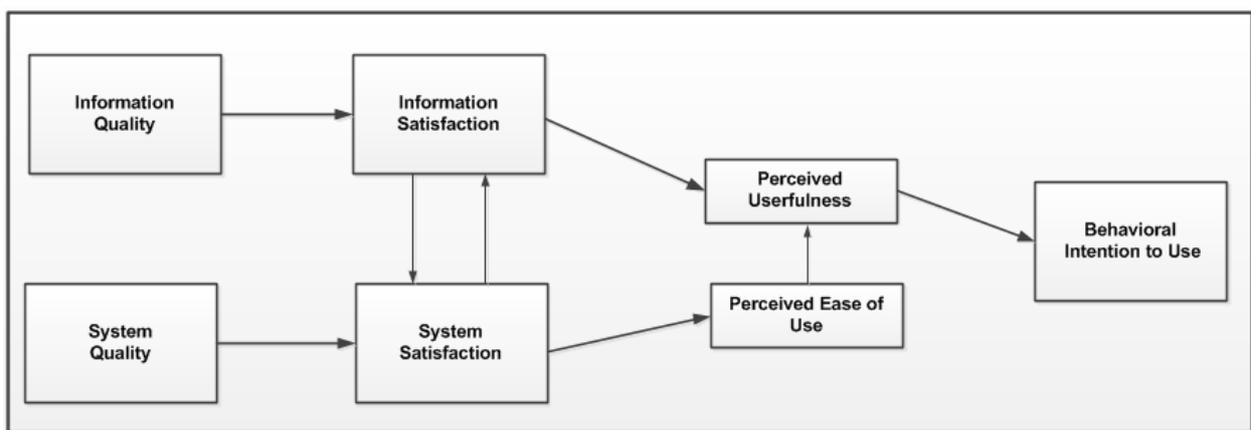


Figure 2.11: Wixom and Todd's IS conceptual model (adapted from Wixom and Todd (2005:90))

Elpez and Fink (2006) proposed another model for evaluation of IS success in the public sector. According to Elpez and Fink (2006), evaluation of IS success has mainly been performed in the private sector while IS success in the public sector has been neglected. When designing an IS success model for the public sector, researchers need to take into account public sector characteristics like expenditure control, accountability and long term perspective (Elpez & Fink 2006).

Elpez and Fink (2006) identified the following variables of IS success in order of importance: meeting user requirements, system usability and performance, information quality, use, user acceptance and IS ownership and interaction with IT infrastructure. Public sector characteristics include expenditure control, accountability and long term perspective. The model as presented in Figure 2.12 below, aligns IS success variables with public sector characteristics.

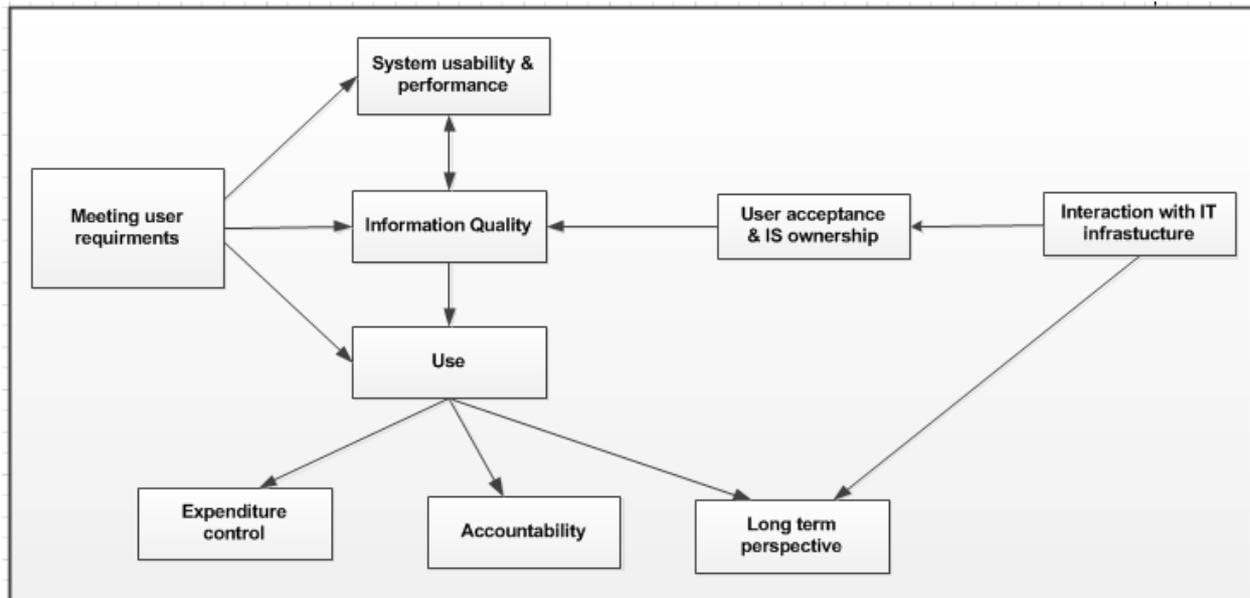


Figure 2.12: Elpez and Fink's IS success model (adapted from Elpez and Fink (2006:228))

The model for IS success evaluation in the public sector is critical, since the public sector depends on IS to increase its efficiency and effectiveness of delivery of public services (Elpez & Fink 2006). The public sector is heavily reliant on IS to stay efficient and effective and therefore is a major investor in IS (Elpez & Fink 2006; Eskom 2012).

Another model, Information System Acceptance (ISA) model, was proposed by Seen, Rouse and Beaumont (2007). The ISA model was developed based on well-established IS frameworks and IS success models namely: diffusion of innovation, information system success and information system implementation. According to Seen, Rouse and Beaumont (2007), by combining these frameworks it enables ISA to provide richer issues to consider when evaluating IS. By evaluation of the system in terms of technology characteristics, management actions and service quality, the ISA model can be used to identify potential challenges to IS success.

The ISA model, as presented in Figure 2.13 below, can be interpreted as follows; a system possesses certain technology characteristics, namely, relative advantage, compatibility, simplicity and trialability. Users will have expectations of using the system that will have an influence on their intention to use the system. If the expectations are positive, use of the system will increase. Once software is used over

a period of time, users will develop opinions of using the system based on their experiences (Sean, Rouse & Beaumont 2007).

Management actions have an impact on “intention to use”, for example not sharing the motivation and objectives of the system may potentially reduce the intention to use the system. Rewards, managing expectations and leading by example may positively impact “Intention to Use.” Resources in the form of funds and personnel will help in the implementation process. All components of management actions i.e. communication, rewards, resourcing and implementation of management will also influence “User Satisfaction.” Service quality whether provided internally or externally will influence “Intention to Use” and “User Satisfaction.”

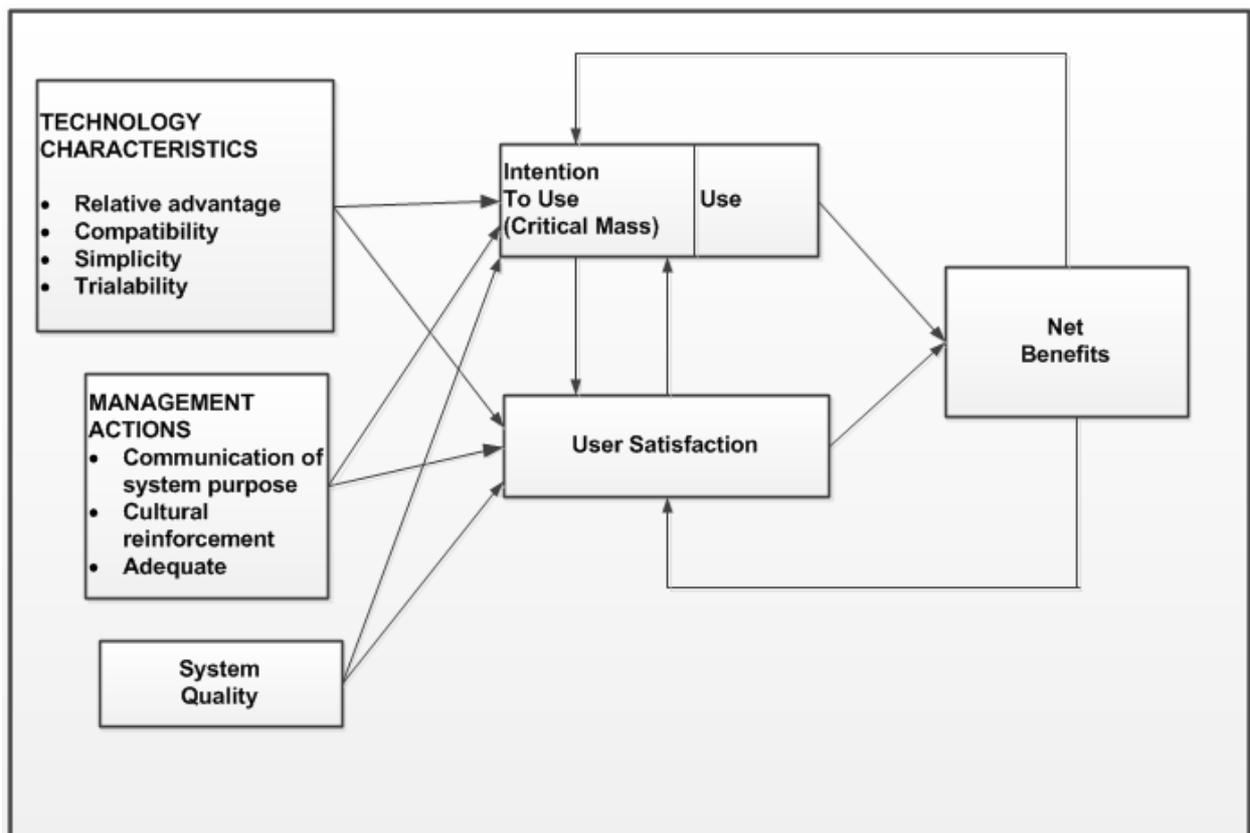


Figure 2.13: Information systems acceptance model (adapted from Sean, Rouse and Beaumont (2007:1363))

Another model for IS success is the one proposed by Thomas (2006) as model for assessing IS success and technology acceptance within government organisations. The model was built by integrating three major models of IS success: D&M (2003) model of IS success, Venkatesh, Morris, Davis and Davis (2003) Unified Theory of

Acceptance and Use of Technology (UTAUT) and Wixom and Todd (2005) IS success model. The main goal of the proposed model was to measure technology acceptance and IS success in a government setting. Combining these three models provides a complete and effective means of assessing IS success, incorporates the missing IS success constructs in major IS models and provides a holistic view of measuring IS success (Thomas 2006). The IS conceptual model is presented in Figure 2.14 below.

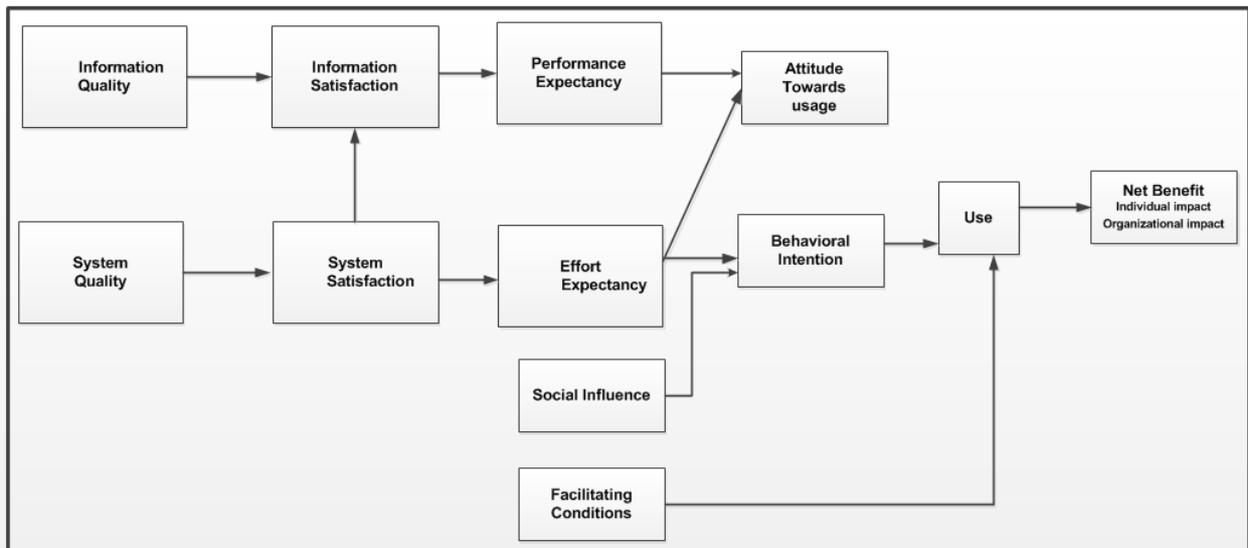


Figure 2.14: Thomas' IS conceptual model (adapted from Thomas (2006:32))

Having reviewed various models relating to IS success, the next section focuses on quality standards, specifically International Organisation for Standardisation standards related to software development.

## 2.7 INTERNATIONAL QUALITY STANDARDS

International Organisation for Standardisation (ISO) is a worldwide body that establishes quality standards for products and services. ISO's standards are well known standards implemented by more than a million organisations in some 175 countries (Frost 2008). International Organisation for Standardisation seeks to offer a global consensus of what constitutes best practices; practices that can assist companies' delivery of high-quality products and services. Since an information system is critical for a company's success, organisations seek assurance that software systems are of high quality standards. A company can use ISO guidelines

when developing in-house IS to ensure that the final product is aligned to ISO quality standards.

According to ISO (Frost 2008), companies that embed ISO standards in their products and services will result in products and services that are of good quality and satisfying to customers. For business, ISO standards enhance productivity by eliminating waste and inefficiencies. Companies will then be able to access new markets, improve their competitiveness, level the playing field for developing countries and facilitate free and fair global trade. The ISO standards are useful since they have been built based on the international agreement of all countries members of the ISO organisation. The ISO standards that are discussed in this research study are those dealing with quality, quality management and software engineering.

### **2.7.1 ISO 9001**

According to Frost (2008), ISO 9001 is the generic standard for quality management. Because ISO 9001 is a generic standard it can be applied to any organisation, big or small and on any products or services. ISO 9001 can also be applied to any sector including a business enterprise, a public administration or a government entity (Frost 2008). Quality refers to all requirements, features and functions of a product or service that are required by a customer. Quality management refers to those steps the organisation takes to ensure that the products or services meet the customer's quality requirements. Quality management means the continuous improvement of products to enhance customer satisfaction and maintain high performance levels.

Standards help an organisation to carry out their processes in order to improve quality. Figure 2.15 below presents worldwide growth of ISO 9001 certificates. ISO's are well-known standards that are implemented by more than a million organisations in some 175 countries (Frost 2008). This is an increase from 170 countries during the previous year.

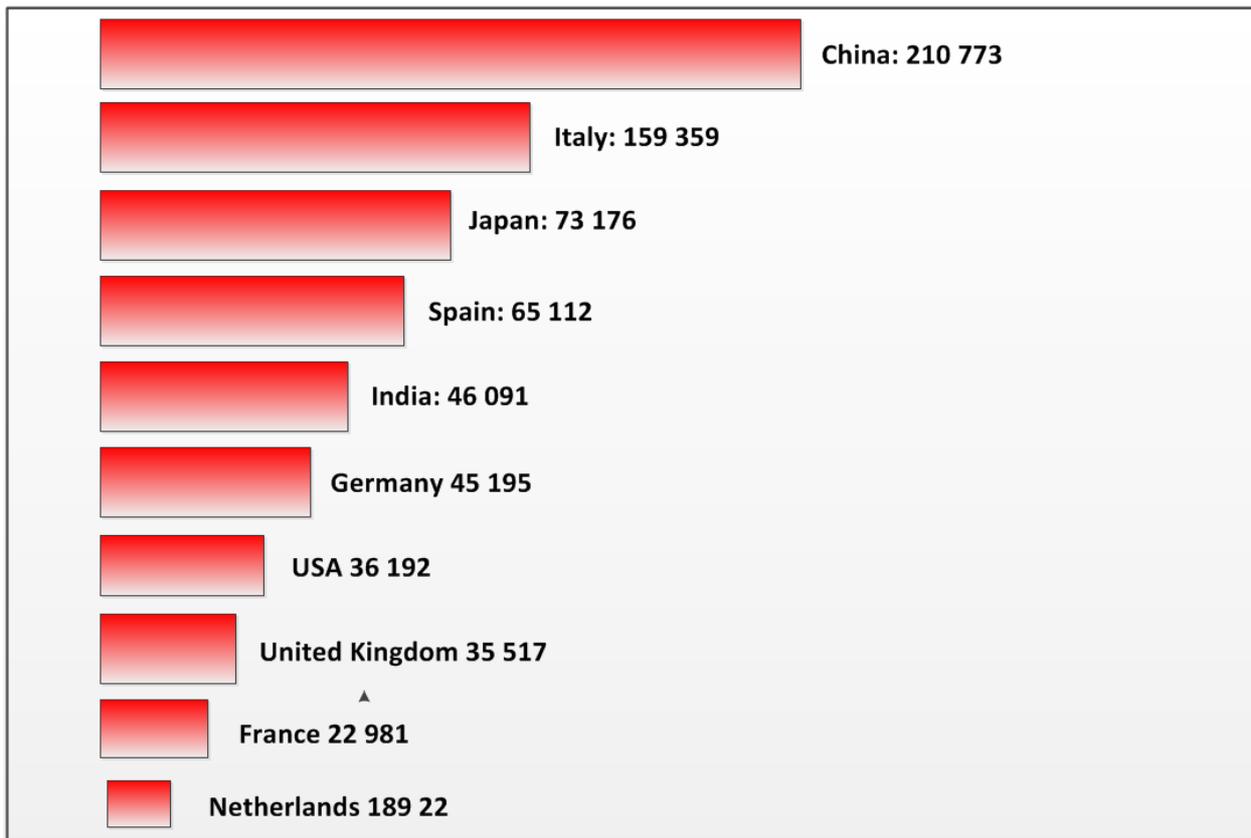


Figure 2.15: ISO 9001:2000 (adapted from Frost (2008:17))

The worldwide total of certificates issued by ISO 9001:2001 at the end of 2007 was 951 486. This was an increase of 6% compared to the previous year's total of 896 929 certificates. According to Frost (2008), by implementing ISO 9001 standard, an organisation can achieve the following benefits:

- Model for satisfying customers and other stakeholders.
- Build quality into products and services from planning, design, and implementation of products.
- Ensuring stable business.
- Transfer of good practice to developing countries.
- Increase efficiency and effectiveness.
- Model for continual improvement.

The next section describes ISO 9126 standard for quality characteristics of software development.

## 2.7.2 ISO 9126

The ISO 9126 series of quality models contains a two part quality model for software product quality namely internal and external quality model, and quality in use model (ISO 2001). Internal quality is measured by quality of the source code and external quality by the properties of the executed code e.g. response time (Bevan 1999). The first structure model consists of an internal and external quality model. This structure is modelled with six characteristics, with each characteristic divided into a further six sub-characteristics. The highest level of this structure comprises of quality characteristics and the lowest level comprises of quality sub-characteristics which represent software quality criteria. Figure 2.16 below shows these characteristics with their corresponding sub-characteristics.

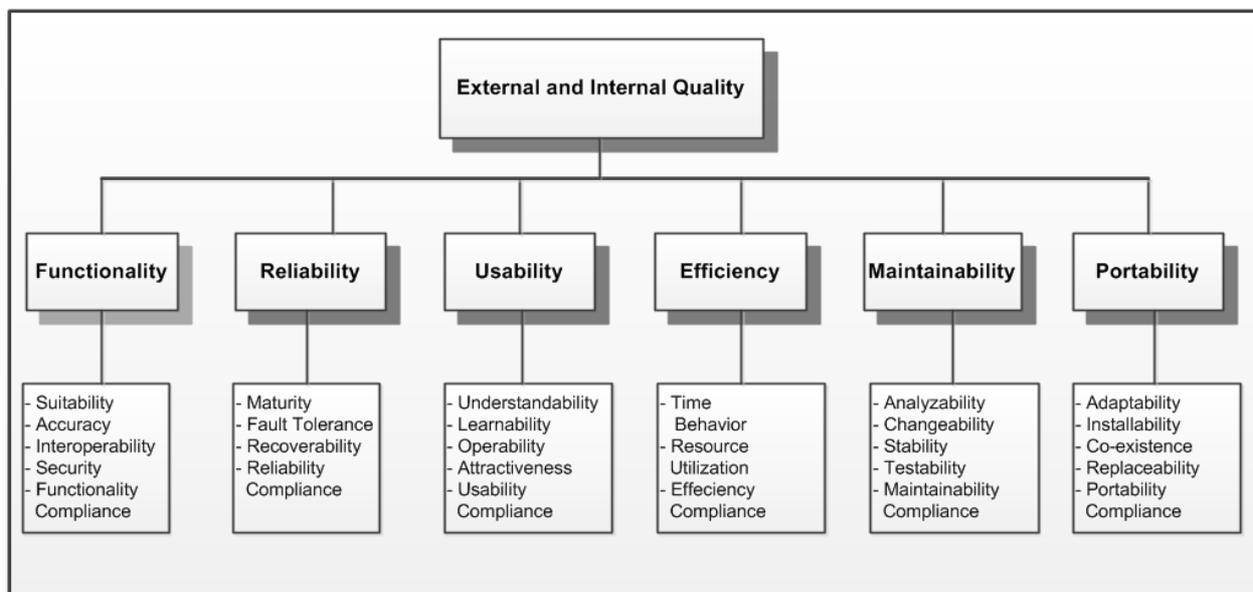


Figure 2.16: ISO quality model for external and internal characteristics (adapted from ISO 9126-1 (2001))

The characteristics and sub-characteristics are defined below (ISO 9126-1 2001):

- **Functionality:** “is a set of attributes that bear on the existence of a set of functions and their specified properties; the functions are those that satisfy stated or implied needs.” This characteristic consists of five sub-characteristics: suitability, which means that the features and functions of a system enable users to perform their tasks with ease; accuracy means that the output produced by the system is correct; interoperability means that the system can easily interface with other

systems; compliance means that the system complies with the company's best practices, standards, policies and regulations; and security means the system is able to detect and prevent unauthorised access.

- Reliability: “the capability of software to maintain its level of performance under stated conditions for a stated period of time.” Reliability characteristic consists of three sub-characteristics: maturity, which refers to the recurrences of system errors; fault tolerance, which refers to the ability of a system to handle system failures; and recoverability, which means the ability to restore data in case of a failure.
- Usability: “a set of attributes that bear on the effort needed for use and on the individual assessment of such use, by stated or implied users.”
- The usability characteristics consists of the following sub-characteristics; understandability which refers to the users' ability to understand the logical flow of the system; learnability, which refers to the ease with which the system can be learned; operability, which refers to the ease with which the system can be operated; and attractiveness, which refers to the look and feel of the system.
- Efficiency: “a set of attributes that bear on the relationship between the level of performance of the software and the amount of resources used, under stated conditions.” The efficiency characteristic consists of the following sub characteristics: time-efficiency, which refers to the processing times and throughput rates; and resource-efficiency, which refers to the amount of resources used and the duration of use.
- Maintainability: “a set of attributes that bear on the effort needed to make specified modifications.” The maintainability characteristic consists of the following sub characteristics: analysability, which refers to the ease with which system failures can be detected and how much effort is required to detect the fault; changeability, which refers to the ability to configure or modify the system in order to fix a system failure; stability, which means the capability of the system to handle unexpected changes; and testability, which refers to the ability to test system changes.
- Portability: “a set of attributes that bear on the ability of software to be transferred from one environment to another.” The portability characteristic consists of the following sub-characteristics: adaptability, which refers to capability to operate the

system under different environments; installability, which refers to the capability of the system to be easily installed in a particular environment; conformance, which means the conformance of a system with regard to standards or conventions relating to portability; and replace-ability, which refers to the effort to use the system in place of another system.

- The second structure of model of software quality is the quality in use. Quality in use is the user's view of the quality of the system and is measured by the experience of using the system (Bevan 1999). The quality in use model, as presented in Figure 2.17 below, is modelled with four "quality in use" characteristics: effectiveness, productivity, safety and satisfaction.

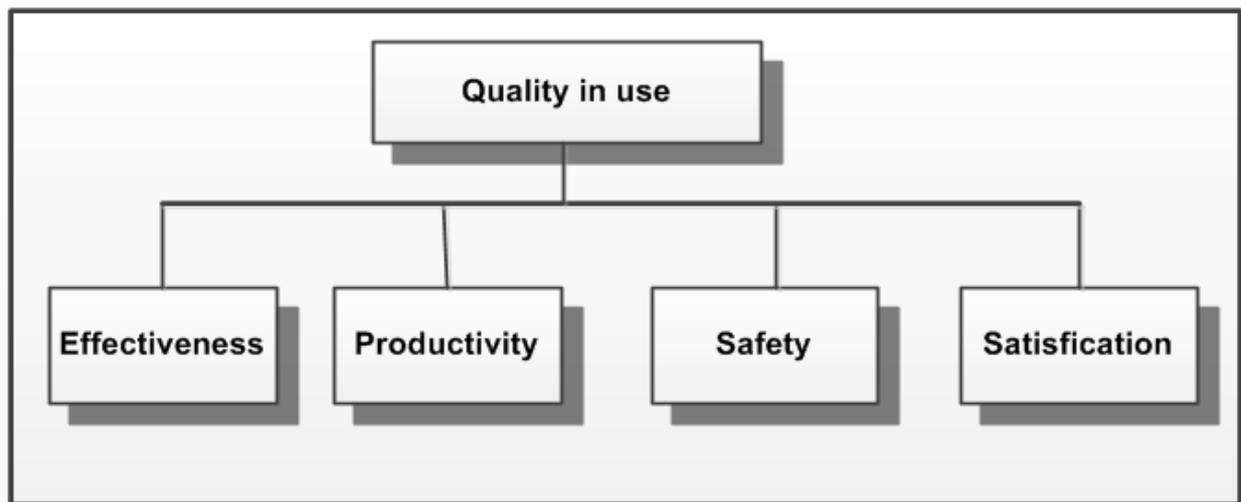


Figure 2.17: Quality model for quality in use (adapted from ISO (2001))

Effectiveness, productivity and satisfaction are influenced by ease of system use, reliability, function ability, usability and efficiency (Bevan 1999). According to Bevan (1996), measures of quality in use can be interpreted in two ways:

- Measures can be used to evaluate different software products or versions of the software.
- Quality in use can be used for improving quality, making changes to the software, hardware and by training the user.

Quality in use can be interpreted as follows (Bevan 1999): measures of effectiveness relate to tasks of user to the accuracy and completeness with which tasks are completed. Measures of productivity relate the level of effectiveness to how

resources have been utilised to achieve stated goals. Common resources include physical effort, mental effort, materials and financial costs. Measures of satisfaction evaluate the comfort and acceptability of the use.

The next section discusses the value that IS brings to business.

## **2.8 VALUE OF IS TO BUSINESS**

The value of IS to business lies in the fact that IS generate information for the process of decision making (Al-adaileh 2009). The decision making function enables businesses to turn financial input into profit in profit-making organizations. Information systems enable the enterprise to improve organisational efficiency and effectiveness and thereby gaining competitive advantage (Irani 2002). According to Irani (2002), the importance of creating robust and responsive IS to support formal business processes and operation is increasing thereby increasing the value of IS.

Effective and secure IS are essential for the efficient, accurate and timely customer billing, creditor and employee payment and effective generation and transmission of power over the national grid (Eskom Integrated Annual Report 2012). Information systems evaluation is emerging and deemed important because most organisations apply IS in their strategic, tactical and operational issues (Delone & McLean 1992).

However, failures of IS remain a major concern for most organisations (Al-adaileh 2009). Since IS initiatives are costly, IS failure is therefore an expensive failure. Due to the high failure rate of IS projects as indicated by the Standish Report (1995), IS evaluation is viewed as a solution to increase success rate of IS initiatives. Table 2.3 below, presents the information technology (IT) success and failure profile report compiled by the Standish Group in 1995. The IT success and failure report shows IS success variables as perceived by IT executive managers.

Table 2.4: IT Success and failure report (adapted from Standish (1995))

<b>Project success factors</b>	<b>% of responses</b>
<b>1. User involvement</b>	15.9%
<b>2. Executive management support</b>	13.9%
<b>3. Clear statements of requirements</b>	13%
4. Proper planning	9.6%
<b>5. Realistic expectations</b>	8.2%
6. Smaller project milestones	7.7%
<b>7. Competent staff</b>	7.2%
<b>8. Ownership</b>	5.3%
<b>9. Clear vision and objectives</b>	2.9%
10. Hard-working, focused staff	2.4%
11. Other	13.9%

The highlighted factors are those that appear in IS success models reviewed in the previous section. The above factors are related to human characteristics (e.g. executive management support, user involvement) where the IS success models have mostly emphasised system characteristics. The inclusion of human characteristics takes into account the human element in the contribution of IS success.

The next section presents a preliminary model of IS success developed based on literature review.

## **2.9 PRELIMINARY IS SUCCESS MODEL**

From the review of literature on IS success models and ISO standards, it is possible to propose a preliminary model of IS success at Eskom. Information systems success models identified factors that determine IS success, and ISO standards identified quality characteristics of software systems. This research study reviewed major streams of IS success literature, namely user satisfaction (Delone & Mclean 1992; Seddon 1997; Delone & Mclean 2003), technology acceptance literature (Wixom & Todd 2005) and ISO quality standards.

Since the preliminary model combines user satisfaction literature, technology acceptance literature and ISO standards of software product, it is viewed as a comprehensive measurement model for evaluating IS success. The preliminary model is presented in Figure 2.18 below. The model consists of eight main constructs and three underlying constructs that represent IS success.

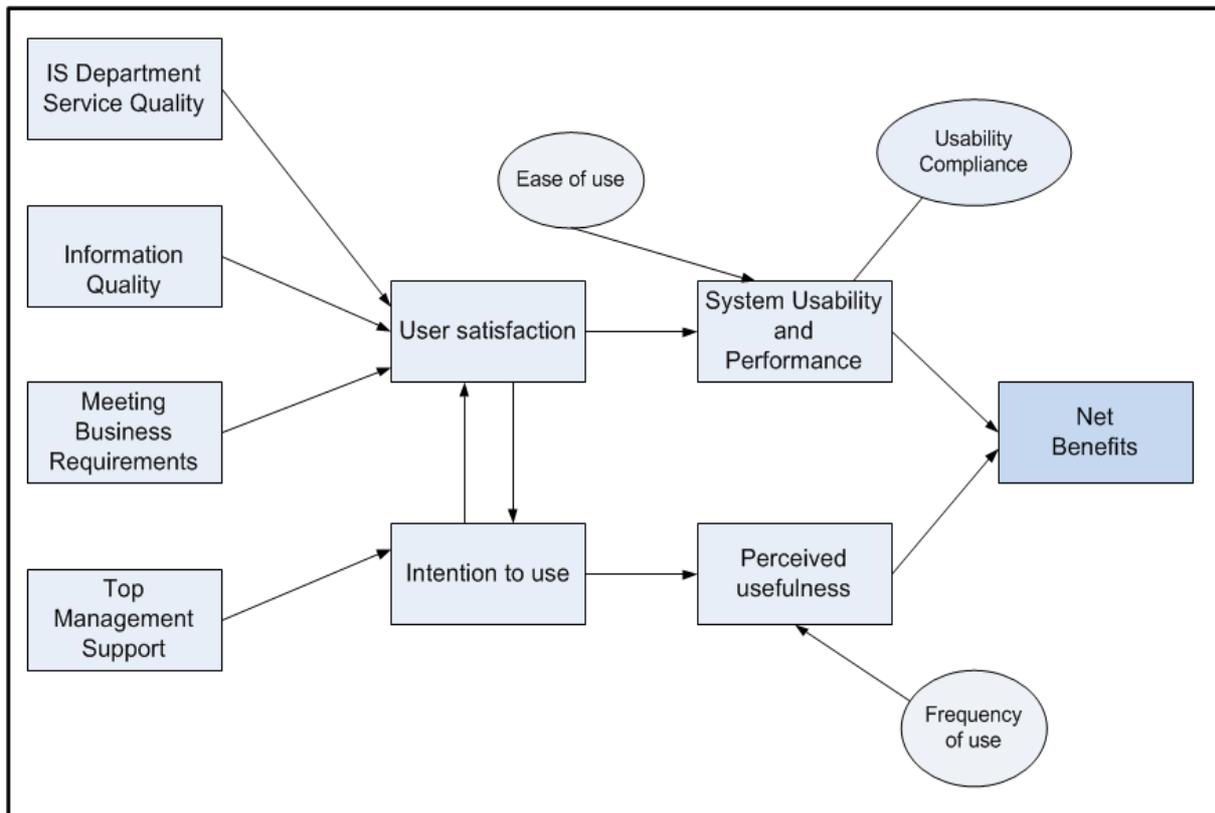


Figure 2.18: The preliminary model of IS Success

Traditionally, IS success measures focus on system characteristics, e.g. system use, but the proposed model goes a step further by incorporating human characteristics, e.g. top management support, and ISO standards for software development. All IS variables with similar names were grouped together under one name.

## 2.10 CONCLUSION

This chapter provided the insight view of how Eskom operates and how IT fits into the Eskom value chain. It also elaborated the functions and importance of IT/IS in organisations. Theories and studies on IS success by other researchers were also covered in this chapter. This detailed elaboration ensures that readers understand

the environment, thereby laying a good foundation for understanding the subject of focus.

Journal articles, internal company documents and books were also reviewed pertaining to IS success in the organisation. This chapter reviewed various established models of IS success as well as ISO standards related to software development. The chapter ends with a proposed IS success model built on existing frameworks.

The next chapter covers the research methodology and design that will be used in this study.

# CHAPTER 3: METHODOLOGY

## 3.1 INTRODUCTION

This chapter clarifies the research model and strategy employed in this study, which the study will follow to develop the proposed IS success model. The philosophical assumptions underlying this research are also described in detail. This chapter also examines the research methodology which consists of the research design, research approach, research process, research method, research technique, data analysis and the validity and reliability of the study. The next section focuses on the research model.

## 3.2 RESEARCH MODEL

As stated in Chapter 1, the primary research question of this study took the following form:

What is needed to construct an effective framework for IS evaluation at Eskom?

The main goal of this research study was to evaluate IS evaluation criteria at Eskom and propose an evaluation framework based on reviewing IS models in the literature and input from selected individuals at Eskom. In addition to the primary research question, the following secondary research questions were raised as well:

- What types of IS success models and theories exist?
- Which constructs are needed to develop a framework for IS evaluation at Eskom?
- What are the effects of the proposed framework at Eskom?

By answering the first three questions, this study will provide a justification for a need for a standardised method for IS evaluation at Eskom. In order to answer the last two questions, the research strategy as outlined in section 3.3 below will be followed.

The next section discusses the research strategy that will be employed to develop the proposed framework.

### 3.3 RESEARCH STRATEGY

To answer questions raised in section 3.2 above, the research strategy presented in Figure 3.1 below will be followed.

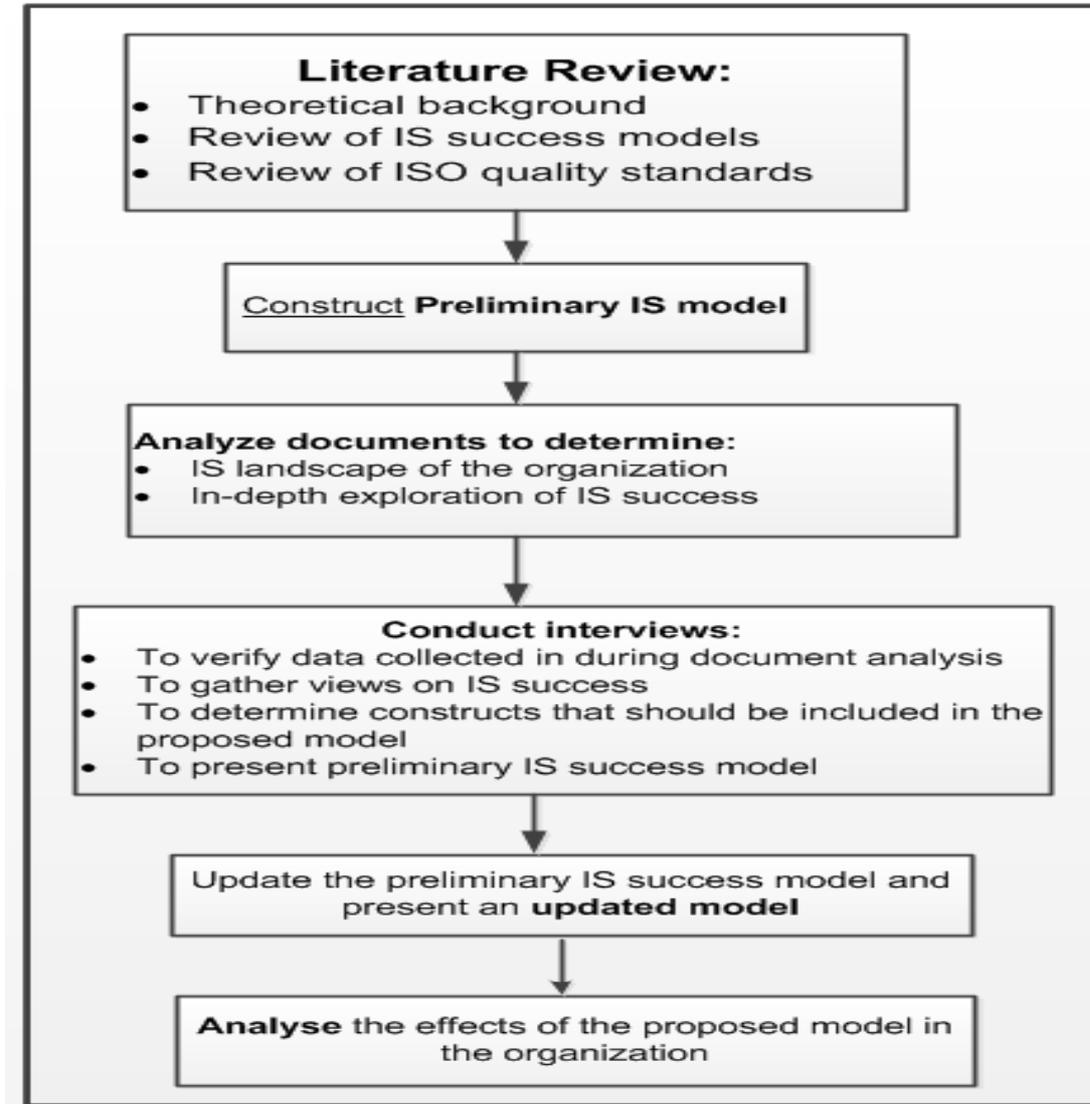


Figure 3.1: Strategy used to develop the proposed model

This section provides a deeper understanding of the process this study followed to develop the proposed IS model as depicted in Figure 3.1 above. The development started with a literature review. This involved conducting reviews of major IS success models and ISO standards related to software development. Thereafter a preliminary IS model for the study was constructed based on review of IS success models and ISO standards. Next, the company documents were analysed to determine the IS

issues and IT landscape in the organisation. Next, interviews were conducted to present the proposed model to participants and seek comments and suggestions regarding the improvement of the proposed model. Next, the model was updated based on document analysis findings and feedback from interviews, resulting in the final model for the study. Finally, the effects of the proposed model in the organisation were also examined.

The next section discusses the research method.

### **3.4 RESEARCH METHOD**

A research method is defined as a strategic way of inquiry which starts from underlying philosophical assumptions and moves to data collection and research design (Myers 1997). Research methods can broadly be classified into two broad categories, namely, qualitative and quantitative.

Quantitative research employs experimental methods and quantitative measures to test a hypothesis so as to make generalisation about a phenomenon (Golafshani 2003). A quantitative researcher typically seeks to predict, test hypothesis and generalise findings (Hoepfl 1997). The purpose of quantitative research is to project results onto the larger population allowing the researcher to make objective generalisations (Borrego, Douglas, Amelink 2009). The main goal of the quantitative research is to “... establish, confirm or validate relationships and to develop generalisations that contribute to theory” (Leedy & Ormrod 2001:102).

On the other hand, qualitative research methods attempt to describe and interpret some human phenomena, often using the interpretation of meaning of research participants (Heath 1997). According to Myers (1997), qualitative research methods are useful in helping the researcher understand the cultural and social context in which people live. In qualitative research a phenomenon is investigated in the view of the study participants. The following are some of the advantages of using the qualitative research method (Johnson & Onwuegbuzie 2004):

- The data is based on the participants’ own understanding of meaning.

- It is effective for investigating a set number of cases in more details.
- It is useful for providing information for each case.
- It is effective for presenting participants' own understanding, interpretation and description of complex phenomena.
- It possible for the researcher to identify the context and the settings in which a phenomenon of interest is occurring.
- In qualitative research, data is normally gathered in a natural environment.
- In qualitative research, it is easy to explore why or how a phenomenon occurs.

Qualitative research methods are not without weaknesses. According to Mays and Pope (1995), qualitative research methods are weak because they are strongly subject to bias of the researcher and also that qualitative research lacks productivity – there is a potential that a different researcher may come to a different finding about the same study. The bias relating to the researcher's subjectivity in collection and interpretation of data can be weakened by using multiple sources of evidence (Miles & Huberman 1984). Both quantitative and qualitative methods use different procedures in carrying out research processes. The fundamental differences between quantitative and qualitative research methods are presented in Table 3.1 below.

Table 3.1: Comparisons between qualitative and quantitative methods (adapted from Mashall (1996:524))

	<b>Quantitative</b>	<b>Qualitative</b>
<b>Philosophical Basis</b>	Deductive, reductionalist	Inductive, holistic
<b>Aim</b>	To test pre-set hypothesis	To explore complex phenomenon
<b>Study plan</b>	Step-wise predetermine	Iterative, flexible
<b>Position of researcher</b>	Aims to be detached and objective	Integral part of research process
<b>Assessing quality of outcome</b>	Direct tests of validity and reliability using statistics	Indirect quality assurances methods of trustworthiness
<b>Measures of utility of results</b>	Generalisability	Transferability

The choice of which appropriate research method to use is determined by the research questions and not by the preference of the researcher (Marshal 1996). According to Marshall (1996), the qualitative method is most useful for answering humanistic “why” and “how” question(s) related to the understanding of complex social issues. The main aim of this research study is to build an IS evaluation

framework at Eskom. In building the proposed framework the central research question for the study is: What is needed to construct an effective framework for IS evaluation at Eskom? This research study adopted the qualitative research method since it is focused on in-depth understanding of phenomena. The next section discusses the research process that will be followed.

### 3.5 RESEARCH PROCESS “ONION”

Choosing of different approaches in this research study was done by using the “onion” research design model developed by Saunders, Lewis and Thornhill (2000). The research process “onion”, as depicted in Figure 3.2 below, comprises of different layers resembling an “onion.” The centre of the research process is the analysis of the collected data (Saunders, Lewis & Thornhill 2000). All the layers of the onions are peeled off until the centre is reached. The first layer to be peeled off represents the research paradigm. The second layer reveals the research approach. The third layer covers research strategy. The fourth layer refers to the research technique used to gather data. The fifth layer examines the data analysis.

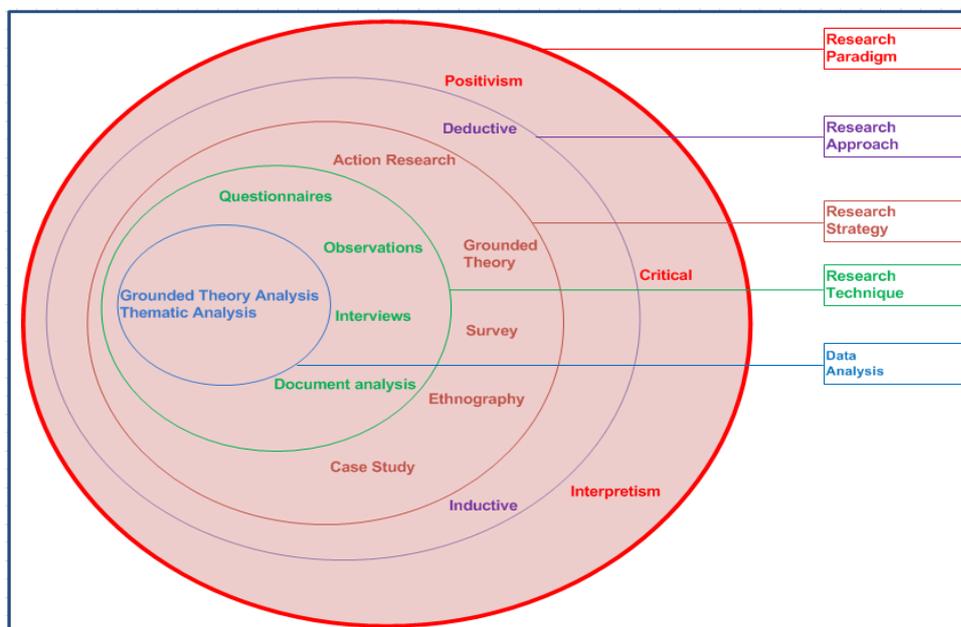


Figure 3.2: Research process “Onion” (adapted from Saunders, Lewis and Thornhill (2000:85))

The three main paradigms that guide researchers are positivism, critical research and interpretivism (Orlikowski & Baroundi 1991). Positivist studies mainly attempt to test

theory in order to enhance people's understanding of a phenomenon of interest. According to Orlikowski and Baroundi (1991), positivist research is concerned with the empirical testability of theories in order to discover the general principles or laws which govern the natural and social world. Information system research is classified as positivist if there is no evidence of propositions, hypotheses and the drawing of inferences about a phenomenon from the sample to a stated population (Orlikowski & Baroundi 1991). Positivist research has been the dominant approach in major IS journals (Walsham 2006), accounting for 96.4% of studies (Orlikowski & Baroundi 1991).

On the other hand, critical researchers take the position that social reality is historically constituted and that it is produced and reproduced by people (Myers 97). A critical research aims at social critique and at being an emancipator, i.e. identifying different forms of social, cultural and political domination that may interfere with human ability (Klein & Myers 1999). A critical research mainly focuses on the oppositions, conflicts and contradictions in an ever-changing society and seeks to help eliminate causes of domination.

Interpretive studies start from the position that what we know about reality, including the domain of human action, is a social construction by human actors (Walsham 2006). In interpretive methods, the researcher uses his or her preconceptions to influence the process of investigation and the researcher interacts with research participants, thereby influencing the perceptions of both parties (Walsham 1995). Interpretive methods attempt to understand phenomena through the meaning people assign to them relying on social constructions such as language, consciousness and shared meanings, and focuses on the participants' cultural and historical context (Orlikowski & Baroundi 1991). In interpretive research, the goal is to gain a deeper understanding of the phenomena being investigated and acknowledge the researcher's own subjectivity as part of the research process (Darke, Shanks & Broadbent 1998).

Regarding the second layer, there are two forms of reasoning, which can broadly be classified into deductive and inductive reasoning. Reasoning is the process of evaluating given information and arriving at particular conclusions that are not

explicitly stated (Goel & Waechter 2004). Thorne (2000) defines reasoning as a way of interpreting and structuring meanings derived from the data.

Deductive reasoning begins with the idea and uses the data to confirm or not confirm the original idea (Thorne 2000). Figure 3.3 below depicts a continuum that represents argument strength. The four points in between indicate individual arguments of differing strength. When a hypothetical high criterion is used, the same continuum proves deductively correct (Rips 2001). The deductive reasoning ends with specific argument to either confirm or not confirm.

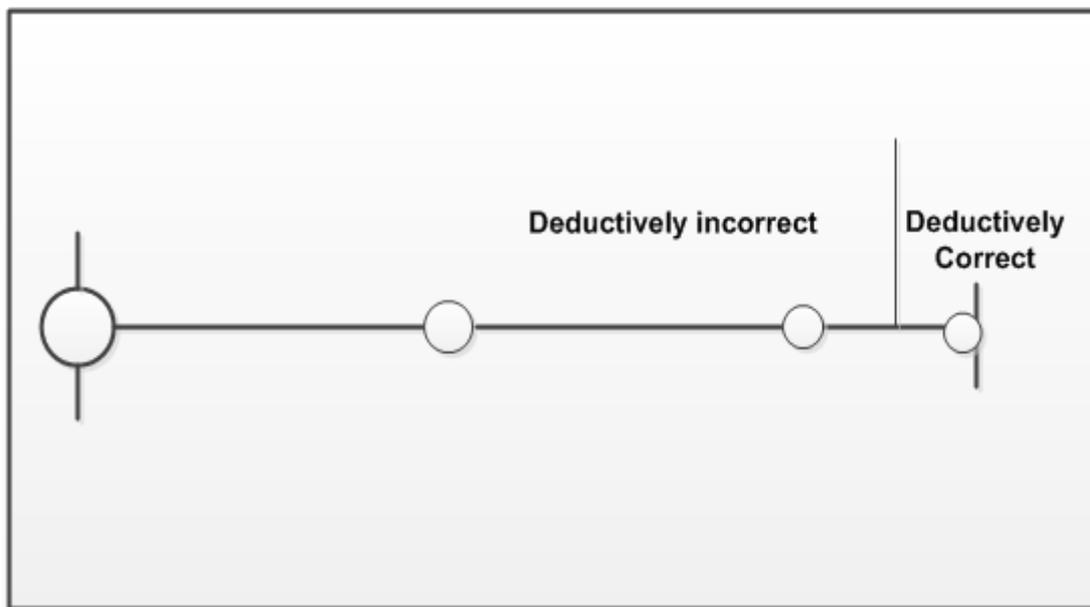


Figure 3.3: Deductively correct continuum (adapted from Rips (2001:130))

On the other hand, inductive reasoning is based on the idea of learning from experience by observing patterns, resemblances, irregularities and associations and projecting them to other cases (Tidman & Kahane 2003). Figure 3.4 below depicts a continuum that is inductively strong from a weak argument and ends up with an argument that is inductively strong and general.

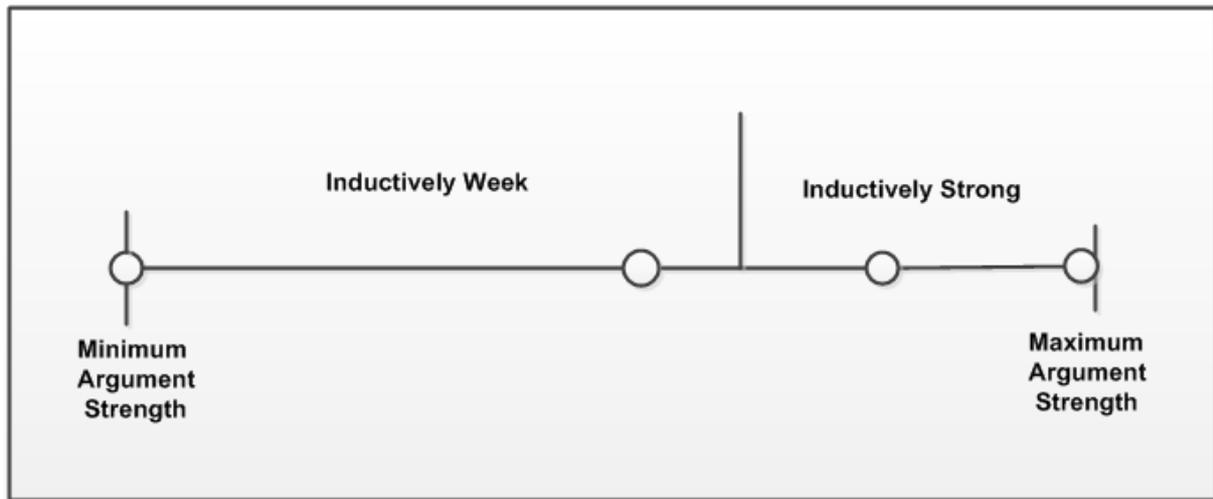


Figure 3.4: Inductively strong continuum (adapted from Rips (2001:130))

Since inductive reasoning involves measuring aspects of a phenomenon under study and then analysing those measurements and making generalisations, this will be the appropriate approach to conduct this research study (Tidman & Kahane 2003).

Moving into the third layer of the “onion”, the researcher had to choose one of these research strategies: survey, action research, grounded theory, ethnography or case study.

A survey is the collection of information from a sample population, usually through questionnaires or interviews (Robson 2002). The survey strategy is usually linked to a quantitative method. The survey method provides a generalisation of the situation at a certain point in time, thereby ignoring the underlying deeper meaning of the data. The survey method has been criticised for being inflexible to discoveries during the collection of data (Gable 1994). Once the work is underway, there is nothing one can do upon realising some important data items have been left out from the questionnaire, or questions are not clear. Due to the survey method being poor in discoverability (explorability), this method will not fit in with the objective of the study which is to explore the phenomena in real live context.

Action research integrates theory and practice by involving researchers and practitioners to work together on a cycle of activities in solving problems (Avison, Lau, Myers & Nielsen 1999). This cycle of activities includes problem diagnosis, action

intervention and reflective learning. Action research approaches are classified into four categories (Avison, Lau, Myers & Nielsen 1999):

- Action research focusing on change and reflection;
- Action research trying to resolve conflicts between espoused and applied theories;
- Participatory action research emphasising participation; and
- Action learning for programmed instruction and experiential learning.

This classification of action research makes this approach more complex and confusing. Due to the action research method being complex, confusing and lengthy, this approach will not be adopted in this research study.

Grounded theory is a general research strategy used to develop theory that is grounded in that data gathered and analysed (Strauss & Corbin 1994). Grounded theory starts with a theory then generates the data from the theory, or if existing (grounded) theories seem appropriate to the area of investigation, then these may be elaborated and modified as incoming data are meticulously played against them. Grounded theory focuses on continuous interplay between data analysis and data collection (Strauss & Corbin 1994). This approach is lengthy as data needs to be generated and analysed continuously. Due to this limitation, this approach would not be adopted in this research study.

Ethnography originated from social sciences and a cultural anthropology discipline wherein an ethnographer is required to spend a certain amount of time in the field (Myers 1997). Ethnographic study is relatively lengthy and requires too much resource to conduct. Due to this limitation, this approach would not be adopted in this research study.

Case study is an approach that uses groups of methods that emphasize qualitative analysis, in which data is collected from an organisation using various methods such as interviews, observations and document analysis (Yin 1984). A case refers to an event, an entity, an individual or even an organisation (Yin 1989) and contains one or more unit of analysis (Yin 2003). Case data is collected from subjects of study i.e.

those from whom the information is sourced (Yin 2003). Case study is intended to focus on a particular issue, feature or unit of analysis; as such it is not intended as a study of the entire organisation (Mohd-Noor 2008). Case study is most useful when a researcher wants to gain in-depth understanding of a phenomenon and its context (Cavaye 1996). In order to evaluate IS success in the real-life context of Eskom, an exploratory case study method was chosen as the appropriate method to conduct this research study.

The next section describes case studies and their applicability in researches.

### **3.6 A CASE STUDY AS A RESEARCH METHODOLOGY**

Case study has been defined differently in the literature. Gerring (2004:341) defines a case study as “an intensive study of a single unit for the purpose of understanding a larger class of units.” On the other hand Yin (1994:13) describes a case study as “an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” and a case study “relies on multiple sources of evidence.” Benbasat, Goldstein and Mead (1987) state that case study is a process for information gathering from entities such as people, groups or organisations and lacking experimental control. This definition of case study emphasises the “context” as part of the study. Case study is conducted in a normal or natural context.

According to Yin (1981), experiments differ from case study because they deliberately separate a phenomenon from its context where factors can be controlled. Yin (1981) also argues that historians differ from case studies because they are interested in the phenomena of the past, where informants may not be available for interview or events available for observation. According to Marshall and Rossman (2010), it is important for the researcher to specify the intent of the study – its purpose. The statement of the intent informs the reader what the study is likely to accomplish. Table 3.2 below presents seven types of case studies used in researches and their definitions. According to Baxter and Jack (2008), the choice of a particular type of case study is informed by overall study purpose.

Table 3.2: Different types of case studies (adapted from Baxter and Jack (2008:547))

Case Study Type	Definition
Explanatory	This type of case study would be used if you were seeking to answer a question that sought to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies (Yin 2003).
Exploratory	This type of case study is used to explore those situations which the intervention being evaluated has no clear, single set of outcomes (Yin 2003).
Multiple-case studies	A multiple case study enables differences within and between cases. The goal is to replicate the findings across cases. Since comparison will be drawn, it is imperative that the cases are chosen carefully so that the researcher can predict similar results across cases or predicts contrasting results based on a theory (Yin 2003).
Intrinsic	Stake (1995) uses the term intrinsic and suggests that the researcher who has a genuine interest in the case should use this approach when the intent is to better understand the case. It is not undertaken primarily because the case represents other cases or because it illustrates a particular trait or problem but because in all its particular and ordinariness, the case itself is of interest. The purpose is NOT to come to understand some abstract construct or generic phenomenon. The purpose is NOT to build theory (although that is an option; Stake (1995)).
Instrumental	This type of case study is used when trying to accomplish something other than understanding a particular situation. It provides insight into an issue or helps to refine a theory. The case is secondary interest; it plays a supportive role facilitating our understanding of something else. The case is often looked at in depth, its contexts scrutinized, its ordinary activities detailed and because it helps the researcher pursue the external interest. The case may or may not be seen as typical of other cases (Stake 1995).
Collective	Collective case studies are similar in nature and description to multiple case studies (Yin 2003).

This research study adopted an exploratory case study in order to explore the IS success at Eskom in real-life context. According to Darke, Shanks and Broadbent (1998), case studies help the researcher in various ways. First, case studies can be used to provide descriptions of phenomena to develop and test theory. Secondly, case studies are useful in developing understanding of the interactions between information technology innovations, IS development, implementation, usage and organisational contexts. When used in this way, case studies enable the capturing and understanding of context when studying a phenomenon of interest. The distinct strength of case studies is its ability to deal with both quantitative and qualitative evidence including documents, artefacts, interviews, questionnaires and observations (Yin 1984). Case studies also have the following characteristics and strengths:

- Case studies are useful for gaining a full view of a specific subject of interest or series of events;
- Case studies use many sources of evidence, thus providing a full picture of a phenomenon of interest;

- Since case studies use multiple cases, they are useful for making generalisations which can lead to replication;
- Case studies allow the researcher to study phenomena in its natural setting, learn about the state of the art in information systems and generate theories from practice. Thus, a case study method allows the researcher to understand the nature and complexity of the process taking place;
- Case studies are suitable for studying contemporary events and it is not necessary to control behavioural events or variables; Single case studies are most suited for exploring an unknown phenomenon; and
- Multiple case studies are desirable when the objective of the research is to describe a phenomenon, build theory and test theory (Yin 1984; Benbasat, Goldstein & Mead 1987; Yin 1998; Mohd-Noor 2008).

Case studies are not without weaknesses. Case studies have been criticised for being subjective and producing findings that cannot be generalized across different settings (Patton & Appelbaum 2003). According to Miles and Huberman (1984), bias relating to the researcher's subjectivity in collection and interpretation of case data can be weakened by using multiple sources of evidence. This triangulation of data strengthens the case study, by having multiple sources measuring the same phenomena.

According to Darke, Shanks and Broadbent (1998), triangulation of data sources assists in correlating information provided by different research participants in order to check for conflicting accounts and actions. Another criticism of case study is that it cannot be generalised in the meaning of being representative of a population. A counter-criticism is that statistics is not the only way of achieving knowledge as conclusions can be drawn without statistics and they may be interpreted and related to other cases (Runeson & Host 2009). According to Benbasat *et al.* (1987), case studies are suitable for IS studies for three reasons:

- The researcher can study IS in its natural settings, learn about the state of the art and generate theories derived from practice.

- The case study method allows the researcher to answer “How” and “Why” questions related to the phenomena of interest and thus gain an in-depth understanding of the process taking place.
- The case study method is appropriate to conduct research in a research area where few studies exist; therefore, resonates with the context of IS, since new research topics keep emerging. This is an important step in empirical research.

The next section describes steps to be undertaken in order to undertake a proper case study research.

### **3.6.1 UNDERTAKING A CASE STUDY**

Patton and Appelbaum (2003) suggest five sets of activities to be undertaken in order to conduct a proper and useful case study:

- Determine the object of study: This step involves identifying the direction the case will take. The object of the study should be explicitly described so that the area of focus will be understandable.
- Select the case: The researcher should select a case that is related to the object of study.
- Building initial theory through a literature review.
- Collecting and organising the data gathering: Data gathering is done so as to avoid information overload. Data is collected through methods such as interviews, document analysis and observations. It is important that the collected data relate to the object of the study.
- Analysing the data and reaching conclusions: Due to the potential of information overload, analysing data is important in order to identify patterns, determine meanings, draw conclusions and build theory. After analysing the data, findings can be presented.

According to Mohd-Noor (2008), the first step in conducting a case study starts with conducting a literature review on the topic of focus. This might involve doing interviews, document analysis and getting expert opinions on the topic being studied. The next step involves formulation of a theoretical framework to form structure for the

study. Figure 3.5 below shows steps to be followed when formulating a theoretical structure. This is followed by selection of the cases and construction of sets of questions to be used in the interviews. Next cases are conducted, then data analysis before drawing conclusions.

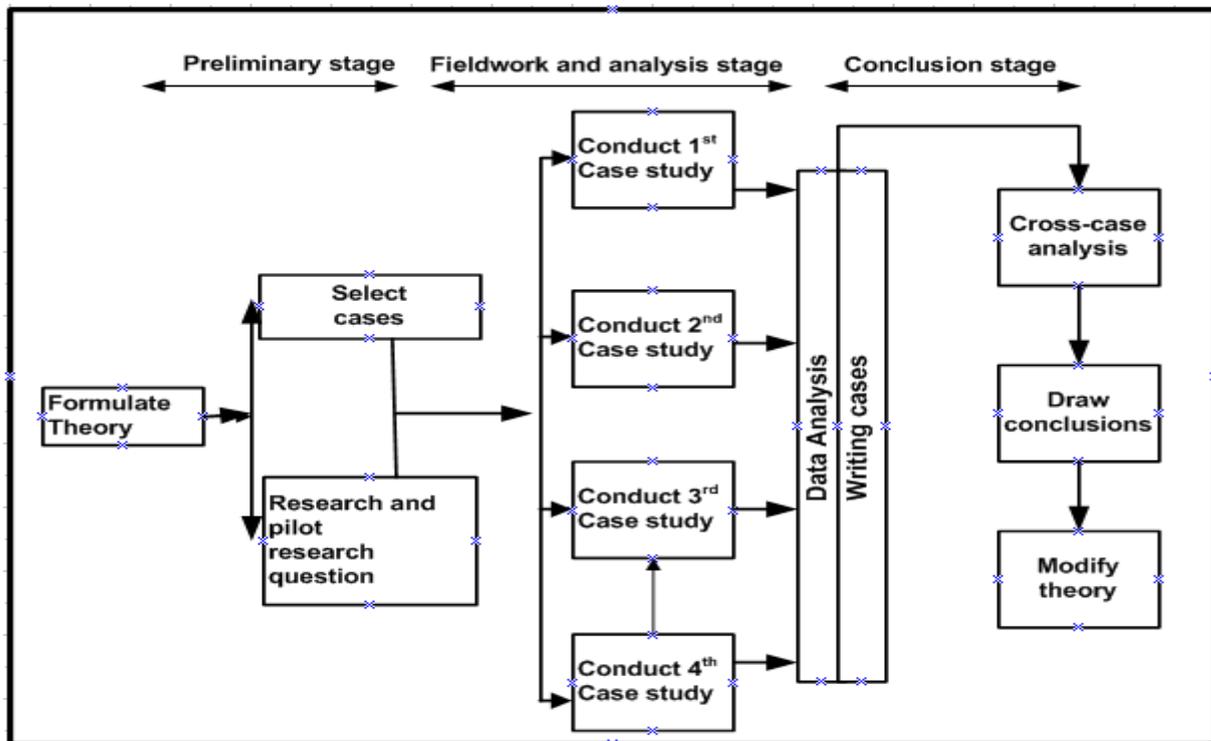


Figure 3.5: Case study research steps (adapted from Mohd-Noor (2008:1603))

The next section describes various options available for reporting a case study research.

### 3.6.2 REPORTING A CASE STUDY

The quality of the case study is judged by its reporting of the research findings based on written material (Runeson & Host 2009). According to Baxter and Jack (2008:555), the main aim of a report is “to describe the study in such a comprehensive manner as to enable the reader to feel as if they had been active participants in the research and can determine whether or not the study findings could be applied with which phenomenon is occurring as well as the phenomenon itself.” However, case study reports tend to be large since case studies are based on text data and reasoning and linking of observations to conclusions (Runeson & Host 2009).

Case study reports usually have a range of audiences including peer researchers, academic colleagues, policymakers, practitioner professionals, research supervisors and examiners, research sponsors, and the general public (Rowley 2002). This inevitably leads researchers to tailor-make their reports for different audiences. In the context of this research, the main audiences of this report are IS executives, IS managers, user managers, academic supervisors and examiners. A case study report should contain a set of characteristics, namely (Runeson & Host 2009):

- Introduce the study in a clear and concise manner.
- Articulate the studied case clearly.
- Present a trail of inquiry in the subject so readers can see what has been done in the subject area.
- Present information in a structured form to enable the reader to accept the conclusions as reasonable.
- Communicate the researcher's conclusions and set them into the right context.

There are several structures for reporting case studies. The six types of structures for reporting case studies can be distinguished based on Runeson & Host's (2009) classification:

- Linear-analytic; this is a common report structure that begins with the research problem, then moves to review of related work, specifying the research methods to be employed, conducting analysis of data and drawing conclusions.
- Comparative; this structure is characterized by repetition of the same case to compare different perspectives and explanations.
- Chronological; this structure is mostly used in longitudinal studies.
- Theory-building; this structure presents the case by building a theory then present evidence to back up the theory.
- Suspense; this structure is the reverse of linear-analytic structure as It first reports conclusions and then presents evidence to back up the conclusions.
- Un-sequenced; this structure is most suitable for reporting general characteristics of specific cases.

In the context of this study, linear analytic structure will be adopted. Linear analytic structure starts with problem statement, review of literature on the topic and methods

employed to gather, organise, analyse and draw conclusions from findings. This structure fits with the objectives of this study, which are to build a framework for IS information systems at Eskom.

The next section discusses the unit of analysis.

### **3.6.3 UNIT OF ANALYSIS**

Miles and Huberman (1994:25) define a unit of analysis as “a phenomenon of some sort occurring in a bounded context.” The main objective of this research study is to evaluate factors that determine information systems success and build an evaluation IS framework. The unit of analysis is the individual since the study is concerned with individual perception of IS success in the context of Eskom.

Back to the research “onion”, the fourth layer reveals the research technique. The following research techniques were available for use in this research study: observation, questionnaires, interviews and document analysis.

Observation involves observing the phenomena of interest in the real-life environment to construct information which cannot be obtainable by other research techniques (Mohd-Noor 2008). Observation is expensive, time consuming and needs a high degree of concentration. This study aims to gain an understanding through participants’ viewpoints. Due to this limitation, this technique was not adopted in this research study.

Questionnaires are another research technique that available for researchers. Questionnaires are normally administered online or presented in paper form with a set of questions that respondents are expected to answer (Adams & Cox 2008). Questionnaires are most effective when the researcher wants to get more information from large audiences. Reaching out to large audiences also means that there would more data needs to be coded and analysed (Adams & Cox 2008). Questionnaires are impersonal in nature and do not allow the researcher to probe for more information and gain in-depth understanding. Due to these limitations, questionnaires were not adopted in this research study.

Another research technique used in researches is document analysis. Before explaining what document analysis is, it is important to first explain what a document is? A document is any stored information or data, including writings, oral testimonies or photographs (Caulley 1983). Document analysis refers to the analysis of documents with the aim of collecting information (Pershing 2002). Document analysis uses documentary evidence for cross-validation of data gathered from interviews. As a result, document analysis was adopted in this study. Document analysis also provided guidelines in assisting the researcher with interview questions (Mohd-Noor 2008). Documents used in this study include published and unpublished documents, literature review, annual reports, memos, charts, graphs and physical artefacts. The corroboration of multiple qualitative research techniques for this exploratory case study strengthens the validity and reliability of the findings.

According to Pershing (2002), document analysis has several strengths as a research technique: data collected from documents in most cases is more credible than information obtained from interviews, questionnaires or observations, because the data is viewed as evidence; it is a good technique for gathering retrospective information and yields direct data on an organisation's actual work; it can be used to gather certain types of information such as background documents or company reports; and it may be the only way to obtain certain types of information and it is relatively effortless and inexpensive.

In addition to document analysis, interviews were also adopted in this study. Interviews refer to an exchange of views between one or more research participants on a subject of mutual interest (Kvale 1996) and allow the researcher to collect data through conversations. Kajornboon (2005) states that interviewing is a way to collect data and gain knowledge by getting participants involved and talk about their views. According to Gray (2004), using interviews as a data collection method is encouraged when there is a need to obtain personalized data; there are opportunities required for probing; and a good return rate is important. Table 3.3 below presents three major types of interviews.

Table 3.3: Interview types (adapted from Runeson and Host (2009:146))

Type	Focus	Type of Question	Interview Objective
Unstructured	How individuals qualitatively experience the phenomenon	Interview guide with areas to focus on	Explanatory
Semi-structured	How individuals qualitatively and quantitatively experience the phenomenon	Mixed of open and closed questions	Descriptive and explanatory
Fully Structured	Researcher seeks to find relations between constructs	Closed questions	Descriptive and explanatory

The semi-structured interview is the main source of data collection in this study. Semi-structured interviews offer adequate flexibility to approach different respondents differently while sticking to the same themes, issues and questions (Kajornboon 2005; Mohd-Noor 2008). The strength of the semi-structured interview lies in the fact that the researcher can prompt and probe deeper into a situation to gain more understanding of a phenomenon (Kajornboon 2005). This resonates with the point stated by Patton (2002:343) that semi-structured interviews allow for the ability to “... explore, probe and ask questions that will elucidate and illuminate that particular subject ... to word questions spontaneously.” Since everything cannot be written down, interview conversations were recorded to avoid missing key details. Each recorded file was saved using the interviewee’s name.

The next section discusses the manner in which interviews were conducted.

### 3.7 CONDUCTING INTERVIEWS

One-on-one interviews were conducted and recorded on a tape recorder. The notebook was used to record thoughts, questions and links between issues. Interviews were selected ahead of questionnaires because they allow the researcher to probe for more information. Critical answers were followed up as suggested by Kvale (1996) by testing the interviewee’s accuracy and probing for more information. Interviews were conducted in the interviewer’s work environment. The questions were then compared with the research problem, to ensure that the data would contribute to the understanding of the research problem (Ghauri & Gronhaug 2005).

An interview schedule was drafted based on the research problem and used as a reference in the event that some relevant issues were not covered.

The next section discusses the interview schedule.

### **3.8 INTERVIEW SCHEDULE**

The interview schedule was structure into three sections, namely standard questions, presentation of the preliminary model and other suggestions for improvement. These sections are described below in detail:

- Standard questions.

Respondents' views and their perceptions of IS success were focus points for the questions. This was an area that needed critical questioning. The researcher needed to establish the thought process for this behaviour. For a list of standard questions refer to Addendum B.

- Preliminary model.

Preliminary IS success model in Figure 2.18 was presented to the interviewees. Interviewees were asked to offer suggestions for improvement to the proposed model.

- Other suggestions for improvement.

Interviewees were asked for suggestions, recommendations or general improvements.

Reaching the fifth layer of the research "onion" is data analysis. For this study, selecting an overall data analysis method was a choice between grounded theory analysis and thematic analysis.

Grounded theory analysis is a qualitative analysis approach that emphasises theory as the by-product of the research (Strauss & Corbin 1998). According to Lacey & Luff (2001), the grounded theory process of analysis goes through a lot of recurring procedures, resulting in a cumulative process that involves frequent revisiting of the

data as new ideas emerge while data collection progresses. Grounded theory qualitative analysis is a very complex, detailed and lengthy process. Due to this limitation, this approach would not be adopted in this study.

Another data analysis method is thematic analysis. Thematic analysis is a method that seeks to code textual data provided by research participants and analyse it to identify themes and meanings. Braun and Clarke (2006:6) define thematic analysis as, “a method for identifying, analysing and reporting patterns (themes) within data. It minimally organises and describes your data set in (rich) detail.” Thematic analysis also interprets various aspects of a research topic (Boyatzis 1998). Thematic analysis, according to Braun and Clarke (2006), captures the experiences, meanings and the reality of participants and examines various ways in which events, realities, meanings and experiences are the effects of the operation in organisations. This research study adopted thematic analysis as data analysis method.

Braun and Clarke (2006) note that thematic analysis provides a more detailed account of one particular theme or set of themes within the data, relating to a specific question or phenomenon of interest. The data analysis and coding process was conducted following the steps as suggested by Braun and Clarke (2006):

- Familiarising yourself with your data; writing down ideas, producing initial transcriptions.
- Searching for themes; identifying themes that emerge from the data.
- Review themes: compare themes with transcription, grouping similar themes together.
- Defining and naming themes: continuously refining, naming and describing themes.
- Producing the report: this section involves producing final analysis of the data extracts, which includes direct quotes by respondents to back up the theme selection.

This study adopted Miles and Huberman’s (1994) model for the thematic analysis process. The model, presented below in Figure 3.6, consists of three concurrent stages of data analysis, namely: data reduction, data display and data conclusion-drawing/verification.

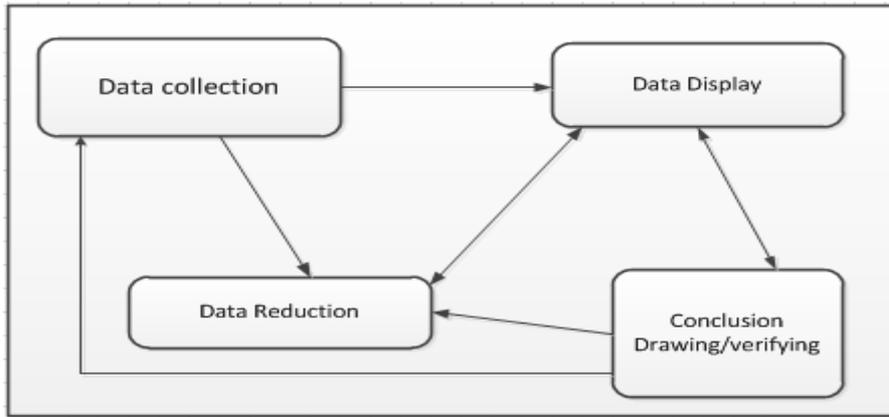


Figure 3.6: Components of thematic analysis process (adapted from Miles & Huberman (1994:12))

Data reduction involves selecting and breaking up data into small units and transformation of data (Miles & Huberman 1994). This stage involves developing new ideas and deciding what should be included in the data display (Miles & Huberman 1994). Data display refers to the analysed and summarised information that allows construction of conclusion and action (Miles & Huberman 1994). The final stage of this process involves re-arranging concepts and ideas by developing findings and structure of the data results from the displayed data (Miles & Huberman 1994).

Figure 3.7 below presents the research “onion” again but with specific options adopted in this research study.

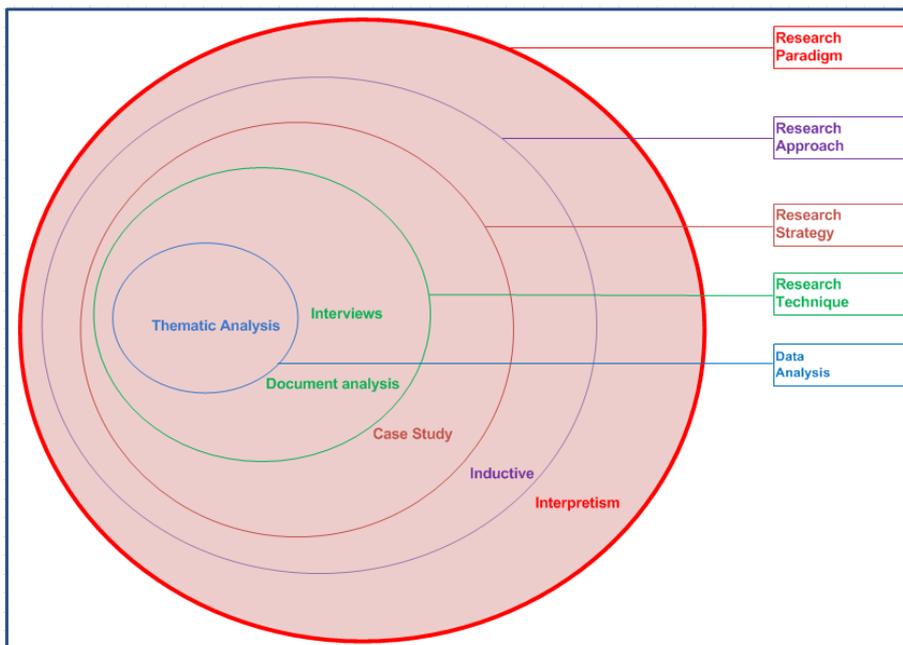


Figure 3.7: Research “Onion” for this study

### **3.9 ACCESS TO SITE OF STUDY**

This section describes the challenges the researcher faced in gaining entry into the field of study and securing access to the study participants. Devers and Frankel (2000) state that access to the study site should be secured by requesting permission from the “gatekeepers.” Gatekeepers are individuals or organisational personnel responsible for a specific function or department that a researcher wishes to study (Devers & Frankel 2000).

In the context of this research, the study site is the researcher’s own place of work. Access to the site was requested by writing a request to the Eskom chief information officer (CIO). This was followed by a meeting with the CIO where the researcher further explained the purpose of the study, its benefits to the organisations and made a formal request to conduct the research at Eskom.

Permission to conduct research study at Eskom was granted by CIO (refer to Addendum B). The permission was granted also in terms of accessing company documents such as annual reports, intranet, and communiqués and archived data. This gave the researcher access to the data that was sought and also to arrange interview sessions with selected participants. Another thing that also helped was the personal contact the researcher had with some top managers at Eskom. The next step was to identify sites and potential participants. Since the researcher understands the environment better having worked in the organisation for more than six years, sampling was done to identify the study samples.

The next step was to develop a relationship with participants of the study and contact them via telephone and email requesting their participation. This was important as the participants needed to be free so that they could provide the necessary information without feeling threatened. According to Devers and Frankel (2000), getting to know people in the organisation and establishing rapport are more important than data collection in the initial stage of the research project. Rapport was established based on guidelines for establishing rapport as suggested by Devers and Frankel (2000) which include the following:

- Helping out to the extent possible;
- Accommodating routines;
- Being humble but knowing when to share knowledge; and
- Showing interest in conversations even when it is not relevant to the subject of focus.

The next section discusses the reliability and validity of research.

### **3.10 RELIABILITY AND VALIDITY OF RESEARCH**

- **Reliability**

Thomas (2006:81) defines reliability as the “degree to which the variables are consistent with what they are supposed to be measuring”. Since raw data is collected in an unstructured form like tape recordings or transcripts of interviews, test of reliability was ensured by maintaining records of interviews and documenting the data analysis process in detail (Mays & Pope 1995). The reliability of the methods used is important in qualitative research as that demonstrates that the researcher used methods that are reproducible and consistent (Lacey & Luff 2001).

- **Validity**

Validity of a research entails the trustworthiness of the research findings, the extent of the validity of the findings and that the findings are not biased by the researchers’ subjective point of view and interpretation (Runeson & Host 2009). According to Lacey and Luff (2001), the validity of data interpretation is achieved when the findings represent the truth. Validity is mainly concerned with whether the research instruments are accurate and are measuring what they are meant to measure (Golafshani 2003). There are different ways to measure aspects of validity and threat to validity. In the main, validity is measured by the accuracy with which an account represents the data collected (Lacey & Luff 2001). The four aspects of measuring validity and threat to validity are explained based on Yin’s (2003) classification scheme:

- Construct validity, this aspect of validity checks the extent that measures studied represent what the researchers have in mind.
- Internal validity, this aspect of validity is of concern when causal relations are evaluated. This kind of validity checks if there is a third party factor that affects the investigated factor. If the investigated factor is affected by a third party factor, there is a threat to validity.
- External validity, this aspect of validity is concerned with the extent to which findings can be generalised and the extent to which the findings are of interest to other people. The measurement of external validity also checks the extent to which the findings are of relevance to other cases.
- Reliability, this aspect is concerned with the extent to which the data and analysis are dependent on the specific researcher(s). If another researcher conducted the same study, the findings should be similar. A threat to validity in this instance is, for instance, if interview questions are not clear or vague.

All the factors help ensure validity and reliability of a research whose results can be trusted. However, all these factors occur in different phases of the research including data collection, composition and data analysis. Table 3.4 below, illustrates phases where these factors occur (Rowley 2002).

Table 3.4: Test for quality of empirical social research (adapted from Rowley (2002:21))

Tests	Case Study tactic	Phase of research in which tactic occurs
Construct validity	Use multiple sources of evidence	Data Collection
	Establish chain of evidence	Data Collection
	Have key informants review draft case study report	Composition
Internal validity	Do pattern matching	Data analysis
	Do explanation building	Data analysis
	Do time series analysis	Data analysis
External validity	Use replication in multiple case studies	Research design
	Use case study protocol	Data collection
Reliability	Develop case study database	Data Collection

This research study used various ways to improve validity of this research study. The methods used to improve validity included triangulation as described in Section 3.11

below, the research designs were reviewed by peer researchers, collected data and findings were reviewed by case subjects, each case was thoroughly analysed and negative cases were also adequately analysed (Runeson & Host 2009). Analysis of negative cases involved identifying patterns and trends and considering situations and cases where that does not fit with the patterns and trends (Patton 1999).

The next section discusses triangulation, a method of demonstrating validity and reliability in qualitative research.

### **3.11 TRIANGULATION**

One of the strengths of case studies in contrast to other methods is that evidence can be collected using both quantitative and qualitative data (Rowley 2002), a concept known as triangulation. Triangulation means collecting data from multiple sources to gain an in-depth understanding of the phenomena under study (Lacey & Luff 2001). The use of different sources enables the corroboration of the same fact or finding (Rowley 2002), thereby providing a broader and richer picture (Runeson & Host 2009). Triangulation is another way of showing reliability and validity in a study. Four different types of triangulation based on Patton's (1999) classification are as follows:

- Data (source) triangulation: triangulating data sources involves comparing and cross-checking the consistency of information derived at different times and by different means within the qualitative methods. This method involves: comparing observational data with interview data; comparing what people say in public with what they say in private; checking for the consistency of what people say about the same thing over time; and comparing the perspectives of people from different points of view.
- Investigator triangulation: this method involves using multiple as opposed to one observer. Having multiple observers analyse the same data and compare their findings reduces interpretive bias.
- Methodological triangulation: this method involves comparing data collected through some kinds of qualitative methods with data collected through some quantitative methods.

- Theory triangulation: this method involves using different theoretical perspectives to look at the same data set, using alternative theories or viewpoints.

To enhance the reliability and validity of the collected data, this study used data triangulation. Data triangulation was used in this study as two data collection methods were used, namely, interviews and document analysis. Combining interviews and document analysis is desirable in fieldwork because studies that use one method is vulnerable to errors linked to that particular method e.g. loaded interview, bias or inaccurate responses, rather than studies that use multiple methods (Patton 1999).

The next section discusses the research population and sampling.

### **3.12 RESEARCH POPULATION AND SAMPLING**

A study's population refers to the unit of analysis such as events, individuals or organisations from which data can be gathered (Parahoo 1997). Since it is not practical or ethical to study the whole population, selecting a study sample is a fundamental step in a research study (Marshall 1996). According to Marshall (1996:522), the size of the sample "is determined by optimum number necessary to enable valid inferences to be made about the population."

The target population for this study is 43 000 employees of Eskom (Eskom Integrated Annual Report 2013). The sample will comprise mainly of employees working in IT/IS including chief information officers, executives, general staff, project managers and end users. This resonates with the suggestion by Devers and Frankel (2000) of seeking cases that are rich with information i.e. individuals, groups or organisations with most insight into the subject of focus. Sampling in qualitative research involves determining which individuals to study and making decisions about study parameters including settings, contexts, locations, times, events, incidents, activities, experiences and social processes (Onwuegbuzie & Leech 2007).

The two broad categories of sampling are random sampling and non-probability sampling (Marshall 1996). Random sampling is a sampling technique in which the nature of the population is defined and all members have an equal chance being

selected. Studying a random sample provides an opportunity to generalise the results to the population (Marshall 1996) but is not the most effective method to develop an understanding of complex human issues. Thus, random sampling is not suitable for qualitative research where the intention is to gain deeper understanding of a phenomenon. Random sampling is not an effective method in qualitative researches because choosing a participant at random might ignore informants that would provide more insight (Marshall 1996). Due to this limitation, random sampling was not adopted in this study.

In this research study, the sampling method that was adopted was non-probability sampling and judgemental (purposive). Non-probability sampling is non-random and subjective and each member does not have a known non-zero chance of being included (Cooper & Schindler 2003). In a judgemental sample the researcher actively selects the most productive sample to answer the research questions. In the context of this study, a judgemental sample will be well suited since the purpose is “... to identify specific groups of people who either possess characteristics or live in circumstances relevant to the social phenomenon being studied” (Mays & Pope 1995:110). The main goal is to have informants that are information rich and who could provide more insight into the subjects of focus. A total of 8 participants were selected. Table 3.5 below presents the sample of the study.

Table 3.5: Sample of the study

Category	Group IT
Executive IS manager	2
Senior IS manager	2
Middle IS manager	2
End-users	2

The sample was selected taking into account the experience of working in an IS driven environment. The selected participants were IS executives, IS managers, user managers and end users across all Eskom divisions. The participants were selected by their positions relevant in answering the appropriate research questions.

The next section discusses the role of data analysis.

### 3.13 ROLE OF DATA ANALYSIS

The goal of data analysis in interpretive studies is to produce an in-depth understanding of the context in information systems and how these systems interact with the context (Darke, Shanks & Broadbent 1998). According to Darke *et al.* (1998), the ultimate aim of the data analysis is to explain the phenomena of interest based on the interpretation of the data. Data analysis involves organising, summarising and analysing masses of data generated by interviews, document analysis and literature reviews into a format that a reader can make sense of.

Since data is collected in large volumes in a qualitative case study, data analysis is important in order to reduce and organise data to provide a chain of evidence for the conclusions (Runeson & Host 2009). Data analysis was done simultaneously with data collection as supported by Miles and Huberman (1994), who argue that data gathering and analysis should closely follow each other to allow for flexibility in data collection procedures, so that the research can adapt to new ideas and patterns which may change. All qualitative data analysis follows similar steps during the analysis process (Lacey & Luff 2001):

- Transcription: this process involves writing up summary notes from tape recorded interviews. Non-verbal gestures may be included.
- Organising your data: after transcription, data was organised into easily retrievable and accessible sections. Each script was given an interview code for identification purpose.
- Familiarisation: this process involves the researcher listening to tapes of the recorded interviews. Reading the material, taking notes and making summaries.
- Coding: this involves construction of the main ideas or concepts in the interviews.
- Themes: this process involves the identification of themes or developing concepts.

The transcripts of the recorded interviews were coded following the thematic analysis process and data analysis guidelines as outlined above. The findings of the data analysis were sent to the participants for verification. To enhance the reliability of the

analysis, transcripts were sent to an independent assessor and comparison of the ratings was made (Mays & Pope 1995).

### **3.14 CONCLUSION**

This chapter presented the research methodology adopted in this research study. Research onion was used to present alternative research methods and justification for each choice was made. The three research paradigms that influence researchers were presented, namely positivist, critical and interpretivism. Interpretivism was found to be suited to this study. Moreover, an exploratory qualitative case study methodology was a well-suited approach to conduct the study.

## **CHAPTER 4: DATA ANALYSIS**

### **4.1 INTRODUCTION**

The preliminary IS success model for this study and methodologies applied in this study were discussed in Chapter 2 and 3. Chapter 2 presented literature of IS success models. Chapter 3 presented the justifications of the decisions for choosing different research methods. The purpose of this chapter is to present and discuss the analysis, findings and interpretations of the data analysis. In order to construct a comprehensive model, qualitative data was collected through document analysis and interviews. All interviews were recorded with the permission of the interviewees for transcription purposes. Interviews were conducted one-on-one with each interview lasting between 30 and 45 minutes.

All data collected was analysed using the thematic analysis technique in order to identify categories, themes and patterns. The purpose of data analysis was to extract meanings from the data and present data in a form that can be interpreted and applied. The data analysis process was discussed in more detail in Chapter 3, thus, the purpose of this chapter is to present the findings and interpretations of that analysis.

### **4.2 ISSUES COVERED BY RESEARCH TECHNIQUES**

This section covers the objective of each research technique in more detail. Two research techniques were employed in this study, namely, document analysis and interviews.

#### **4.2.1 DOCUMENT ANALYSIS**

Documents that were available to the public and internal documents were examined. Among documents that were examined include Eskom Integrated Annual Report and Group IT Business Plan. Eskom Integrated Annual Report is available on the Eskom website and has the following objectives (Eskom Integrated Annual Report 2013):

- To set out an in-depth, contextual view of the company’s overall performance for a specific year. Eskom year-end is a period between 1 April and 31 March of the following year.
- To outline business operations, review challenges faced by the company over the past and how the company has overcome them or plans to mitigate those challenges.
- To present Eskom’s assessment of the period ahead.
- To report on qualitative and quantitative issues arising in the financial year that impact on Eskom’s business operations and strategic objectives.

Audiences of the Eskom Integrated Annual Report are the company’s stakeholders. Eskom’s stakeholders include its employees, the government of SA, parliament, lenders, analysts and investors, industry experts, academics and the media, business groups, civil society and non-governmental organisations and suppliers and contractors (Eskom Integrated Annual Report 2013). Eskom uses certain methods to interact with different stakeholders. Table 4.1 below presents the method that Eskom uses to interact with various stakeholders.

Table 4.1: Methods adopted by Eskom to interact with stakeholders (adapted from Eskom Integrated Annual Report (2013))

Stakeholders	Method of interaction
Employees and unions	Provincial employee engagement; policies; collective bargaining practices; pre- and post-interim and annual results; regular meetings.
Government, parliament and regulators	One-on-one meetings, appearances at parliamentary portfolio committees; Eskom websites; monthly, quarterly and annual reports; annual general meeting; industry associations and task teams; site visits and public hearings.
Lenders, analysts and investors	Roadshows; meetings; annual and interim reports; results presentation; webcasts; annual general meeting; site visits; Eskom websites; teleconferences.
Customers	Formal presentation website; roadshows; company announcement and reports; site visits; quarterly forums.
Industry experts, academics and media	Industry associations and task teams; forums and committees; emails and Eskom websites; interviews; roadshows; quarterly briefings; company reports; articles.
Business groups, civil society and non-government organization	Roadshows; annual results presentation; community forums; stakeholder forums; peer educators; industry partnership; wellness campaigns and HIV/AIDs awareness; skills development programmes; advertising in local newspapers.
Suppliers and contractors	Roadshows; one-on-one meetings; preferential procurement programmes; open days; contracts and service agreements; workshops; presentations; training; project steering.

In addition to Eskom Integrated Annual Report, Eskom Group IT Business Plan was also scrutinized. Eskom Group IT Business Plan is a detailed business plan that outlines Eskom's IT strategy, IT sourcing strategy and IT initiatives (Eskom 2012). Eskom Group IT Business Plan is available on the Eskom intranet and has the following objectives (Eskom 2012):

- To align IT initiatives with Eskom Group's strategy and Eskom values in order to assist Eskom in achieving its strategic objectives.
- To outline the opportunities and challenges facing information and communication technologies.
- To present Eskom IT plans and initiatives in the pipelines.
- To present Eskom's IT landscape and infrastructure.

Audiences of the Eskom Group IT business plan are the Eskom Group IT's stakeholders. The main stakeholders of the Eskom Group IT business plan are Eskom business units, SA government, state-owned enterprises and the SA public (Eskom 2012). Document analysis included analysing company documents such as Eskom newsletters, emails, minutes of meetings and annual reports.

#### **4.2.2 INDIVIDUAL INTERVIEWS**

In addition to document analysis, data collection included individual interviews at different Eskom offices. The primary research technique used to gather data for this study was the interviews. The interviews were used to gather data regarding perceptions of IS success from different stakeholders. The participants that were interviewed included executive IS managers, senior IS managers, middle IS managers, project managers, user managers and end users. Summary of the themes and objectives of interviews is presented in Table 4.2 below.

Table 4.2: Research interview themes and objectives

Interviewees	Reflection	Main Themes	Subthemes
Middle Manager: Information System;	From your own perspective, how would you define a successful IS?	IS success perspective	To determine the values that are placed on IS.
	What are the most significant indicators of IS success?	Key IS success	To determine the current methods used.
Senior Manager: Enterprise Architecture;	What is the success rate of IS initiatives?	IS adoption level	To determine the acceptance level of IS.
Executive Manager: Information System	What are the most significant indicators of IS success.	Interventions that are needed	To determine criteria used to deem IS successful.
Senior Manager: Information System Production;	What can be done to improve the success of IS initiatives?	Barriers to IS	To determine factors that can improve IS success.
Project Manager: Information Systems;	What are the qualities of a good Information System?	Characteristics	To identify key indicators of IS success.
User Manager; and	What are the most important Information Systems success factors?	Key success factors	To determine the most important IS success factors from participants' perspective.
End users.	Which systems do you use at work environment?	Tools used	To determine the user's experience regarding the use of IS.
	What elements of the system do you consider most important?	Positive system features	To identify features and functions that users value the most
	If you can change anything about the system what could it be?	Improvement opportunity	To determine features and functions users would want to be added on the systems they currently use
	Preliminary IS success model	Preliminary IS success model developed in Figure 2.18 was presented.	The preliminary IS success model presented in Chapter 2 Figure 2.18 was presented to the interviewees. Interviewees were asked suggestions for improvement of the model.
	General: suggestions and comments	General views and suggestions.	General suggestions were sought about other elements or factors that could improve the model

### 4.3 INTERVIEW FINDINGS

A total of eight stakeholders were interviewed individually (face-to-face) with each interview lasting for about 30 to 45 minutes per stakeholder. The stakeholders who participated in the interviews included executive IS managers, senior IS managers, middle IS managers, project managers, user managers and end users. The interviewees were chosen using purposive sampling as explained in Chapter 3 in order to get a good representative sample on the participants' perspectives of IS success. Middle IS managers and end users were interviewed in the company's boardrooms, while executive IS managers and senior IS managers were interviewed in their offices. Table 4.3 below presents the process the interviews followed.

Table 4.3: Research Interview process

#	Activity	Description
1	Standard question	Respondent's views and their perceptions of IS success were focus points for the questions. This was an area that needed critical questioning. The researcher needed to establish the thought process for this behaviour. For a list of standard questions refer to Addendum B.
2	Presentation of preliminary IS model	Preliminary IS success model presented in chapter 2 Figure 2.18 was presented to the interviewees. Interviewees were asked to make suggestion for the improvement to the proposed model.
3	General comments and other suggestions for improvement	Interviewees were asked for suggestions, recommendations or general comments.

The main goal of interviews was to gain understanding of IS success through the perspective of the participants. The interview process followed the interview schedule as presented in Chapter 3 section 3.8. It must be noted that all interviewees chose to remain anonymous. Interviewees were also asked to identify other success variables not included in the preliminary IS success model.

As explained in Chapter 3, this study adopted thematic analysis as a data analysis technique. The interviews findings were used to identify categories, themes and subthemes. Categories helped in discovering and arranging ideas, expanding the understanding of ideas and concepts and clarification. After identifying categories, themes and subthemes were established. The three categories that emerged from the findings are people, technology and organisational characteristics.

Analysis of the data resulted in the emergence of three main themes namely, human characteristics, system characteristics and organisation factors. Table 4.4 below presents categories, main themes and subthemes and the researcher's reflection. Researcher's reflection is the researcher's own views, experience and feelings regarding the analysis of the data. Direct quotations by participants to justify each category, theme and subtheme were included.

Table 4.4: Categories, main themes and subthemes relating to participants' experiences

Categories	Main Themes	Sub-themes	Reflection
<p><b>Category 1: People.</b> The people category captures the critical role people play within information system. Introduction of IS means adjustment to how people perform their daily task. Information systems should be centred on customer needs of people instead of IT needs. This study identified that if IS solution are developed in isolation from people factors IS success will be affected. Special care should be taken to address the needs of people when undertaking IS initiatives.</p> <p>The involvement of various people including users, management, sponsors and other stakeholders can positively influence IS success. This stance was clearly supported by participants as shown by the following comments below:</p> <p><i>"To achieve information systems success three issues need to be looked at. First, People issues; this entails the issue of change management, getting buy-in from everyone is going to affect by the change..." Participant 2.</i></p>	<p><b>Theme 1: Human characteristics.</b> This theme is related to human aspect of IS success. A well-designed system should not only satisfy system aspect of IS success, it should also satisfy human aspect too. Satisfying both human and system aspect results in a unified system. Human characteristics have been found to be influencing IS success as humans develop and operate information systems. So, humans ultimately make IS functions</p> <p>Human characteristics include an individual's attitude, values, culture, behaviour. Human characteristics are key aspects of information systems as human design, develop and operate IS to drive value in the organisation. The comments below by participants statements bear testimony to the above mentioned statements:</p> <p><i>"Expectations of company stakeholders may directly impact on system success. So the management of stakeholder and sponsor is important in order to manage their expectations of system success." Participant 3</i></p>	<p><b>Sub-theme 1: Usability.</b> User sub-theme captures the ease with which a user is able to perform tasks on the system. The comments below by participants is proof of this:</p> <p><i>"A good system will let users perform their task with ease and minimal effort and that's the ultimate aim of the system; to let users perform their tasks " Participant 7.</i></p> <p><b>Sub-theme 2:</b></p> <p><b>User involvement:</b> Involvement of users in activities like training and testing will improve help to reduce fear and well as uncertainty. The following comments by participants confirm the statements above:</p> <p><i>"User participation in the system development team will surely improve user buy-in in the new system and users will also feel valued by participating in the project" Participant 6.</i></p>	<p>People factor in information system is important since the introduction of IS comes with new ways of doing things. When people think of IS, they mostly think about system aspect of it. Human aspect of Information systems is also important as human interact with IS to achieve particular tasks. Humans are an integral part of IS, by prioritizing human factors, users will find the system easy to use leading to user acceptance.</p> <p>To improve IS success, a user-centred approach needs to be adopted. Information systems should not be developed in isolation from the users. Involvement of users holds the key to success of IS. One way of making users participate in the new solution is through involving them in workshops, user forums and testing. This also will allow social interactions among team members and assist in building relationships.</p>

Categories	Main Themes	Sub-themes	Reflection
<p>"The participation of people in information systems project is important as this will ensure the approval of the solution or systems. This will also facilitate the signing off of business requirements and change requests because people will be aware of the change" Participant 5.</p> <p>"User participation is important. system development team should include members of user community..." Participant 6.</p> <p>"... our user satisfaction level increased from 84% to 97% because we moved from IT centric solutions to customer centric solutions" Participant 3.</p> <p>People play a central role in the success of information systems as emphasised by participants In the statements above. The key to IS success lie in addressing issues related to people. System design objectives should strive to address the people factors that can negatively impact IS success.</p>	<p>"... at the end of the day, human make things happen, technology let things happen" Participant 8.</p> <p>"A system is used by users, so meeting the needs of users is important because success of information systems is what its users perceive it to be" Participant 7.</p> <p>"Users' attitudes can also hamper system success especially in an organisation like Eskom where you have people who have been in the organisation for a long long time and are afraid of change" Participant 7.</p> <p>It is clear from the above statements that human needs should be given particular attention in order to improve IS. Humans hold the key to IS success, as such human aspects of IS success should be prioritized. Information system designers should prioritize human factors when developing systems.</p>	<p>"The participation of people in information systems projects is important..." Participant 8.</p> <p>User involvement makes users feel valued in IS projects, thereby leading to IS acceptance.</p> <p><b>Sub-theme 3: Meeting business requirements.</b> Meeting business requirements in terms of producing features and function as specified is perceived as the ultimate measure of IS success. The quotes by participant below confirm this:</p> <p>"Firstly, we need to determine why we need a system. We need a system to meet some form of requirement. So IS success is about meeting specific requirements of the business." Participant 1.</p>	<p>Focusing enough efforts on stakeholders' needs enables the IS department to provide customer centric service in contrast to IT centric service. Customer centricity leads to IS that is service orientated that an organisation can then use IS to drive value. The relevant stakeholders in IS include users, management, system sponsors and IS professionals.</p> <p>Interviews findings revealed the importance of embedding and managing the people dynamics when dealing with changes related to IS. The key to making IS success does not lie in technology but in people. Therefore, people are an integral part of IS effectiveness. The adequate measurement of IS success must address all the relevant stakeholders' perspectives.</p>

Categories	Main Themes	Sub-themes	Reflection
<p><b>Category 2: Technology.</b></p> <p>The technology category captures the role technology plays in enabling information systems functions as it related to its role at Eskom. Technology category includes hardware and software used to transform business process into a form that makes business run efficiently.</p> <p>To ensure IS success, the system should not only be designed in terms of human characteristics, technology factors should also be taken into account. Technology factors relate to how the IS would fit into existing IT infrastructure work environment, organisational culture, business process and work practices. Comments below by participants are proof of the above mentioned statements:</p> <p><i>"New technologies should easily fit into existing IT infrastructure and adhere to certain standards and best practices adopted by Eskom."</i> Participant 2.</p>	<p><b>Theme 2: System characteristics.</b></p> <p>This is the main theme that emerged in this category. This theme relates to system aspect of IS success. Systems aspects include system features, look and feel of IS, response time, system reports, ease of use etc. For IS to be successful it should include both human and system aspects. Humans have certain expectations of IS success and those expectation can be addressed by system behaviour.</p> <p>System factors entail those factors that are related to the technology itself e.g. system performance, system reliability, user-friendliness. Technology facilitates the way in which people work by automating business process. The statements below serve as evidence:</p> <p><i>"System success is all about having all the requested functions and features that enable users to perform their tasks."</i> Participant 8.</p>	<p><b>Sub-theme 4:</b></p> <p><b>Availability.</b> Availability of system was a major issue for most interviewees. The following statements back this claim:</p> <p><i>"System availability is critical in the energy sector as unavailability could affect transmission of powers which could result in interrupted supply or even load shedding."</i> Participant 6.</p> <p><b>Sub-theme 5:</b></p> <p><b>Adherence to standards.</b> Adherence to standards, procedures, best practices and applicable legislation is important.</p> <p><i>"Eskom has adopted certain standards and best practices to manage and control its operations e.g. Cobit, ITIL, so adherence to this standards is non-negotiable"</i> Participant 2.</p>	<p>The primary objective of information systems is to automate routine processes that would otherwise have been manually performed. Factors related to technology encompasses the technology aspect of IS success related to the technology itself.</p> <p>Information systems rely heavily on technology to execute business processes and work instructions. Information systems should easily fit into existing IT infrastructure. Thus, focusing on technology factors will results in efficient and effective IS. System aspects of IS success gathered from interviews include The following: system availability, scalability, adherence to standards and benefit realisation. When developing information systems the above mentioned factors must be taken prioritized.</p>

Categories	Main Themes	Sub-themes	Reflection
<p>Focusing on technology factors enables an organisation to produce well-designed IS that support existing business processes. The importance of focusing on the technology factors of IS success was supported by participants who stated the following comments:</p> <p><i>"... In Eskom, we heavily rely on systems to achieve our objectives, so a system has to work for you. If it doesn't work for you it is worthless"</i> Participant 1.</p> <p><i>"The success of the system depends on three factors, technology, people and the environment"</i> Participant 2.</p> <p>Technological factors were viewed by participants as the significant factors that could inhibit or enhance IS success. For IS to be considered successful it should satisfy users in terms of having relevant functionality and features.</p>	<p><i>"Successful system has to be robust, responsive and be dynamic to respond to changes in the operating environment"</i> Participant 3</p> <p><i>"... systems are now designed with users' needs in mind so that it can be easy to use and provide all the required functionalities"</i> Participant 3.</p> <p><i>"For me the way an application is designed, its look and feel, features and ease of use are key issues that need to be addressed for system to be considered successful"</i> Participant 7.</p> <p>It is clear from the above statements that system characteristics focus more on the needs of end-users. For IS to be effective, it should address the needs of users in terms of what they expect the IS to do for them. System characteristics should be incorporated into the design of information systems in order to improve IS success.</p>	<p><b>Sub-theme 6: Reporting.</b> This sub-theme entails the ability of the system to produce accurate reports. The quality of the system is measured by the reports it produces. The stance is supported by participants as shown by comments below:</p> <p><i>"Transparent and quality reporting is important for Eskom, so a system should be able to produce a high level of reporting..."</i> Participant 4.</p> <p><i>"Eskom is obliged to share information with various stakeholders including the SA government, lenders, rating agencies, analysts, investors, industry experts, media, suppliers and contractors. So the quality of reporting should always be beyond reproach"</i> Participant 4.</p>	<p>Addressing the system aspect of IS will lead to a high level user satisfaction, since users measure system success based on system aspects. The automation of business processes is achieved by addressing the systems aspect of IS success.</p> <p>To meet the needs of business and the expectation of users, technological design of IS should focus on system aspects of IS success. Focusing on systems aspects of IS success facilitates automation of business processes in such a way as to reduce routine work and increase efficiency of the organisation. This will also ensure the IS has all the functions and features that will enable users to perform their task to optimise cost and save time.</p>

Categories	Main Themes	Sub-themes	Reflection
<p><b>Category 3:</b> <b>Organisation characteristics.</b> The characteristics of the organisation relate to its business practice, style of leadership and corporate culture and values. The organizational characteristics may inhibit or enhance information systems success. To ensure IS success, an organization needs to share with its employees company values, mission, IT strategy and strategic objectives.</p> <p>Shared values and mission enable the organisational stakeholders to strive together to achieve a common goal. The management style that encourages participative environment is desirable in order to ensure success of IS projects. The top management should clearly explain how the introduction of IS will enhance organizational performance. The comments by participants is proof of the above mentioned statements:</p>	<p><b>Theme 3: Organisational factors.</b> Organisational factors encompass organisational-related issues that impact on the success of IS. Organisational factors provide an environment where people interact with systems and technologies to achieve certain business objectives. Organisational factors include factors such as corporate culture, resources, processes, business practices, policies and design of work environment.</p> <p>Organisational factors create an enabling environment for information systems implementation by way of providing resources and thereby preparing people for the change process. The provision of resources creates an environment where all stakeholders can work together with a view to achieve common goals to meet organisational objectives. Organisational factors significantly influence IS success by providing a conducive environment.</p>	<p><b>Sub-theme 7:</b> <b>Senior management support.</b> Support of top management is important for the success of IS. Top management support is demonstrated by providing resources such as funds, manpower, in-house and vendor based training and hardware and software. The following comments below support the above statements:</p> <p>“... senior management can demonstrate support by providing funding and resources” Participant 3.</p> <p>Top management support should be continuous and sustainable. One way of demonstrating support is by attending workshops, road shows and training sessions.</p>	<p>Factors related to business environment play a significant role in IS success. One such factor related to the nature of the organisation itself. The other factor is adherence to standards, procedure and best practices adopted by the organisation. Organisational factors create a favourable environment for IS success by providing resources such as expertise, funds, hardware and software and approving training programmes.</p> <p>Top management support and ownership of the project is crucial right from the inception of a project to the end of a project. The sponsor commitment and involvement of senior management in projects is key for the success of project.</p>

Categories	Main Themes	Sub-themes	Reflection
<p>"An organisation should create a conducive environment where the needs of the people are aligned with technology in order to facilitate IS implementation " Participant 2.</p> <p>"One of our values includes innovation and innovation is more visible in information technology as way a way of developing new ways of working. Eskom is currently exploring mobile technologies space to see how it can improve its interaction with customers" Participant 4.</p> <p>"It is important for the leadership team to share their IT vision with staff so that everyone can see the impact of IT in the organisation" Participant 3.</p> <p>Organisational characteristics play a key role in improving IS success. The characteristics of the organisation need to be aligned with its mission and values and be shared to all stakeholders. The management style that is open and transparent is desirable as employees will be informed about IS initiatives and prepare themselves for change process.</p>	<p>The quotes below by participants serve as testimony to the above statements:</p> <p>"Management needs to encourage user participation in IS project. Participation by users brings excitement and social interaction thereby increasing the chances of system acceptance and success" Participant 8.</p> <p>Participants also expressed the desire to have regular training workshops:</p> <p>"It is important to have training sessions whether in-house or vendor based in order to familiarize yourself with the system" Participant 7.</p> <p>The main objective of introducing information systems is to increase efficiency and contribute to organizational performance. Thus, organisational factors such as training resources, funding and leadership provided by management teams are critical for IS success. These factors are integral to the success of IS as they provide an enabling environment for IS to strive.</p>	<p><b>Sub-theme 8: Change Management.</b></p> <p>The introduction of IS brings about new ways of working, hence the change management is important. Change management is done through justification of the change and clear communication of the change process and activities. The following comments below are proof of this:</p> <p>"Communication of the change and how the change is going to benefit individuals and the organization as a whole is important" Participant 3.</p> <p>"In Group IT we have regular employee engagement sessions to keep employees informed about our IT initiatives" Participant 3.</p> <p>It is important for management to clearly state how the change is going to benefit users and the organisation at large.</p>	<p>Equally important as well is the readiness of employees to embrace the change process. Senior management needs to raise awareness throughout the organisation or affected business units so employees are aware of the change process. The benefits of the change process and its impact need to be explained to all relevant stakeholders. Users are mainly concerned with how the change is going to firstly benefit them and second how it is going to benefit the organisation. This process needs to be clearly communicated.</p> <p>Awareness should be in the form of communication that justifies the change process and the impact the change will bring in the organisation. Lack of proper change management will potentially lead to resistance to change, thereby impacting on IS success. Typical, users are interested in how the change will benefit them and management in how it will benefit the organization.</p>

## 4.4 SUMMARY OF INTERVIEW RESEPNSES

The one-on-one interviews gave the researcher an inside view of the research findings. The responses gathered from interviews were used to generate categories, themes and sub themes as explained in section 4.3 above. The interviews findings revealed that IS success can be improved by measuring the system in terms of technology, human and organisational characteristics and are summarised as follows:

Human characteristics play an integral part in the success of IS since people operate and use IS to achieve their tasks. An organisation can achieve certain benefits by focusing on human characteristics of IS success. Potential benefits which can be achieved include the following:

- User satisfaction; designing easy to use interfaces with all the features and functions as specified will lead to a greater level of user satisfaction and IS acceptance.
- Reduced user errors; a huge amount of user errors is caused by non-involvement of users during the development of IS. Participation of users will significantly reduce a large portion of human errors.

System characteristics assist in improving the effectiveness and efficiency of the characteristics related to the technology. A thorough understanding of system characteristics will assist stakeholders to consider which attributes of the system should be included in the business requirements. For the system to be used effectively, it is important to focus on system characteristics as a major design objective. An organisation can achieve certain benefits by focusing on system characteristics of IS success. Potential benefits which can be achieved by incorporating system aspects of IS success include the following:

- Improved system acceptance; a well-designed system that is easy to use and that has all the functions and features specified can increase its acceptance by end-users and management.

- System availability; system availability is critical as Eskom relies on stable IT/IS to deliver its services. System unavailability may result in injury, death or significant loss of revenue, which will also result in reputational damage.
- Improved quality of service; quality of service by IS service provider is also important. Service quality is measured by the ability of the IT department to attend to and resolve customer queries, turnaround times and customer care.
- System usability; a system that is easy to use, supports business processes and work activities will result in a high level of user-friendliness and user satisfaction.
- Process accuracy; a well-designed system will result in more accurate execution of processes for high quality results.
- System flexibility; a system that has increased flexibility to adapt to changing conditions, customer needs and changes in regulations.
- Cost reduction; a well-designed system will require minimal change requests and as a consequence results in cost reduction and savings.

Organisational factors include those attributes that are related to organisation that could potentially affect IS success. One organisational factor that could affect IS success is top management support. The support of top management should not only be given during project implementation but should be on-going and all-encompassing. The introduction of IS brings new ways of doing things and the support of senior management is needed to manage the change process. Senior management can also support IS projects by attending the training and actually using the system. The support of top management can result in the following benefits to the organisation:

- A well-managed change process; the introduction of a new IS brings about new ways of working in organisations. This could lead to resistance by end-users if there is a lack of management support. Senior management could also help by providing communication and justification of the system purpose. Senior management support will help facilitate the change management process by way of communication, engaging employees and participating in activities relating to the change process.

- Provision resources; organisational resources such as funds, human resources and hardware/software will enhance the success of IS.
- Provision of training; end user training allowing users to get involved in the IS implementation. Users will learn the features and functions of the IS. The involvement of users will reduce resistance to change and accelerate IS acceptance.
- Adherence to standard; this entails the capability of IS to comply with organisational standards, policies, procedures and conventions relating to usability and best practices.

The next section discusses general comments and suggestion made by participants.

## **4.5 COMMENTS AND GENERAL FEEDBACK**

In addition to interview questions depicted in Table 4.2, the participants were also asked to suggest improvements to the proposed model of IS success. The following IS constructs were suggested by the interviewees for inclusion in the proposed model:

- Benefit realisation

Benefit realisation encompasses the delivery of quantifiable and meaningful business benefits to the organisation. Benefit realisation focuses on how a business area could benefit from a change associated with the introduction of new capabilities provided by IS. Potential benefits for implementing IS are operational improvement and cost savings. Operational improvements include process efficiency, responsiveness and throughput, system reliability and system usability. Cost savings include cost of training, hardware and software and cost associated with change requests and enhancement.

- Data and report quality

Quality of data is important as poor data quality could lead to incorrect reporting. Data and report quality is related to information quality. Having high quality information will result in data integrity and quality reporting.

- System usability

System usability as defined by ease of use, ease of access and user-friendliness leads to user satisfaction. Usability reflects the quality of the system. Potential benefits of system usability include enabling users to perform their tasks with ease thus improving their job performance. From a business perspective usability improves productivity, increases sales and customer satisfaction. Unusable IS may lead to more changes, more enhancement and requires a lot of support.

The next section presents the updated IS success model.

## 4.6 UPDATED IS SUCCESS MODEL

The data analysis provided evidence that the preliminary IS success model presented in Chapter 2 Figure 2.18 needed to be updated. Based on the interviews findings it was possible to update the preliminary model. The model presented in Figure 4.1 below is an update of the preliminary IS success model presented in Chapter 2 Figure 2.18. The updated model incorporates new understanding gained from the interview process.

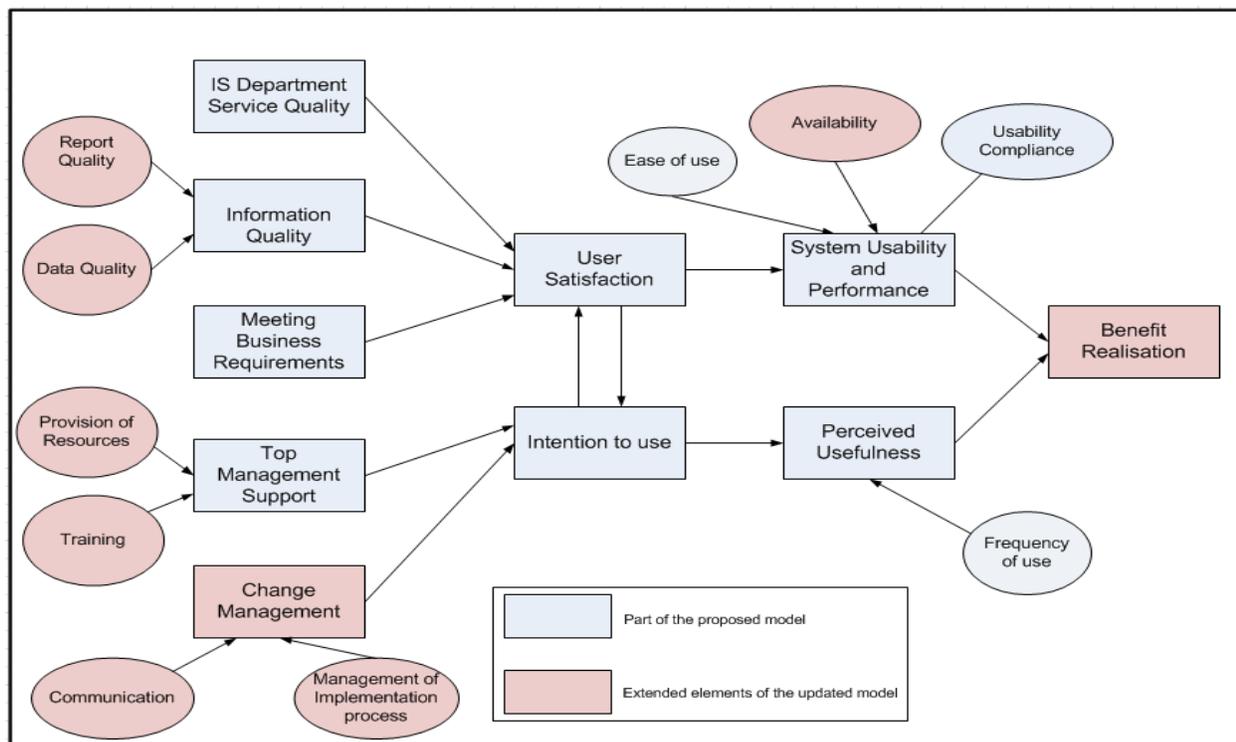


Figure 4.1: Updated IS Success Model

The extension of the preliminary model included adding new IS success constructs to the model. The extension of the model included adding two constructs and seven underlying constructs. The following additions were made to the preliminary model:

- Constructs 'report quality' and 'data quality' were added to the construct information quality;
- Constructs 'provision of resources' and 'training' were added to top management support;
- Construct 'availability' was added to construct 'system usability and performance';
- Construct 'change management' was added with underlying constructs 'communication' and 'management of the implementation process'; and
- Construct 'benefit' was renamed 'benefit realisation'.

The next section examines all items of the updated IS success model presented in Figure 4.1 and also the interpretation of the model.

## **4.7 EXAMINATION AND INTERPRETATION OF THE UPDATED IS MODEL**

The updated IS success model presented in Figure 4.1 resulted in the following IS success constructs:

**IS department service quality:** service quality is a key indicator of IS success (DeLone & Maclean 2003). In addition to product development and operation of information systems, IS departments now have more responsibilities including software and hardware installation, software development, training and information center services (Pitt, Watson & Kavan 1995). Therefore, the quality of IS department's service as perceived by its users is a key indicator of IS success. Service quality is associated with reliability, responsiveness and technical knowledge of IS staff providing the service (Delone & Mclean 2003).

**Meeting user requirement:** meeting user requirements of the users is a key issue in IS as it relates to meeting the needs of the users. According to a study by Elpez and Fink (2006)

that ranked IS variables by importance, meeting user requirements was ranked high by participants. Meeting user requirements is a good indicator of IS success (Wateridge 1998).

**Top management support:** information system development and operation is management's responsibility, therefore top management commitment is important. Management support involves the following factors (Seen, Rouse & Beaumont 2007): providing resources such as funding, facilities and ongoing support related to training, system modifications; change management i.e. communication of the system's purpose in case of system implementation, how it will benefit the organisation and management's response to staff questions; and leading by example by actually using the system and being involved in certain aspects like training and workshops.

**Information quality:** Information quality refers to the quality of IS's output. Information quality is measured by the data quality and the quality of reporting. For IS to be deemed successful it should contain reliable data sets and be able to produce quality reports. Thus, the quality of information the IS contains is important. Information quality can also be measured by accuracy, timeliness, usability and reliability of information.

**Change management:** the introduction of IS brings about new ways of doing things in the organisation. Change management is the process that facilitates the change process by managing the change process and communicating the change. Communication of the change includes stating how the change will benefit individuals and the organisation.

**System usability and performance:** usability is measured by technical excellence, ease of use and fitting in with work practices and activities of the business and end users (Bevan 1999). Usability also involves the effectiveness of user interface, ease of use and quality of documentation of the information (Elpez & Fink 2006). According to ISO 9126, quality is defined by functionality, reliability, usability, efficiency, maintainability and portability. Usability is defined in ISO/IEC 9126-1 (2000) as "The capability of the software product to be understood, learned, used and be attractive to the user, when used under specified

conditions.” Davis (1989:320) defines usability as “the degree to which a person believes that using a particular system would enhance his or her job performance.”

**User satisfaction:** the extent to which a user gets pleasure when interacting with the system (Seddon & Kiew 1994). The success of IS depends on the level of satisfaction its users experience. Positive feedback means the system is likely to be successful.

**Intention to Use:** this proposed model adopted “Intention to Use” instead of “Use” from the D&M (2003) model since both variables are alternative in the D&M model. According to D&M (2003), system “Use” is more suited to voluntary usage and “Intention to Use” is more suited in a mandatory usage. Since most of Eskom’s systems are mandated by top management, “Intention to Use” was adopted in this study.

**Perceived usefulness:** Perceived usefulness is the positive outcome of using the system. It is measured by the frequency of using the system. If users find the system to be useful and assisting them to perform their tasks, they will perceive it as useful.

**Benefits realisation:** benefits mean different things for different stakeholders (Seddon, Stapples, Patnayakuni & Bowtell 1999). Since the purpose of this study is to develop an IS framework at Eskom, the net benefit of the system would be defined by system responsiveness, performance and usability, the degree to which the system improves the user’s work performance (productivity) and benefits to the organisations.

The updated IS model can be interpreted as follows:

The system will be evaluated in terms of ‘IS department service quality’, ‘information quality’, ‘meeting business requirements’, ‘top management support’ and ‘change management’. These factors jointly or singularly will affect ‘user satisfaction’ of the system and ‘intention to use’ the system. Users will experience system features and functions by using the system. By using the system users will be either satisfied or dissatisfied. Positive user experience will lead to ‘user satisfaction’ and more ‘intention to use’ the system. Satisfaction with the system will lead to ‘system usability and performance’ (e.g. ease of

use, reliability). 'Intention to use" (e.g. frequency of use) will lead to 'perceived usefulness' of the system. As a result of "system usability and performance" and 'perceived usefulness' of the system, certain benefits will be realised.

## **4.8 CONCLUSION**

The objective of this chapter was to analyse and interpret data collected through interviews. Qualitative data gathered through interviews was analysed and the findings were presented. The data analysis was done by conducting thematic analysis. The data analysis followed the following process:

- Identifying categories within the data;
- Establishing themes and subthemes; and
- Reflection by the researcher was included for the researcher to add his own feelings.

The data analysis provided evidence that the preliminary model needed to be extended to reflect views presented by participants. Extension of the preliminary model included adding eight constructs and seven underlying constructs. The proposed model was then updated accordingly and an updated model was presented in Figure 4.1.

The next chapter will summarise and conclude this research study by answering the research questions formulated in Chapter 1. The research questions will be answered based on literature review and analysis of the data. The next Chapter will further provide practical contributions of the study, recommendations, limitations of the study and future research on this topic.

# **CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS**

## **5.1 INTRODUCTION**

The main aim of this research study was to develop a framework for IS success evaluation at Eskom. The development of the IS framework started with a review of literature on existing IS success models. After conducting a literature review, a preliminary IS success model was developed. The data was collected through document analysis and semi-structured interviews with various stakeholders in the organisations. The preliminary IS success model was updated with a new understanding gained from interview findings. This led to an updated IS success model to reflect views expressed during interview processes.

This chapter analyses the findings of the study and explores the answers to the research questions. Furthermore, this chapter presents a summary of the study, interpretation of the updated model and research presentation. Finally, the chapter presents the practical contribution of the study, discusses future research, states recommendations and concluding remarks.

## **5.2 SUMMARY OF THE STUDY**

A new model for evaluating IS success at Eskom was proposed. The model is based on well-established IS evaluation frameworks and ISO quality standards. The models that were reviewed included the DeLone and Mclean (2003) IS model, Wixom and Todd (2005) IS model and other relevant scientific evaluation models (Ballantine, Bonner, Levy, Martin, Munro & Powell 1996; Seddon 1997; Hwang, Windsor & Pryor 2000). The proposed model combines user satisfaction literature, technology acceptance literature and ISO standards of software products. Combining these streams of IS literature results in a comprehensive measurement model for evaluating IS success. Furthermore, the proposed model integrates all missing constructs in these models and results in a unified model that represents a comprehensive measure of IS success. The interviews were conducted with

different IS stakeholders in order to confirm or reject the proposed model. Interview findings resulted in the extension of the proposed model. The proposed IS success model was updated with new understanding gained from the interview process.

### **5.3 DISCUSSION OF THE FINDINGS**

The findings in this research study highlight the importance of using standard frameworks for IS success evaluation. The main objective of information systems is to automate routine processes that would otherwise have been manually performed. Often, these processes are intricately intertwined with dependencies that spread throughout the entire organisation. The main goal of doing IS evaluation is to make decisions based on evaluation feedback so as to make quality improvement. The findings of this study revealed that Eskom is a major investor in IS, thus evidence was provided that an IS success evaluation model is needed to improve the acceptance of IS within Eskom.

The next section discusses evidence that addresses each research question.

### **5.4 ANSWERING THE RESEARCH QUESTIONS**

Information presented in the previous chapters provided evidence that the main research question has been answered. The primary research question has been answered by addressing the secondary research questions. In order to answer the primary research question, this study will first answer the secondary research questions. In answering the secondary research questions this study provides evidence that the objectives of this study, as outlined in Chapter 1, were achieved.

#### **5.4.1 SECONDARY QUESTION 1: WHAT TYPES OF IS SUCCESS MODELS AND THEORIES EXIST?**

Secondary research question one is concerned with existing IS success models used to measure IS effectiveness. Various models found in literature were reviewed. The preliminary model was developed based on the following models: DeLone and McLean's (1992, 2003) IS success models, Wixom and Todd (2005) IS model and relevant scientific evaluation models (Ballantine, Bonner, Levy, Martin, Munro & Powell 1996; Seddon 1997; Hwang, Windsor & Pryor 2000; Thomas 2006).

#### **5.4.2 SECONDARY QUESTION 2: WHICH CONSTRUCTS ARE NEEDED TO DEVELOP A FRAMEWORK FOR IS EVALUATION AT ESKOM?**

Secondary research question two involves IS factors that are needed to develop a comprehensive model of IS success at Eskom. The search for appropriate IS factors started with the literature review. After conducting the literature review, appropriate IS factors to be included in the model were identified. The identified IS factors were then presented to the interviewees for comments, suggestions and improvements. The final list of IS factors was consolidated with factors that emanated from the interview findings.

#### **5.4.3 SECONDARY RESEARCH QUESTION 3: WHAT ARE THE EFFECTS OF THE PROPOSED FRAMEWORK AT ESKOM?**

Secondary research question three concerns the analysis of the effects of the proposed IS model in the organisation. The proposed model was presented to interviewees during the interview process to get feedback on the potential effect of the model. The proposed model was found to be comprehensive as it addressed various facets of IS success including technological, organisational and human factors that influence IS success.

#### **5.4.4 PRIMARY RESEARCH QUESTION: WHAT IS NEEDED TO CONSTRUCT AN EFFECTIVE FRAMEWORK FOR IS EVALUATION AT ESKOM?**

In answering the primary research question, the findings of the secondary research questions as discussed above were combined. The proposed IS success model is presented in answering the main research question. The presentation of the proposed IS success model is an indication that the primary research question (*What is needed to construct an effective framework for IS evaluation at Eskom?*) has been addressed. Furthermore, this is also an indication that the objectives of the study have been accomplished and aims of the study have been met.

## **5.5 RESEARCH PRESENTATION**

This section elaborates on the purpose of each chapter as presented in this dissertation. Chapter 1 introduces the research study by discussing the challenges faced by the organisation with respect to IS evaluation. This research study presents a case that there is a need for a framework for IS evaluation within state owned enterprises in the energy sector. Based on the case presented by the researcher, the research problem and the research questions were formulated. The significance of the study is based on the fact that the study aims to develop a framework for IS evaluation that will assist managers and users within Eskom to quantify their return on investments and improve IS acceptance by users.

The purpose of Chapter 2 is to inform the reader of the theoretical basis of the study. Chapter 2 presents the literature review by reviewing the literature on IS models to show how IS models can benefit Eskom. Reviewing previous literature enabled the researcher to develop a preliminary IS model. The preliminary model was informed by established IS models found in the literature. Chapter 3 presents and justifies the choice of each research methodology and approach adopted for this research study. Chapter 4 presents research results and interpretation. The preliminary IS model was then modified based on new understanding gained from interview processes. Chapter 5 represents the final chapter of this study which concludes the research, discusses of the study's practical contribution, recommendations, limitations and area of future research. The next section discusses practical contributions that are made by this research study.

## 5.6 PRACTICAL CONTRIBUTION

The findings of this study are important on a practical level. On practical level, it is acknowledged that evaluation of IS success is important because of huge investments made in IS and a high failure rate of IS projects. This study established the necessary evaluation tool that can be used to effectively measure IS success. After conducting an extensive literature review on IS success and analysing data from company documents and interviews, a model for IS success evaluation was proposed.

The model of IS success evaluation helps in measuring the effectiveness and success of IS and provides ways of managing IS acceptance in organisations. This study makes a practical contribution by making this IS success model available for use at Eskom. The IS evaluation framework is comprehensive and consists of system and human aspects of IS success resulting in a unified framework for evaluating IS success.

Another practical contribution of the study is the fact that study attempted to define IS success within a state owned enterprise in the energy sector. Most IS success evaluations have been conducted in the private sector. This study made a practical contribution by developing an IS success model that incorporates organisational, technological and human characteristics resulting in a comprehensive model. This study uncovered IS success factors that are aligned to the energy sector, resulting in a unified model for IS success.

Another practical contribution is that managers now have a framework to follow when evaluating IS success. This framework will enable managers to follow a structured, standardised and consistent approach to assess the merit and worth of information systems. The IS framework will serve as a diagnostic tool to help measure IS effectiveness. This will ensure that managers are equipped with relevant information for decision making. Furthermore, the IS framework for evaluation will assist managers to implement robust and responsive IS and be able to evaluate and quantify these IS investments because there is a suitable framework to guide them. The next section presents the recommendations of the study.

## **5.7 RECOMMENDATION**

Based on the findings of this study, the following recommendations are made:

- During the introduction of a new IS, communication and justification of the system purpose is critical. Communication should include impact of the change process and the introduction of IS will benefit users and managers alike.
- This study revealed that system training is an important factor in getting users to accept the IS. Thus, structured training programs should be arranged. In addition, internal and vendor based training should be arranged to promote learning and interaction among various stakeholders. A formal training policy should be formulated to identify training needs.
- Top management support is critical. Since information systems are mandated by management, the commitment of executive management is a significant indicator of IS success. Top management support should be on-going and not be given only during project implementation. Top management can support the IS project by providing both human and financial resources.
- Change management is important to ensure user readiness in terms of embracing the change. The management team needs to raise awareness throughout the organisation or affected business units so that employees are aware of the change and the impact it is going to make.
- Information systems developers should incorporate both system and human characteristics in their design plans.

The next section discusses the limitations of this study.

## **5.8 LIMITATIONS OF THE STUDY**

This study has presented some interesting findings regarding the choice of IS success constructs at Eskom; however, some limitations did emerge. The first limitation encountered was regarding participation. The participation in this research study was voluntary and

participants were not motivated to participate in this study since there were no real benefits to them. Moreover, participants included middle managers, senior managers and executives and finding time in their busy schedule to participate in the study was a challenge. Another limitation was the fact that only Eskom divisions and not subsidiaries participated in this study. However the use of Eskom divisions typifies the whole Eskom, including subsidiaries.

The next section discusses areas of future research.

## **5.9 FUTURE RESEARCH**

This study was conducted within the state owned enterprise in the energy sector. However, there is the potential for research in other contexts. This study can be conducted in other state owned companies, private organisations and federal government. Furthermore, the study can be replicated in other sectors such as retail, freight, IT, customer services and finance to determine if the proposed model would be useful to evaluate IS success in other settings.

A second future research area could also look at comparing the proposed model in this study with previous research to ensure that other IS success factors that should have been included in the model were not excluded.

A third future research area should look at testing the model against the empirics. The model proposed in this study is just a conceptual model and has never been tested against empirics.

A fourth area of future research should look at other IS variables that might influence stakeholders' perception of IS success. This study looked at a limited set of variables that influence IS success. Other variables that future research could focus on might include organisational culture, socio-economic factors, job experience, age, gender, race and occupation.

## **5.10 CONCLUSION**

This chapter reflects on the background of the research by looking at the justification and background of this research study. The research questions and objectives are revisited and interrogated to ascertain if they had been achieved. The contributions made by this study on a practical level are reviewed and presented. Furthermore, the summary of research findings, research presentation, future research areas and recommendations are discussed.

The main goal of this study was to build an IS success model for measuring IS effectiveness to improve business efficiency. The IS success model was built based on well-established IS frameworks found in the literature. The IS success model was later modified to accommodate the views of participants; that resulted in a more comprehensive model of IS evaluation. This study provides evidence that using a standard IS success model can lead to benefits to the organisation. This study has found that an IS success model can improve IS success of IT projects and acceptance of IS by end-users. This study, therefore, built the IS success model which can be used to ensure IS success at Eskom.

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**ADDENDUM A: LIST OF QUESTIONS PER INTERVIEW**

#	Interviewee	Questions
1	Middle Manager: Information Systems	<p>From your own perspective, how would you define information systems success?</p> <p>What are the most significant indicators of IS success?</p> <p>What is the success rate of IS initiatives?</p> <p>Prompt: if success rate is not good or not good, what can we attribute that to?</p> <p>What can be done to improve the success of IS initiatives?</p> <p>What can this success be attributed to?</p> <p>What are the qualities of a good Information Systems?</p> <p>What are the most important Information Systems success factors?</p> <p>Which IS constructs are needed to develop framework for IS evaluation at Eskom?</p> <p>What are the effects of the proposed framework at Eskom?</p>
2	Senior Manager: Enterprise Architecture	<p>From your own perspective, how would you define information systems success?</p> <p>What are the most significant indicators of IS success?</p> <p>What is the success rate of IS initiatives?</p> <p>Why can be attributed to lower rate or higher rate of success?</p> <p>What should we be doing or not be doing to improve the success of IS initiatives?</p> <p>What are the qualities of a good Information System?</p> <p>What are the most important Information Systems success factors?</p>

#	Interviewee	Questions
3	Executive Manager: Information Systems	<p>From your own perspective, how would you define information systems success?</p> <p>What are the most significant indicators of IS success?</p> <p>What are the success rate of IS initiatives?</p> <p>Why can be attributed to lower rate or higher rate of success?</p> <p>What should we be doing or not be doing to improve the success of IS initiatives?</p> <p>What are the most important qualities of a good Information Systems?</p>
4	Senior Manager: Information System Production	<p>From your own perspective, how would you define information systems success?</p> <p>What are the most significant indicators of IS success?</p> <p>What are the success rate of IS initiatives?</p> <p>Why can be attributed to lower rate or higher rate of success?</p> <p>What should we be doing or not be doing to improve the success of IS initiatives?</p> <p>What are the most important qualities of a good Information Systems?</p>

#	Interviewee	Questions
5	Project Manager: Information Systems	<p>From your own perspective, how would you define information systems success?</p> <p>What are the most significant indicators of IS success?</p> <p>What is the success rate of IS initiatives?</p> <p>Prompt: What are the factors that affect project success?</p> <p>What should we be doing or not be doing to improve the success of IS initiatives?</p> <p>What are the most important qualities of a good Information Systems?</p>
6	End user 1	<p>Which applications do you use primarily at work?</p> <p>From you own perspective, how would you define information systems success?</p> <p>What elements of the system do consider most important?</p> <p>If you can change anything about the system what could it be?</p> <p>What should we be doing or not be doing to improve the success of IS initiatives?</p> <p>What are the most important qualities of a good Information Systems?</p>

#	Interviewee	Questions
7	End user 2	<p>Which applications do you use primarily at work?</p> <p>From your own perspective, how would you define information systems success?</p> <p>What elements of the system do consider most important?</p> <p>If you can change anything about the system what could it be?</p> <p>What should we be doing or not be doing to improve the success of IS initiatives?</p> <p>What are the most important qualities of a good Information Systems?</p>
8	User Manager	<p>From your own perspective, how would you define information systems success?</p> <p>What are the most significant indicators of IS success?</p> <p>What are the success rate of IS initiatives?</p> <p>What should we be doing or not be doing to improve the success of IS initiatives?</p> <p>What are the most important qualities of a good Information Systems?</p>

**ADDENDUM B: ETHICS APPROVAL LETTER FROM ESKOM**



ESKOM SOC LTD  
Group IT Division  
Maxwell Drive  
Sunninghill

Date: 18<sup>th</sup> July 2013

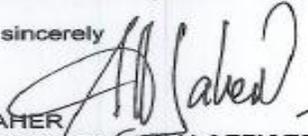
Dear Mr M.E. Ramafalo,

**RE: APPROVAL TO CONDUCT RESEARCH AT ESKOM**

The letter serves to indicate that approval is hereby granted to conduct research study at Eskom. This permission allows you access to the Eskom offices for the activities limited to your research scope.

I would like to wish you the very best in your research and study endeavors.

Yours sincerely

  
S.H. LAHER  
CHIEF INFORMATION OFFICER (CIO)  
GROUP INFORMATION TECHNOLOGY DIVISION  
ESKOM SOC LIMITED

Group IT  
Office of the CIO  
Megivatt Park, Maxwell Drive, Sunninghill Sandton  
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Eskom Holdings SOC Limited Reg No 2002/015627/06

## **ADDENDUM C: INFORMED CONSENT**

**Project Title:** A framework for the evaluation of the information system at Eskom

### **Consent to Participate in a Research Study: A framework for the evaluation of the information system at Eskom**

#### **Dear Participant,**

My name is Emmanuel Ramafalo. I am an Information System Officer at Eskom Finance Company, in the Department of Business Systems and Processes. I am currently enrolled for a Master's Degree in Information Technology at the Vaal University of Technology, Faculty of Applied and Computer Science. As part of the fulfillment of the requirements of the degree, it is compulsory that I conduct a research study. You are therefore asked to participate in this research study.

#### **Purpose of the Research**

Information systems (IS) success has been a very contentious issue for academics and practitioners alike. Many organization rely on IS to achieve their goal and to stay competitive, however a great number of IS failures are still emerging. The purpose of this study is to explore factors that influence IS success and develop appropriate IS evaluation framework at Eskom.

#### **Research Procedures**

This study consists of an interview session that will last for 30 - 45 minutes. Please note that interviews will be recorded by audio tape for the purpose of transcription and data analysis. It is important to answer all questions openly and provide as much information as possible.

#### **Benefits and Risks**

I believe there are no direct benefits to you in participating in my research project. However, the results of this project might help me and Eskom understand more about factors that influence information system success. Although this research study is unlikely to result in a major breakthrough, it could make small contribution to one of the challenges facing Eskom. I believe there is little or no risk to you in participating in this project. If, however, you are uncomfortable or stressed by answering any of the interview questions, we will skip the question, or take a break, or stop the interview, or withdraw from the project altogether.

## Confidentiality

The results of this research may be presented at scientific conferences or specialist publications. Although individual responses are obtained and recorded anonymously and kept in the strictest confidence, aggregate data will be presented representing averages or generalizations about the responses as a whole. No identifiable information will be collected from the participant and no identifiable responses will be presented in the final form of this study. All data will be stored in a secure location accessible only to the researcher and assists researcher. The researcher retains the right to use and publish non-identifiable data. At the end of the study, all records will be destroyed.

## Participation & Withdrawal

Your participation is entirely voluntary. You are free to choose not to participate. Should you choose to participate, you can withdraw at any time without consequences of any kind. However, once your responses have been submitted and anonymously recorded you will not be able to withdraw from the study.

## Questions about the Study

If you have questions or concerns during the time of your participation in this study, or after its completion or you would like to receive a copy of the final aggregate results of this study, please contact:

**Emmanuel Ramafalo**

Researcher

Tel No: 011 800 2979

Cell: 083 330 8467

Email: [ramafaem@eskom.co.za](mailto:ramafaem@eskom.co.za)

**Pieter Conradie**

Supervisor

Vaal University of Technology

Tel No: 016 950 9840

Email: [pieterc@vut.ac.za](mailto:pieterc@vut.ac.za)

## Signature(s) for Consent:

I agree to participate in the research project entitled, "***A framework for the evaluation of the information system at Eskom.***" I understand that I can change my mind about participating in this project, at any time, by notifying the researcher.

**Participants' initials and Surname:** \_\_\_\_\_

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## ADDENDUM D: INTERVIEWS TRANSCRIPTS

Interview transcripts: Participant 1

#	Question Type	Responses
1	Standard Questions	<p>1. From your own perspective, how would you define a successful project?</p> <p><b>Firstly, we need to determine why we need a system. We need a system to meet some form of requirement. So information systems success is about meeting some specific requirements of the business. In Eskom, we heavily rely on systems to achieve our objectives, so a system has to work for you. If it doesn't work for you it is worthless.</b></p> <p>2. What are the most significant indicators of IS success?</p> <p><b>First is the issue of functionality; Does the system meet the business requirements in terms of providing all the features and functions as requested. Secondly is the issue of sustainability; is the application dynamic, can it adapt to change. And lastly is the issue of Benefit Realisation because the business would need to measure the benefits that have been realised from implementing the system.</b></p> <p>3. What is the success rate of IS initiatives?</p> <p><b>As far as possible Eskom does not develop systems. We normally use application from outside vendors and have them customised to suit our business. Because of that you will find that IS adoption is smooth due to our strict requirements. So overall the success of our initiatives is pretty good.</b></p> <p>Prompt: if success rate is not good:</p> <p>4. What can be done to improve the success of IS initiatives?</p> <p>Prompt: if success rate is good:</p> <p>a. What can this success be attributed to?</p> <p><b>This can be attributed to strict requirements that we put in place. System implementation is monitored from start to finish to ensure that project is completed on time and within budget.</b></p>

		<p>5. What are the qualities of a good Information Systems?</p> <p><b>The system should improve business processes and the improvement should be measurable and quantifiable. The primary objective information system is to automate business processes that are performed manually. In essence a system should not be adopted unless it results in improvement in business operations.</b></p> <p>6. What are the most important Information Systems success factors?</p> <p><b>Systems success needs to be assessed from two levels, at a technical level as well as at user level. Technical level look at system related factor of success which include scalability, system performance, and dynamic to handle changes. User related factors include the whole user experience such as ease of use, intuitive and user-friendliness. Having said that, I would say the most important factor in information system is benefit realisation.</b></p>
2	Preliminary IS success model was presented	<p>Preliminary IS success model in Figure 2.18 was presented and suggestion on improvement of the model was sought.</p> <p><b>The interviewee mentioned the importance of adhering to procedure, standard and best practices at Eskom, therefore a model for IS success should include this elements to be considered complete.</b></p>
3	General Comments and suggestions	<p>Interviewees were asked for suggestions, recommendations or general comments.</p> <p><b>The model looks good and is something that is needed in Eskom.</b></p>

Interview Transcripts: Participant 2

#	Question Type	Responses
1	Standard Questions	<p>1. From your own perspective, how would you define information systems success?</p> <p><b>Information system is about the automation of business processes to save time and optimise costs. The success of the system depends on three factors, technology, people and the environment.</b></p> <p>2. What are the most significant indicators of IS success?</p> <p><b>The key indicators of Information Systems success in the context of Eskom are benefit realisation and cutting of costs.</b></p> <p>3. What are the success rate of IS initiatives?</p> <p><b>Success rate is generally low due.</b></p> <p>Why can be attributed to lower rate or higher rate of success?</p> <p><b>The low success of IS initiatives is largely due to scope and lack of dedication in IS project. Scope creep occurs due to constantly business requirements.</b></p> <p>4. What should we be doing or not be doing to improve the success of IS initiatives?</p> <p><b>Business ownership of the IS project needs to be improved. The issue is the measuring of benefits. Business benefits needs to be measured not after IS project has been completed. Benefits should be measured at each stage and milestones that are achieved during the cause of the project.</b></p> <p>5. What are the qualities of a good Information System?</p> <p><b>To achieve information systems success three issues need to be looked at. First, People issues; this entails the issue of change management, getting buy-in from everyone is going to affect by the change. Secondly, it he issue of technology; technology involves the capabilities provided by the currently technology infrastructure of the</b></p>

		<p>organisation. Technology also involves the business processes. The business processes need to be efficient so that they can be easily understood and translated into functional specification. Lastly, it is the issue related to the organisation itself. An organisation should create conducive environment where the needs of the people are aligned technology in order to facilitate IS implementation.</p> <p>6. What are the most important Information Systems success factors?</p> <p><b>Benefits realisation is the most important factors. Huge Investment in information technology is made in order to derive some benefits, be it process, financial or technical benefits. If benefit cannot be realised then the system will be considered a failure.</b></p>
2	Preliminary IS success model was presented	<p>Preliminary IS success model in Figure 2.18 was presented and suggestion on improvement of the model was sought.</p> <p><b>The IS success framework is good but maybe you adapt to the Togef framework. Eskom has adopted certain standards and best practices to manage and control its operations e.g. Cobit, ITIL, so adherence to these standards is non-negotiable. New technologies should easily fit into existing IT infrastructure and adhere to certain standards and best practices adopted by Eskom.</b></p>
3	General Comments and suggestions	<p>Interviewees were asked for suggestions, recommendations or general comments.</p> <p><b>Management team needs to in courage user participation in IS project. Participation by users brings excitement and social interaction thereby increasing the chances of system acceptance and success. New technologies should easily fit into existing IT infrastructure and adhere to standards.</b></p>

Interview Transcripts: Participant 3

#	Question Type	Responses
1	Standard Questions	<p>1. From your own perspective, how would you define information systems success?</p> <p><b>An information system is based on meeting specific business requirement as requested by business.</b></p> <p>2. What are the most significant indicators of IS success?</p> <p><b>The key indicators of Information Systems success are realisation of benefits both system benefits and user benefits.</b></p> <p>3. What are the success rate of IS initiatives?</p> <p><b>Success rate in Eskom is improving compared to previous years. Systems are now designed with users' needs in mind so that it can be easy to use and provide all the required functionalities. It is important for the leadership team to share their IT vision with staff so that everyone can see the impact of IT in the organisation.</b></p> <p>4. Why can be attributed to lower rate or higher rate of success?</p> <p><b>The improved rate of success can be attributed to three customer centricity. IT people are perceived people who sit in dark corners, developing solutions and handing them to users without their involvement. Now, with this approach customers are engaged in every step of the design process. As a result our user satisfaction level increased from 84% to 97% because we moved from IT centric solution to customer centric solution.</b></p> <p>5. What should we be doing or not be doing to improve the success of IS initiatives?</p>

		<p>Having employee engagement model. Engagement of employee is critical. The other issue is the “promise deliver”, when we promise customer to deliver a product by a certain date and time, we make sure that that happens. The final issue is the service level agreement. Having service level agreement improved the quality of services a great, because there is a formal agreement between service provider and receiver of services.</p> <p>6. What are the most important qualities of good Information Systems?</p> <p><b>Change management and system training the two important qualities of IS. The other factors are stakeholder and sponsorship management. Senior management support is also critical. Senior management can show support by providing funding and resources.</b></p>
2	Preliminary IS success model was presented	<p>Preliminary IS success model in Figure 2.18 was presented and suggestion on improvement of the model was sought.</p> <p><b>Expectations of company stakeholders may directly impact on system success. So the management of stakeholder and sponsor is important in order to manage their expectations of system success.</b></p>
3	General Comments and suggestions	<p>Interviewees were asked for suggestions, recommendations or general comments.</p> <p><b>Once the system is operation and has been accepted as way of working the organisation, it important to perform post system support and service. Survey should also be conducted at certain intervals to measure if the system still delivers benefits and to measure satisfaction levels.</b></p>

Interview Transcripts: Participant 4

#	Question Type	Responses
1	Standard Questions	<p>1. From your own perspective, how would you define information systems success?</p> <p><b>Information system success means developing a system according to a business case and adoption of that system.</b></p> <p>2. What are the most significant indicators of IS success?</p> <p><b>Cost cutting is a major indicator especially at this moment since Eskom is in a cost saving mode. Any IS initiative that could result in cost saving will be a major success.</b></p> <p>3. What are the success rate of IS initiatives?</p> <p><b>Success of IS has improved a lot since the new CIO came on board.</b></p> <p>4. Why can be attributed to lower rate or higher rate of success?</p> <p><b>The new CIO has made a great difference since coming on board. The key thing that happened was re-engineering of processes. Our processes are now efficient across the enterprise. Also because of a number of initiatives that were launched in the last couple of months.</b></p> <p>5. What should we be doing or not be doing to improve the success of IS initiatives?</p> <p><b>Transparent and quality reporting is important for Eskom, so a system should be able to produce a high level of reporting. We need to develop a system that empowers users. Users need to have tools such as reporting tools. Eskom is obliged to share information with various stakeholders including the government, lenders, rating agencies, analysts, investors, industryexperts, media, suppliers and contractors. So the quality of reporting should be beyond reproach.</b></p>

		<p>6. What are the most important qualities of good Information Systems?</p> <p><b>A system that should focus on system aspects and people aspects of IS. A modern system should empower its users so that it can work for them.</b></p>
2	Preliminary IS success model was presented	<p>Preliminary IS success model in Figure 2.18 was presented and suggestion on improvement of the model was sought.</p> <p><b>IS governance would be a good addition to the model, this include disaster recovery, system vulnerability and back up.</b></p>
3	General Comments and suggestions	<p>Interviewees were asked for suggestions, recommendations or general comments.</p> <p><b>Users are now intrigued by mobile application. M-applications are flexible in terms of accessing system anywhere, anytime. One of our values includes innovation and innovation is more visible in information technology as way a way of developing new ways of working. Eskom is currently exploring mobile technologies space to see how it can improve its interaction with customers.</b></p>

Interview Transcripts: Participant 5

#	Question Type	Responses
1	Standard Questions	<p>1. From your own perspective, how would you define information systems success?</p> <p><b>From project management perspective, Information systems success is defined by IS project completed within budget, within allocated time and with business requirements as specified.</b></p> <p>2. What are the most significant indicators of IS success?</p> <p><b>Benefit realisation. Information systems can be over budget or run over time but if it does not result in any benefits then it's a total failure.</b></p> <p>3. What are the success rate of IS initiatives?</p> <p><b>Success rate in Eskom is improving compared to previous years.</b></p> <p>Prompt: What are the factors that affect project success?</p> <p><b>Poor business plan and unrealistic expectations. Eskom procurement processes also have impact. It takes long to procure resources such as hardware or software as everything that we buy should follow procurement process. Another factor is loss of key skills. IT project management skills are scarce, so when project managers leave the organisation, we find it difficult to replace them on time as a result the project success is impacted.</b></p> <p>4. What should we be doing or not be doing to improve the success of IS initiatives?</p> <p><b>Information system projects need to be prioritised so we can identify critical systems. Enough resources need to be assigned to a project to avoid overburdening resources.</b></p>

		<p>5. What are the most important qualities of good Information Systems?</p> <p><b>A good system will result in considerable financial benefits and mitigation of risk to the business. Meeting business requirements and benefit realisation are the most important qualities. Meeting Business requirements involves producing features and function as requested by the business. Benefit realisation involves ensuring that the introduction of the system leads to strategic, financial and operational benefits.</b></p>
2	Preliminary IS success model was presented	<p>Preliminary IS success model in Figure 2.18 was presented and suggestion on improvement of the model was sought.</p> <p><b>You just need to show in that model that at the end of the benefits are going to be realised after implementing a system.</b></p>
3	General Comments and suggestions	<p>Interviewees were asked for suggestions, recommendations or general comments.</p> <p><b>The participation of people in information systems project is important as this will ensure the approval of the solution or systems. This will also facilitate the signing off business requirements and change requests because people will be aware of the change.</b></p>

Interview Transcripts: Participant 6

#	Question Type	Responses
1	Standard Questions	<p>1. Which applications do you use primarily at work?</p> <p><b>Hyperwave, SAP, Email system and normal Microsoft applications like MS word and Excel.</b></p> <p>2. How would you define an effective system?</p> <p><b>One that enables me to perform my work with ease and without hassle. An effective system should be available during critical business hours especially during month end when most people do most of processing. Ultimately a good system should help improve my job performance.</b></p> <p>3. What elements of the system do consider most important</p> <p><b>System availability; there is nothing as frustrating as a system that goes offline during critical business hours. Also the system should be usable, secure and produce accurate reporting.</b></p> <p>4. If you can change anything about the system what could it be</p> <p><b>I will spend much effort improving the response time. Most systems are slow especially during the last week of the month when everyone is logged on and trying to complete their monthly tasks. System availability is also critical in the energy sector as unavailability could affect transmission of powers which could result in interrupted supply or even load shedding.</b></p> <p>5. What should we be doing or not be doing to improve the success of IS initiatives?</p> <p><b>User participation is important. System development team should include members of user community. User participation in the system</b></p>

		<p>development team will surely improve user buy-in in the new system and users will also feel valued by been included in the project. This will ultimately improve the success of system implementation.</p> <p>6. What are the most important qualities of good Information Systems?</p> <p><b>Having desired look and feel and also the requested features and function. Also the system should be user-friendly.</b></p>
2	Preliminary IS success model was presented	<p>Preliminary IS success model in Figure 2.18 was presented and suggestion on improvement of the model was sought.</p> <p><b>No suggestion, the model looks good.</b></p>
3	General Comments and suggestions	<p>Interviewees were asked for suggestions, recommendations or general comments.</p> <p><b>No comments</b></p>

Interview Transcripts: Participant 7

#	Question Type	Responses
1	Standard Questions	<p>1. Which applications do you use primarily at work?  <b>Hyperwave, loan system, phoenix and normal Microsoft applications.</b></p> <p>2. How would you define an effective system?  <b>For me the way an application is designed, its look and feel, features and ease of use are key issues that need to be addressed for system to considered successful</b></p> <p>3. What elements of the system do consider most important?  <b>The usability of the system. A good system will let users perform their task with ease and minimal effort and that's the ultimate aim of the system; to let users perform their tasks.</b></p> <p>4. If you can change anything about the system what could it be?  <b>The response time. The systems are general slow therefore affecting its performance and our work.</b></p> <p>5. What should we be doing or not be doing to improve the success of IS initiatives?  <b>It is important to have training session whether in-house or vendor based in order to familiarize you with the system.</b></p> <p>6. What are the most important qualities of good Information Systems?  <b>A system is used by users, so meeting the needs of users is important because success of information systems is what its users perceived it to be.</b></p>

2	Preliminary IS success model was presented	<p>Preliminary IS success model in Figure 2.18 was presented and suggestion on improvement of the model was sought.</p> <p><b>System performance is an issue for me. This model should include some performance element.</b></p>
3	General comments and suggestions	<p>Interviewees were asked for suggestions, recommendations or general comments.</p> <p><b>Users' attitude can also hamper system success especially in an organisation like Eskom where you have people who have been in the organisation for a long long time and are afraid of change.</b></p>

Interview Transcripts: Participant 8

#	Question Type	Responses
1	Standard Questions	<p>1. From your own perspective, how would you define information systems success?</p> <p><b>IS success is about automating manual processes to enable users to perform their tasks efficiently and effectively. An effective system should improve employee job performance.</b></p> <p>2. What are the most significant indicators of IS success?</p> <p><b>System success is all about having all the requested functions and features that enable users to perform their tasks.</b></p> <p>3. What is the success rate of IS initiatives?</p> <p><b>The rate of success is generally good. Since all systems in Eskom are mandated by management, effort is made to ensure everyone attends training and familiar with the proposed system before it is implemented.</b></p> <p>4. What should we be doing or not be doing to improve the success of IS initiatives?</p> <p><b>Communication of the change and how the change is going to benefit individuals and the organization as a whole. Also providing sufficient system training whether in-house or vendor based training. Training will enhance user's knowledge of the system making it easier for users to accept the system as a new way of performing their tasks. Also Management team needs to encourage user participation in IS project. Participation by users brings excitement and social interaction thereby increasing the chances of system acceptance and success.</b></p> <p>5. What are the most important qualities of good Information Systems?</p> <p><b>System availability is one important quality as well as response time and having all the features.</b></p>

2	Preliminary IS success model was presented	<p>Preliminary IS success model in Figure 2.18 was presented and suggestion on improvement of the model was sought.</p> <p><b>The framework looks good, no need to make major changes</b></p>
3	General Comments and suggestions	<p>Interviewees were asked for suggestions, recommendations or general comments.</p> <p><b>People should be encouraged to participate in IT initiatives so they can offer ideas and innovation. At the end of the day, humans make this happen, technology let this happen.</b></p>

## ADDENDUM E: ADMINISTRATION - TURNITIN REPORT

Turnitin Originality Report

Emmanuel Dissertation by Pieter Conradie

From Dissertation Emmanuel (Research)



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## ADDENDUM F: ADMINISTRATION - LETTER OF LANGUAGE EDITING



Vaal University of Technology

### MEMORANDUM

TO WHOM IT MAY CONCERN

FROM: CS van Wyk

SUBJECT: Language Editing

DATE: 20 January 2014

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The following dissertation was received and language edited on the above date:

Candidate : E Ramafalo  
Student number : 9925619  
Qualification : MTech ICT  
Title : A Framework for the evaluation of the Information System at ESKOM

A handwritten signature in black ink, appearing to read 'CS van Wyk'.

CS van Wyk  
016 950 6644  
083 264 3185